

POLICY STATEMENT

Vision Requirements for Driving

Policy

The American Academy of Ophthalmology recognizes the need to promote road safety. The Academy also recognizes that the responsibility for credentialing drivers lies with the state departments of motor vehicles and their advisory boards, but it acknowledges that ophthalmologists are regularly called upon to evaluate candidates for driving based on visual parameters. In the absence of well-proven test criteria and predictors of unsafe driving characteristics, ophthalmologists must continue to advise patients according to the established rules of their individual states.

Ophthalmologists may be called upon to make recommendations to licensing agencies for candidates who do not meet unrestricted license requirements. These recommendations, which can involve on-the-road testing for further evaluation, may also specify restrictions for licensure limiting driving to certain conditions, destinations, areas, times of day, or equipment. The Academy recommends establishing evidence-based driver assessment and training programs to address performance deficiencies. These data will help determine what tests to administer, to whom, how often, and how to score them and apply them to licensure.

Background

The preservation of road safety is the prime consideration in addressing vision requirements for driving. The importance of road safety demands that the components of safe driving be understood, the criteria for evaluating candidates be evidence based, and the tests used be valid predictors of driving ability.

The components of safe driving include the following:

1. The motor ability to scan a rapidly changing environment.
2. The sensory ability to perceive information in this rapidly changing environment.
3. The attentiveness to process multiple pieces of information.
4. The cognitive ability to judge this information in a timely fashion and to make appropriate decisions.
5. The motor ability to execute these decisions in a timely fashion.

The interaction of these factors is complex and cannot be inferred from the evaluation of one component alone. For example, an applicant with an excellent visual acuity and fair mobility but impaired cognition may be unsafe, whereas one whose only impairment is moderate visual acuity may be safe. Another applicant with a combination of moderately impaired visual acuity, moderately prolonged reaction time, and moderately impaired motor ability may be unsafe.

Research is under way to develop tests with proved sensitivity and specificity to identify high-risk drivers, but more work is needed to confirm the results and expand on current findings. This is necessary to ensure safety on the roads, to ensure fairness in licensing, and to enable ophthalmologists to provide reasonable guidance for patients and for licensing

agencies and their medical advisory boards. The literature suggests that the standard tests currently used are not adequate predictors of at-fault crash involvement (9,10), whereas previous at-fault crash involvement is a more reliable predictor (2).

Evaluation

The following components of visual sensory ability should be evaluated for possible inclusion in vision tests to assess an individual's ability to drive safely.

Visual Acuity

The easiest parameter to test is visual acuity, and in many states this is the only criterion applied when issuing a driver's license. However, there are no consistent data confirming that visual acuity is a valid predictor of driving ability and safety. In fact, current data indicate that factors other than visual acuity are more accurate predictors of safe driving (9) and that there is no basis for the requirement of 20/40 visual acuity, which is currently the policy in many states.

Although most ophthalmologists agree that severe visual impairments (20/200 or a 20-degree visual field) should preclude driving, there is no consensus about drivers with moderate visual impairments. Studies undertaken in some states have resulted in the acceptance of monocular visual acuity up to and including 20/70 for an unrestricted license and up to and including 20/100 after evaluation and a road test. Prior to final testing, applicants are offered training to compensate for their limitations. Unless there are exceptional circumstances, individuals with visual acuities of less than 20/100 are denied licensure (13). Some states allow licensure for applicants with visual acuities up to but not including 20/200 who can demonstrate their ability in a road test.

Glasses or contact lenses should be worn as needed to optimize visual acuity. More than half of 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 (10). The ability to drive safely using bioptic telescopes should be demonstrated in a road test in all cases.

The impact of reduced visual acuity on driving safety may be decreased by restricting travel to familiar surroundings, nonrush hour times, and low speed areas; by avoiding adverse weather conditions like rain or snow; and by allowing sufficient travel time.

Peripheral Visual Field

There is evidence that peripheral vision plays an important role in safe driving (16,17). Studies have used a variety of definitions of visual field impairment, however, which has resulted in a lack of consensus on the breadth of visual field necessary for safe driving. No data exist on the effectiveness of compensating for a visual field deficit (10). A driver with a restricted visual field but excellent scanning ability, for example, may be safer than a driver with a full visual field but no neck rotation that allows scanning.

Testing the midperiphery is recommended because diseases such as glaucoma and retinitis pigmentosa can create large discontinuities in that area. Approximately half of the states do not require peripheral visual field testing and, although there is no consensus among those that do as to the definition of acceptable visual field, screening tests currently available in vision screeners should be used.

Individuals with some degree of peripheral visual field loss who are cognizant of the parameters of their visual field may master compensatory scanning techniques sufficient to drive safely (18). Individuals with hemianopic visual fields who have mastered scanning techniques are permitted to drive in some states, although no comprehensive studies of safety have been carried out for this group of drivers (5). For some peripheral visual field defects, enlarged side and rear-view mirrors may be useful.

Useful Field of View

The useful field of view (UFOV) test has been developed to assess an individual's ability to process and react in a timely fashion to multiple visual events occurring simultaneously. It defines the visual field within which rapidly presented visual material can be used. The test includes processing speed, selective attention, and divided attention. A reduction in the UFOV has been associated with increased future crash involvement, whereas a moderate reduction in visual acuity, contrast sensitivity, and visual field were not (8).

Because the UFOV test relies on both visual sensory and cognitive skills, it provides a more global measure of visual functional status than either sensory or cognitive tests alone (2). It is a good predictor of driving performance for patients with normal acuities but impaired cognition (3), and it is better than chronological age for identifying drivers at risk for crashes (2). In some states the UFOV is used experimentally, and elsewhere it is combined with other screening tests and simulators and used informally for driver education programs (4, 13). It has been shown that with a modest investment in training time, UFOV reduction can be partially reversed and maintained for at least one year, although the impact of this improvement on driving has not been tested. In some locales such training is offered experimentally (4).

Contrast Sensitivity

Contrast sensitivity is not currently a licensing parameter in any state, although a new study has associated severe reduction in contrast sensitivity with increased crash risk (12). Drivers with reduced contrast sensitivity may benefit by limiting their driving to the hours between dawn and dusk and some find their contrast sensitivity improved by wearing yellow filters.

Glare

Glare has been discussed as a safety threat. While there are no studies to date that support the contention that it is a threat (10), studies are beginning to address this issue. Some drivers find that wearing yellow filters and polarized lenses reduces glare.

Neck Rotation It is known that experienced drivers continuously scan the road to glean useful information, but there is no research on drivers with eye movement disorders (10). Neck rotation, which may facilitate scanning and compensate in part for eye movement disorders, is included in the vision testing in some states (6).

Central Visual Field

Individuals with central visual field defects, or scotomas, who are cognizant of the parameters of their defect may learn effective compensatory scanning techniques. One study found that drivers with Stargardt's Disease and cone-rod dystrophy affecting central vision had an increased crash risk only for night driving when compared to study controls (14). It may be advisable to limit these individuals to daytime driving.

Color Vision

Some states test color vision, anticipating that it is important for identifying traffic signals accurately, but drivers with color deficiencies successfully use clues other than color. Studies show no association between color deficiency and reduced driving performance (10,15), and this component of visual sensory ability should not be included in vision tests to assess an individual's ability to drive safely.

Recommendations

Driving tests should include an evaluation of cognitive and motor abilities as well as visual sensory ability. In general it is reasonable to classify performance on screening tests in three basic ranges. If performance is excellent, driving fitness may be assumed to be normal unless the individual's driving record suggests otherwise. If performance is moderate, or in an intermediate range, further evaluation and, ideally, interventions to improve visual, cognitive, or motor abilities including training to improve these skills would be offered to assist in overcoming performance deficiencies. The applicant should then have the opportunity to demonstrate on-the-road ability to compensate for the tested deficiencies. The licensing authority may then grant an unrestricted license; a license restricted to certain conditions, destinations, areas, or equipment; or deny licensing. Performance in the poor, or lower, range would suggest a combination of abilities too limited for licensure unless exceptional circumstances warrant further consideration.

The license to drive a car on public roads is a privilege rather than a right. It should not be extended indiscriminately. Nevertheless, in a society where the personal vehicle is the primary, and often the only mode of transportation, cessation of driving results in personal hardship (7), and licensure should not be withheld without clear justification.

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