

“tauopathy” (e.g. pure Alzheimer’s disease, frontotemporal dementia, progressive supranuclear palsy). Some medications, especially NSRIs and SSRIs are known to precipitate and exacerbate the disorder. Idiopathic RBD also exists.⁷

Circadian Rhythm Disorders: Advanced Phase Sleep Disorder

The tendency for elderly patients to spend more time asleep during the day and less time asleep at night raises the possibility that neurological dysfunction of the biologic clock within the suprachiasmatic nucleus of the hypothalamus mediates these changes. Advanced phase sleep disorder is a well-recognized circadian disorder in which patients complain of difficulty staying awake in the evening and early morning awakening.⁵ This disorder is common in the elderly and may be mistaken for early morning insomnia.

Phase advance is exacerbated by visual impairment and low light exposure during the day; evening light exposure can therapeutically delay rhythms and improve sleep maintenance.⁸

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Driving Safety Among Older Adults

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The number of individuals in the United States who are age 65 and older is expected to double by 2030.¹ As this population increases, so will the number of licensed older drivers. Increasing age is a significant risk factor for unsafe driving. The risk for crash involvement increases dramatically after the age of seventy; and drivers 85 and older have the highest driver fatality rate.² Drivers over the age of 70 have the highest annual fatality rate per miles driven compared to all age groups, except those aged 25 and younger.² In a study of mild dementia and non-demented drivers, baseline age significantly predicted performance on a road test independent of cognitive status.³ These findings suggest that, as older people age, the risk of unsafe driving increases, and care providers will need to monitor their aging patients’ driving safety.

Research on driving safety in the elderly has mainly focused on drivers with dementia, who consistently perform more poorly on open road tests and simulated

driving tests compared to their non-demented counterparts.⁴ For example, Duchek and colleagues found that 43% of participants with mild **Alzheimer’s disease (AD)** failed the road test, compared to 13% of patients with very mild AD and 3% of non-demented control participants.³ Longitudinal data indicated that patients with mild AD experienced a more rapid decline in driving skills compared to the control group; however, patients with very mild AD did not differ significantly from either group.³ Comparing crash rate records collected by the state registries, only one study has observed that patients with dementia are more frequently involved in accidents compared to a control group.⁴

There is also concern about the driving skills of patients with **Parkinson’s disease (PD)**, because of the motor and non-motor symptoms (visual changes and cognitive dysfunction). Interestingly, motor symptom severity and visual functioning do not consistently predict driving skills.⁵

While performance on neuropsychological measures does predict driving abilities, our research has found that PD drivers are infrequently observed to be unsafe drivers: only one of 25 participants assessed actually failed our road test. Rather, most participants received marginal or safe ratings.⁵ Research in dementia and Parkinson’s disease emphasizes that mild degrees of motor slowing, cognitive dysfunction, and changes in vision may not adversely affect driving skills, and that these diagnoses alone are not absolute indicators of unsafe driving.

The American Medical Association’s Physician’s Guide to Assessing and Counseling Older drivers lists acute medical events such as myocardial infarction, stroke, syncope, seizure, surgery, and delirium as well as chronic conditions such as disease affecting vision, cardiovascular disease, neurological disorders, psychiatric illnesses, metabolic conditions, musculoskeletal impairments, and respiratory disease as risk factors for unsafe driving.⁶ Detailing the

specific conditions that may be associated with unsafe driving is beyond the scope of this brief review. Interested readers are referred to chapter 2 of the AMA's guide.

OFFICE BASED ASSESSMENTS FOR DRIVING SAFETY

In a sample of 460 primary care physicians in Canada approximately 72% indicated that physicians should be legally responsible for reporting unsafe drivers to state licensing authorities.⁷ Strikingly, only 55% of the surveyed physicians believed they were most qualified to make this decision, and 88% felt that they would benefit from additional training in this area.⁷ The AMA's guide recommends that physicians assess visual function (acuity and visual fields), cognition (Clock drawing test and Trails B, a visual motor task requiring participants to alternate between connecting numbers and letters) and motor function (20 foot walk and manual test of range of motion and motor strength), with cutoff scores for each measure.⁶

While office-based tests can assist clinicians in making recommendations about driving safety, some have argued that there is not enough research linking these measures to unsafe driving. For example, Molnar and colleagues performed a systematic review of research studies (1984-2005) examining the predictive utility of office-based screening measures for determining driving safety.⁸ They found only sixteen articles were of high enough quality to include in the review and only one study provided cutoff scores for determining driving safety. The review indicated that Trails B was variably related to driving performance; and none of the studies examined clock-drawing performance. At the present time clinicians are expected to make recommendations, without empirical evidence to support office-based assessments.

Ott and colleagues examined the accuracy of physician assessments (based on chart review) for determining a professional driving instructor's rating of AD patients' standardized road test performance.⁹ Physicians' accuracy ranged from 62% to 78%.⁹ Clinicians also indicated which portions of the evaluation they relied upon for making their decision.⁹ Raters with higher accuracy emphasized dementia duration, dementia severity (CDR and MMSE), neuropsychological measures of praxis, visuospatial ability, executive function, attention, history of

accidents and traffic violations, whereas less accurate raters emphasized dementia history, global neuropsychological performance, eye examination results, general medical history, and language skills.⁹ Taken together, these findings suggest that driving safety is best not determined by performance on a single measure, but rather based on consideration of many patient characteristics. Importantly, compared to physical examinations or neuropsychological tests, a road test conducted by a professional driving instructor or certified occupational therapist appears to be the gold standard for determining driving safety.

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OLDER DRIVER RE-EDUCATION

Changes in sensory, motor, or cognitive functioning do not always mean that the older patient should retire from driving. In some cases evaluation and training by an occupational therapist or private drivers' education program may help older adults become safe drivers again. Modifications can be made to vehicles to make them easier to use. For example, older adults with limited range of motion in their necks may benefit from parabolic mirrors. Drivers with limited motion in their arms may need a knob on their steering wheel.

The most common driving re-education program is the AARP Driver Safety Program, which is run as a classroom course and available on-line. AAA and state agencies also offer informational materials as well as classroom education. Research on the benefits of older driver re-education is very limited. Kua and colleagues performed a systematic review of the older drivers re-education literature and found that only eight studies demonstrated sufficient internal validity to be included.¹⁰ Limited benefits of physical (range of motion exercises

or at home physical therapy exercises) and vision interventions (speed of information processing training or at home exercises to improve visual perception) were reported.¹⁰ Educational programs were associated with some improvements in driving safety behaviors.¹⁰ Unfortunately the two studies (self monitoring program and California's mature drivers program) that examined the benefit of driver education programs upon crash rates found no significant effect.¹⁰

The limited research should not completely dissuade clinicians from recommending these "refresher courses" to their older drivers. Driver education programs can help individual drivers, and some insurers provide discounts to older adults who participate in AARP's driver reeducation program. Until these programs are empirically validated, however, it is difficult to judge their relative benefit as well as which elements of the course are associated with the best remediation of driving skills.

CESSATION OF DRIVING

The AMA Guide has compiled each states' reporting procedures for easy reference.⁶ In Rhode Island "Any physician who diagnoses a physical or mental condition which, in the physician's judgment, will significantly impair the person's ability to safely operate a motor vehicle may voluntarily report the person's name and other information relevant to the condition to the medical advisory board within the Registry of Motor Vehicles. Any physician reporting in good faith and exercising due care shall have immunity from any liability, civil or criminal. No cause of action may be brought against any physician for not making a report."⁶ Massachusetts is a self-reporting state. It is the responsibility of the driver to report to the Registry of Motor Vehicles any medical condition that may impair driving ability. However, physicians are encouraged to report unfit drivers to the Registry of Motor Vehicles. The law does not provide any protection from liability, nor does it promise confidentiality due to the "Public Records" law which states simply that a driver is entitled to any information upon receipt of written approval"⁶ pg30-31.

Clinicians who recommend driving cessation to their patients should suggest alternative transportation. In Rhode Island patients can be referred to the Department of Elderly Affairs Pocket Manual of Elder Services,¹¹ which lists the different RIDE programs as

well as a phone number to schedule paratransit for individuals unable to use public transportation. Care providers will want to closely monitor these patients for signs of depression, self-neglect, and isolation as all can occur as a result of loss of driving privileges (see the AMA guide for specific monitoring methods).⁶

FUTURE DIRECTIONS

There is much research to be done in the area of assessing older driver safety. As Molnar and colleagues point out, the establishment of empirically validated cut scores for visual functioning, motor skills, and cognition is necessary to help physicians confidently identify truly at risk drivers.⁸

A second priority is to establish clinically meaningful outcome measures. Certainly poor performance on a simulated driving test or pre-determined driving route is an indication for concern and monitoring, but there is not a perfect correlation between these measures and crash risk. In this regard, a new study examining risk factors for poor drivers in a naturalistic setting has begun at Rhode Island Hospital. In this study, funded by the National Institute of Health, older drivers both with and without dementia will be examined by video camera recordings in their own cars and driving in their neighborhoods. These recordings will be compared to performance on a standardized road

test and computerized office tests. For more information about participation or referrals, contact Lindsay Miller at 444-0789.

A third and final priority is to examine the benefits of driver education programs. If physicians are going to recommend these interventions, as with any other treatment, efficacy trials are necessary.

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Geriatric Neurorehabilitation In the New Millenium

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Rehabilitation interventions have changed little in the last few decades, aside from improvements in materials and medical care. Most neurorehabilitation research involves geriatric patients since most disabling neurologic disease occurs in older populations. Proving rehabilitation intervention efficacy is difficult for methodological reasons.

New technologies and neuroscience advances allow us to foresee development of evidence-based neurorehabilitation interventions improving functional outcomes. The need for such interventions will increase as the population ages. Developing *patient-specific* rehabilitation programs using *selected tools* at *selected times* during recovery now seems within reach.

REHABILITATION SETTINGS

Approximately 6-8% of Medicare patients admitted to acute care hospitals will

need inpatient rehabilitation. Medicare recipients comprise 75-80% of admissions to **acute rehabilitation facilities (ARFs)**. In 2007, the average age of patients admitted to ARFs in the US was 67 years. After an average stay of 16 days,¹ 73% of these patients returned home. With limited staffing and ill patients, acute care hospitals usually provide one or two brief therapy treatments a day. Immobilization for even only a few days causes deconditioning which takes longer to reverse than to develop; therapy should be initiated as soon as possible. **Long-term acute care (LTAC)** facilities manage patients with persistent intensive nursing and medical care needs. Acute rehabilitation hospitals admit 50-60% of their patients with neurologic diagnoses, generally providing the most intensive rehabilitation programs available for patients who can tolerate and

benefit from at least three hours of therapy per day. Subacute rehabilitation units provide programs for patients who cannot tolerate, or will not benefit from, more intensive therapy. Home therapy may often be suboptimal due to lack of equipment and inefficient scheduling. Outpatient therapy varies between one and five sessions a week for medically stable patients. Patients may move between these settings, depending on medical status and rehabilitation needs.

ROLE OF PHYSICIANS IN REHABILITATION

Primary care physicians and/or physiatrists provide general medical management and help to prevent complications. Immobility increases risks of infection, deep venous thrombosis, and skin breakdown, which can usually be effectively prevented.