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Driving And Dementia: A Physician's Perspective

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DRIVING AND DEMENTIA: A PHYSICIAN'S PERSPECTIVE

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Life is a process of becoming; a combination of states we have to go through. Where people fail is that they wish to elect a state and remain in it.

~ Anais Nin

In October 1998, Mr. Alvin Gutkowski, a seventy-five-year-old resident of Oconomowoc, Wisconsin, was involved in a fatal car accident. Married for fifty-four years, Mr. Gutkowski's wife had long depended on him to provide transportation for them both. Beginning in 1995, Mr. Gutkowski was involved in a series of motor vehicle accidents, including a two-vehicle accident in Waukesha (May 1995) in which the other driver was cited for failure to yield right-of-way; a collision with another car on the interstate (February 1996) in which neither driver was cited; an incident (October 1996) in which police reported that Mr. Gutkowski failed to control his car and knocked over seven mailboxes, though no other vehicles were involved; and another collision (November 1996) in which Mr. Gutkowski was cited for failure to yield right-of-way, causing injury to the other driver. In April of 1998, he was ticketed for speeding.

James Race, police chief in the town of Summit where the mailbox incident occurred, said that, in 1996, he requested that Mr. Gutkowski be retested by the Division of Motor Vehicles (DMV), in part because Mrs. Gutkowski made a statement indicating that she did not believe her husband should be driving. No re-examination was ever performed. In December 1996, despite the fact that he had been involved in four accidents, Mr. Gutkowski passed the vision screening and

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received a renewed license valid for an additional four years. State DMV officials claimed they had no record of Race's request.

On October 31, 1998, a disoriented Mr. Gutkowski drove west in the eastbound lanes of Wisconsin Interstate 94 for at least three miles prior to the head-on collision that resulted in his death and the death of the college student driving the other vehicle. After the accident, Mrs. Gutkowski stated that she believed her husband was showing signs of memory loss, which she speculated might have been the early stages of Alzheimer's Disease (A.D.).[1]

DRIVING DEMOGRAPHY

The tragedy described above could have been prevented if Mr. Gutkowski had been told he had to stop driving after his previous accidents. The number of elderly drivers—and within that segment, the number of drivers who suffer from some form of memory impairment—is rapidly increasing. Unfortunately, this means that there will be more drivers on the roads in coming years who pose a threat to the safety of others.

Considering the driving population as a whole, drivers age sixteen to nineteen have the highest accident risk.[2] Their risk, measured in motor vehicle accidents per million vehicle miles traveled (MVA/MVMT), is 28.6.[3] For drivers age forty to forty-five, the rate drops to 3.7.[4] For drivers age eighty to eighty-five, the rate is 15.1 MVA/MVMT, but for drivers over the age of eighty-five, the rate increases to 38.8.[5] Elderly drivers also drive fewer miles than younger drivers.[6] However, not all elderly drivers pose a threat, as indicated by the lower accident risk assigned to those age eighty to eighty-five compared to those age sixteen to nineteen. Ability will even fluctuate among seniors suffering from some form of memory loss; those in the

1. *See* Linda Spice & Colleen Krantz, *Driver in crash had 4 others since '95*, MILWAUKEE JOURNAL SENTINEL, Nov. 15, 1998, *available at* http://www.jsonline.com/news/nov98/1105driver.asp (last visited Oct. 28, 2004).

2. *See Alzheimer's Disease and Driving* (Jan., 2003), *at* http://www.readyhands.com/Alzheimers%20and%20Driving.htm (last visited Oct. 28, 2004).

3. *See id.*

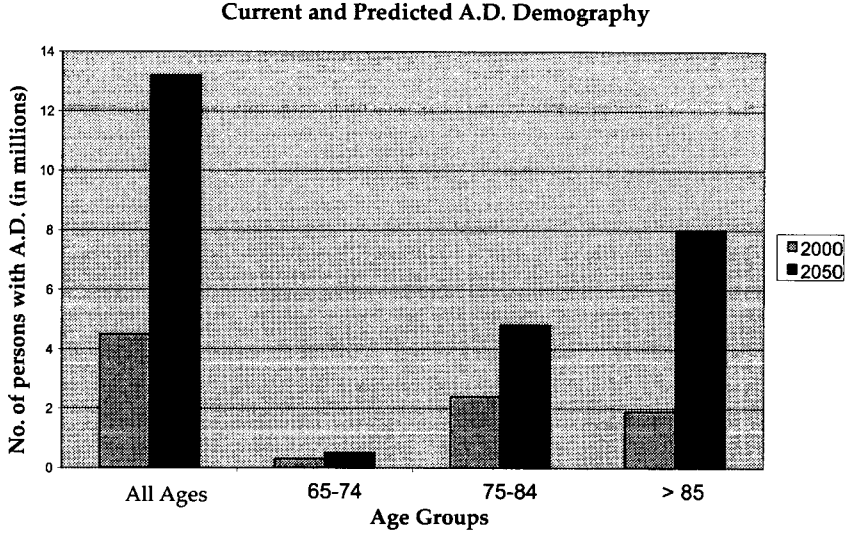
4. *See id.*

5. *See id.*

6. *See id.*

earliest stages of a neurodegenerative disease may still be able to drive safely.

In light of other medical advances, life expectancy has increased; however, this means that the number of people who will suffer from a range of age-related dementias in coming years will likely increase as well. In 2000, there were 4.5 million Americans of all ages who had been diagnosed with Alzheimer's Disease.[7] Currently, 10% of those over age sixty-five have been diagnosed with A.D.; that figure increases to 50% for those over age eighty-five.[8] By 2050, the number of people diagnosed with A.D. is expected to increase to 13.2 million.[9] This increase signifies a growing need to address the issue of driving by Alzheimer's patients.



GOVERNMENT AGENCIES AND DRIVING CESSATION

The Wisconsin Department of Motor Vehicles (DMV), as with many other states' driving agencies, will not re-examine a person

7. *See* L.E. Herbert et al., *Alzheimer's Disease in the U.S. Population: Prevalence Estimates Using the 2000 Census*, 60 ARCHIVES OF NEUROLOGY 1119, 1121 (2003).

8. *See Alzheimer's Disease Statistics*, Alzheimer's Ass'n, (Jan., 2003), *at* http://www.alz.org/resources/FactSheets/FSAlzheimerStats.pdf (last visited Oct. 28 2004).

9. *See* Herbert et al., *supra* note 7.

on the basis of either age or diagnosis alone due to discrimination concerns. Any attempt to legislate standard operating procedures for elderly license renewals—similar to the teenage graduated licensing program recently passed in many states, including Wisconsin—would be opposed by elder advocacy groups, such as the American Association of Retired Persons (AARP). This is not to say that legislators should institute mandatory re-examinations for every driver over the age of sixty-five; however, in the absence of any such across-the-board measure, the responsibility to see that drivers who pose a threat to safety are kept off the road falls inevitably to the elderly person's family and physician. Because the family's observations of a person's driving ability may not always be reliable and because the physician is not in a position to observe the person's driving directly, an easy, time-efficient test is needed to determine a person's ability to drive.

To be effective, the test must be standardized and should be widely used by all physicians caring for elderly patients who may be at risk; it should not be limited to use by specialists. If such a test could be implemented as a standard of geriatric care, its efficacy would be determined by the patient's (or the patient's family's) response to the results. If a physician recommends driving cessation, the recommendation should be followed; if the patient or her or his family do not respond to the recommendation, involvement of a state agency may become necessary to ensure the patient's and others' safety.

Regardless of who was negligent in the above case, Mr. Gutkowski was not re-examined before his license was renewed. Had this precaution been taken, it is possible that he would not have obtained his license renewal in December 1996. Behind-the-wheel re-examinations are not standard procedure for license renewals; they are performed only upon the request of the police, a physician, a family member, or other person who knows the driver.[10] Beverly Larson, director of driver services for the Wisconsin DMV, stated in 1998 that of the 2,500 requests of this nature received annually, only 500 resulted in a re-examination of driving ability.[11]

State officials and elder advocates hope that seniors will

10. *See Medically Impaired Drivers*, Wis. Dep't of Transp. (May 18, 2004), *at* http://www.dot.wisconsin.gov/drivers/drivers/aging/impaired.htm (last visited Oct. 28, 2004).

11. *See* Spice & Krantz, *supra* note 1.

recognize when they are incapable of continuing to drive and will then voluntarily agree to stop driving. There are many instances in which seniors stop driving of their own volition; however, there are also many instances in which seniors continue to drive, despite being told by family and friends that they should not drive. Often in these cases, the senior feels that driving cessation signifies a loss of independence; he fears that limitations will be placed upon him because he will not be able to decide when and where he would like to go.

When met with opposition, family and friends may not know where to turn for help in convincing their loved one to stop driving. Sometimes they are unaware that a report can be made to the state DMV; in other cases, they may not want to make such a report, fearing the reaction of their loved one. Although Wisconsin has an open records law, the DMV will allow anonymous reports under some circumstances.[12]

In the absence of a re-examination request, the only requirement for license renewal in Wisconsin is a vision screening[13] and a fee of twenty-four dollars.[14] Beginning in 1998, licensing procedures underwent a revision; all renewals are now good for eight years, based upon passing a vision screening alone.[15]

Laws regarding licensing differ from state to state, and some states have provisions addressing a diagnosis of Alzheimer's Disease. For instance, California law requires that physicians report any A.D. diagnosis to the DMV; after such a report, drivers are often called in for a driving test.[16] Altogether, twenty states now allow such reports.[17] However, while these states may "allow" such reports, the fact remains that fewer than half of the states in the United States have additional renewal

12. *See Medically Impaired Drivers*, *supra* note 10.

13. *See Driver License Renewal,* Wis. Dep't of Transp., *at* http://www.dot.wisconsin.gov/drivers/drivers/renew/license-renewal.htm (last modified Oct. 14, 2004).

14. *Driver License Fees,* Wis. Dep't of Transp., *at* http://www.dot.wisconsin.gov/drivers/drivers/driver-fees.htm (last modified Oct. 14, 2004).

15. *See 4-Year Driver License Extension*, Wis. Dep't of Transp. (May 18, 2004), *at* http://www.dot.wisconsin.gov/drivers/drivers/renew/dlextend.htm (last modified Oct. 14, 2004).

16. *See* Steven Reinberg, *Tests Tell When Alzheimer's Patients Should Stop Driving,* HEALTHDAY REPORTER, *at* http://www.healthfinder.gov/news/newsstory.asp?docID=517080 (last visited Oct. 19, 2004).

17. *See id.*

requirements for older drivers beyond the renewal requirements for the general population despite the higher percentage of elderly drivers who are involved in accidents and who may be afflicted with a form of dementia.[18]

Other countries' guidelines differ more dramatically. For example, "[p]hysicians in Ontario, Canada, have a legal obligation to report all patients with medical conditions that may impede driving ability to the Medical Review Section of the Ministry of Transportation."[19] In England, any driver diagnosed with dementia is required by law to inform the Driver and Vehicle Licensing Authority of the diagnosis.[20] Failure to do so can result in a fine of up to £1,000.[21] If the patient wishes to continue driving, he may be issued a renewed license—valid for one year only—upon completion of a medical investigation.[22]

Clearly, in the absence of similar legislation addressing this issue in the United States, the responsibility to keep dangerous drivers off the road lies largely with those drivers' families. When family members who perceive a threat fail to convince their loved one that she must stop driving, they often turn to the physician for advice. Family members request evaluations to determine the elderly person's driving ability. Each case must be treated individually. Some elderly persons independently decide to stop driving; some will stop driving upon being told by the physician that they should do so; others refuse to stop driving until presented with test results; and still others deny any impairment no matter what they are told and, ultimately, the only solution is license revocation. In the latter cases particularly, there arises the need for a reliable test that will also be recognized by government agencies.

DANGERS OF DRIVING WITH ALZHEIMER'S DISEASE

A.D. patients are at a significantly higher risk of having motor

18. *See* Robert Imrie, *State has no special rules for older drivers' licenses*, MILWAUKEE JOURNAL SENTINEL, October 12, 2003 at 35A.

19. *Alzheimer's Disease and Driving*, RGAP (Reg'l Geriatric Assessment Program of Ottawa-Carleton, Ont., Can.) 2001, *at* http://rgapottawa.com/dementia/english/issues_concerns.asp (last visited Oct. 19, 2004).

20. *See After the Diagnosis: Driving and Dementia*, Alzheimer's Society Advice Sheet, *at* http://www.alzheimers.org.uk/After_diagnosis/Driving_and_travelling/info_driving.htm (last visited Sept. 2004).

21. *See id.*

22. *See id.*

vehicle accidents than others of similar age.[23] According to a Swedish study conducted by Johansson et al., 33% of a sample of drivers killed in traffic accidents had neuritic plaque scores indicating the presence of A.D., while an additional 20% had scores suggestive of the possible presence of A.D.[24] Another study conducted in the United States compared thirty drivers diagnosed with A.D. to twenty healthy drivers of the same age; evaluation over five years found that the A.D. subjects were involved in five times as many crashes as their healthy counterparts.[25]

Just as teenage drivers face the challenges of inexperience and occasional lapses of judgment, elderly drivers face their own set of challenges on the road. These, according to the Wisconsin DMV, include impaired peripheral vision, depth perception, night vision, visual clarity, ability to hear high frequency sounds, mobility, and reaction time.[26] There are the additional concerns about medications and the fact that driving laws may have changed since some elderly were originally licensed.[27] According to the Assessment of Driving-Related Skills (ADReS), three key functions—vision, cognition, and motor function—are necessary for safe driving.[28] The list of concerns provided by the Wisconsin DMV fall primarily into the vision and motor function categories of ADReS. While these challenges may seem like enough to contend with, the situation is compounded for those with A.D. or other age-related dementias as these diseases can cause cognitive impairment. The cognitive skills required for driving include memory, visual perception, visual processing, visuospatial skills, selected and divided attention, and executive (or decision-making) skills.[29]

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23. *See* NANCY L. MACE & PETER V. RABINS, THE 36 HOUR DAY: A FAMILY GUIDE TO CARING FOR PERSONS WITH ALZHEIMER'S DISEASE, RELATED DEMENTING ILLNESSES, AND MEMORY LOSS LATER IN LIFE 23 (John Hopkins Univ. Press 3d ed. 1999).

24. *See* K. Johansson et al., *Alzheimer's disease and apoliprotein E €4 allele in older drivers who died in automobile accidents*, 349 LANCET 1143, 1144 (1997).

25. *See* Reinberg, *supra* note 16.

26. *See Mature Drivers*, Wis. Dep't of Transp., *at* http://www.dot.wisconsin.gov/drivers/drivers/aging/mature.htm (last modified May 27, 2004).

27. *See id.*

28. *See generally* Wang, et al., PHYSICIAN'S GUIDE TO ASSESSING AND COUNSELING OLDER DRIVERS (Am. Med. Ass'n 2003), *available at* http://www.nhtsa.dot.gov/people/injury/olddrive/OlderDriversBook/ (last visited Oct. 19, 2004).

29. *See id.*

In order to drive, one must have both crystallized and working memory. Crystallized memory can be defined as the ability to remember concrete information; applied to driving, this can include the ability to remember how to operate a car, the meanings attached to traffic signals and road signs, and directions to a specific location.[30] Working memory, on the other hand, is the ability to "retain some information while simultaneously processing other information."[31] Working memory is more likely to decline with age than crystallized memory.[32] Distractions while driving make it necessary for the driver to determine what is important and what is not, for instance, prioritizing a traffic signal or stop sign rather than a road-side advertisement.[33] This is referred to as selective attention.[34] Divided attention is the ability to focus on more than one task at a time, for instance, regulating the speed and direction of the car, watching the road ahead, remembering to turn at the next corner, and executing the steps to complete the turn, including using the directional. Both selective and divided attention skills can decline with age.[35] Finally, executive, or decision-making, skills are critical because they allow a driver to decide to "stop at a red light, or stop at a green light if a pedestrian is in the path of the vehicle."[36] This ability to logically analyze a situation can also decline with age.[37] Overall, the American Medical Association (AMA) reports that "[t]he crash rate for older drivers is related to physical and mental changes associated with aging."[38]

The ADReS, recommended for use by the AMA, is a comprehensive measure of vision, cognition, and mobility as these skills are related to driving. The full assessment includes a

30. *See* P.L. Colsher & R.B. Wallace, *Geriatric assessment and driver functioning*, 9-2 CLINICS IN GERIATRIC MEDICINE 389 (1993).

31. *See* Wang et al., *supra* note 28.

32. *See* J.D.E. Gabrieli et al., *Memory*, *in* TEXTBOOK OF CLINICAL NEUROLOGY 56 (C.G. Goetz et al. eds., 1999) *available (with a username and password) at* http://www.mdconsult.com (last visited January 2003).

33. *See* Wang et al., *supra* note 28.

34. *See id.*

35. *See generally* A.A. Hartley, *Attention*, THE HANDBOOK OF AGING AND COGNITION 3-50 (F.I.M. Craik et al. eds., 1992).

36. *See* Wang et al., *supra* note 28.

37. *See* G.D. Cohen, *Aging and Mental Health*, MERCK MANUAL OF GERIATRICS 2000, *available at* http://www.merck.com/mrkshared/mm_geriatrics/sec4/ch32.jsp (last visited Oct. 19, 2004).

38. *See* Wang et al., *supra* note 28.

vision examination using the Snellen E Chart and a test of the visual fields by confrontation, in which visual field deficits are detected based on correct identification of the number of fingers held up by the examiner in each of four visual quadrants. Cognition is measured through two tests: the Trail-Making Test (Part B only) and the Clock Drawing Test, Freund Clock Scoring for Driving Competency. Finally, to assess motor function, the patient is asked to complete a rapid pace walk, a manual test of range of motion, and a manual test of motor strength.

The ADReS, then, appears to address the concern that the DMV does not require a re-examination on the basis of either age or diagnosis; after all, physicians have a way of comprehensively determining whether or not an elderly patient should continue driving. If the physician determines, based on ADReS results, that the patient should not be driving, the physician can make a report to the DMV requesting either a re-examination or driving cessation for the patient. However, it is not feasible for general practitioners to administer the ADReS in its complete form to each of their elderly patients; the process is too time consuming to be used as a general screening device to identify drivers who may pose a threat. A more simple and faster test is needed to identify potentially hazardous drivers who can then be referred for a more comprehensive evaluation if necessary. Such a test is important because, as the AMA reports, "[p]hysicians can influence their patients' decision to modify or retire from driving. They can also help their patients maintain safe driving skills."[39] Additionally, state agencies should reach a consensus so that physicians can uniformly report potential hazards based on one simple test and can expect that swift action will be taken.

MEDICAL DIAGNOSES AND RECOMMENDATIONS

Although many forms of dementia exist, the most common diagnoses include Mild Cognitive Impairment (MCI), A.D., and Vascular Dementia (VaD). A patient with MCI will often decline to A.D. A.D. accounts for 65% of all dementias and VaD accounts for 10-15%. The remaining 20% of diagnoses of dementias include frontotemporal dementias, dementia related

39. *See* David F. Preusser et al., *Fatal Crash Risk for Older Drivers at Intersections*, *in* 30-2 ACCIDENT ANALYSIS AND PREVENTION 151 (Elsevier Science, Ltd., 1998).

to Parkinson's Disease, and others.[40] A.D. is a neurodegenerative disorder caused by the death of brain cells; two abnormal structures, amyloid plaques and neurofibrillary tangles, are associated with A.D. A prominent clinical feature of both A.D. and VaD, as well as other dementias, is a lack of Executive Control Function (ECF) as defined above in reference to executive skills.[41]

Clinically, when physicians are asked to evaluate a patient's ability to drive, they are far more likely to use a test called the Folstein Mini-Mental State Examination (MMSE) than the more comprehensive ADReS.[42] The MMSE, however, is primarily a memory test, not a test of executive skills. Questions asked of the patient range from orientation questions, such as the current year, season, and date, including day and month; to recall questions in which the examiner will name three common everyday objects and later ask the patient to recite them; to action questions requiring the patient to read directions and carry out a request, for example "close your eyes."[43]

In a more recent study of executive function, Royall et al. demonstrated a strong correlation between executive function and the ability to draw a clock set to a specific time.[44] In this study, the control with a MMSE score of 29 scored a 15 on the Clock Drawing Test (the MMSE score ranges from 0 to 30 and the CLOX test ranges from 0 to 15, with a high score indicating competence), while a VaD patient with a MMSE score of 28 scored only a 4 on the Clock Drawing Test. This study shows that the VaD patient, though he or she was capable of attaining a high MMSE score, lacked the ECF to score well on the Clock DrawingTest.[45]

40. *See* G.W. Small et al., *Diagnosis and Treatment of Alzheimer Disease and Related Disorders Consensus Statement of the American Association for Geriatric Psychiatry, the Alzheimer's Association, and the American Geriatric Society*, 278 JAMA 1363 (1997).

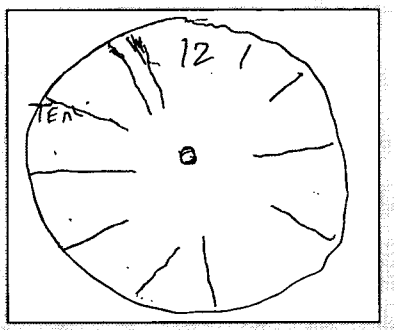
41. *See* Donald R. Royall et al., *CLOX: an Executive Clock Drawing Task*, 64 J. OF NEUROLOGY, NEUROSURGERY, PSYCHIATRY 588, 588 (1998).

42. *See* M.F. Folstein et al., *Mini-mental State: a Practical Method for Grading the Cognitive State of Patients for the Clinician*, 12 J. OF PSYCHIATRIC RES. 189 (1975), *available at* http://www.minimental.com/article.html (last visited Oct. 28, 2004).

43. *See id.*

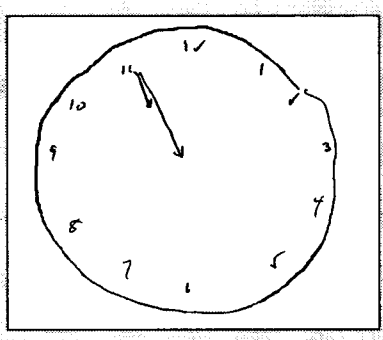
44. Royall et al., *supra* note 41.

45. *See id.*



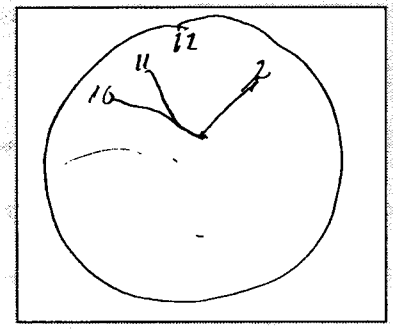
MMSE: 25/30
Age: 68, male
Diagnosis: AD
Education: 20+ yrs.
Retired M.D.
Still driving

CLOX: 6/15



MMSE: 30/30
Age: 78, male
Diagnosis: MCI / VaD
Education: 16 yrs.
Retired CPA
Still driving

CLOX: 11/15



MMSE: 26/30
Age: 85, male
Diagnosis: A D
Education: 12 yrs.
Retired railroad engineer
No longer driving

Figure 2: The CLOX drawings pictured above are three samples from patients at the Dementia Research Clinic at the Medical College of Wisconsin. As demonstrated, high scores on the MMSE do not guarantee performance on tests of executive functions thought to be important in driving and which are often impaired in dementia patients. (A score of 24 or below on the MMSE is considered impaired.) The directed time for the drawings was 11:10.

Currently, there is an ongoing study at the Dementia Research Center, Medical College of Wisconsin, evaluating the use of the CLOX test as a general screening test to determine one's driving ability. It is our belief that, because the clock drawing task is one component of the ADReS and because the test measures executive function—one of the most common abilities impaired in those with dementia—this shorter, easier test could serve as a general screening device to be used by all physicians caring for elderly patients.

In this study, our control is a list of driving behaviors from The Hartford's "Warning Signs for Drivers with Dementia," which the patient's caregiver is asked to complete.[46] Each patient is asked to complete the MMSE, the CLOX assessment, and two other tests of executive function: the Trails tests, parts A and B. The caregiver is also asked to fill out a Lichert scale reflecting his or her confidence in his or her spouse's driving ability. In addition, physicians will be asked to complete Lichert scales reflecting their recommendations relating to driving cessation for each patient, given only the MMSE results, and later, given the MMSE results and executive function test results. In both cases, physicians will also be provided with the caregiver's reported confidence level and the observed driving behaviors of the patient.

It is our belief that, at the conclusion of this study, the executive function tests will be better correlated to the caregiver's direct observations of driving ability than the MMSE, thus making it a better choice for a practical screening test. We believe that the Lichert scale will reflect a higher level of confidence in the patient's driving abilities accorded by the caregiver than executive function tests suggest should be accorded. We believe that the results of the CLOX and Trails tests will affect the opinions of primary care physicians when making recommendations for a patient's modification of or retirement from driving.

Preliminary data, for example, already suggests that a caregiver spouse is likely to have more confidence in his or her spouse's driving abilities than is practical. When asked to fill in the Lichert scale, one caregiver had difficulty, stating that she

46. *See Warning Signs for Drivers with Dementia*, The Hartford (2000), *at* http://www.thehartford.com/alzheimers/warning_signs_form.html (last vistited Oct. 28, 2004).

had 100% confidence in her husband's driving abilities as long as he did not drive outside of a one-mile radius of their home. However, if he exceeded the one-mile radius, the woman said that she had 0% confidence in his driving abilities.

The AMA reports that the Trails test is "a test of general cognitive function [that] also specifically assesses working memory, visual processing, visuospatial skills, selective and divided attention, and psychomotor coordination. In addition, numerous studies have demonstrated an association between poor performance on the Trail-Making Test, Part B and poor driving performance."[47] Of the Clock Drawing Test, the AMA states that the test "may assess a patient's long-term memory, short-term memory, visual perception, visuospatial skills, selective attention, and executive skills. Preliminary research indicates an association between specific scoring elements of the Clock Drawing Test and poor driving performance."[48]

CONCLUSION

Based on past and current research, executive function tests such as the CLOX and Trails tests, rather than the MMSE, should be widely used by physicians to determine driving ability. Furthermore, these tests should be formally recognized by state DMVs as reliable measures of a person's driving ability. Scores suggesting impairment of executive function should be sufficient cause for a full re-examination before license renewals are granted. This problem will continue to grow as a greater segment of the population ages. Many of these citizens, who are currently responsible drivers, are at an ever-increasing risk of developing age-related dementias that will impair their ability to drive. Reliable tests are needed to alert us to the existence of a problem while something can still be done about it; after an injurious or fatal crash occurs—as in Mr. Gutkowski's case—it is too late. Only when the issue of license renewal for individuals with memory impairment is addressed with adequate policies can we hope to prevent future tragedies.

47. *See* Wang et al., *supra* note 28.
48. *Id.*

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