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Summary of national driving policies and the older driver

Kirsten Carmiencke Scott
Pacific University

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Abstract

As the population of elderly drivers increases drastically over the next twenty years attention must be drawn to problems facing that group. In addition, the physiological changes that occur with aging, the increases in the incidence of medical conditions, and the decreases in functional abilities may affect the older driver's performance. As optometrists it is important to understand state driving policies so that we may educate our older patients. Many state licensing agencies are developing policies intended to improve the safety of all drivers, but with emphasis on the older driver. In addition, private interest groups have been developing programs which aim to improve the driving skills of the older driver. In order to effectively address the needs of the older driver, further research is needed to identify which visual and perceptual skills actually decrease in the older population, and of these, which are related to driving performance. With this information, better screening instruments and intervention programs can be devised which will more accurately identify and rehabilitate those drivers who are not safe to be on the road.

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KIRSTEN CARMIENCKE SCOTT, M.S.

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Advisors:

Alan W. Reichow, O.D., M.Ed, F.A.A.O.

Lee Ann Remington, O.D., M.S., F.A.A.O

SIGNATURE PAGE

Author:

Kirsten Carmiencke Scott, M.S. _____

Advisors:

Alan W Reichow, O.D., M.Ed, F.A.A.O. _____

Lee Ann Remington, O.D., M.S., F.A.A.O. _____

BIOGRAPHY PAGE

Kirsten Carmiencke Scott

Kirsten graduated from the University of Puget Sound with a bachelor's degree in Exercise Physiology in 1997. She then completed a Master's Degree in Sports Nutrition from Florida State University in 2000. Following graduation from Pacific University College of Optometry in 2005 Kirsten will fulfill a three year commitment with the Navy.

ABSTRACT

As the population of elderly drivers increases drastically over the next twenty years attention must be drawn to problems facing that group. In addition, the physiological changes that occur with aging, the increases in the incidence of medical conditions, and the decreases in functional abilities may affect the older driver's performance.

As optometrists it is important to understand state driving policies so that we may educate our older patients. Many state licensing agencies are developing policies intended to improve the safety of all drivers, but with emphasis on the older driver. In addition, private interest groups have been developing programs which aim to improve the driving skills of the older driver.

In order to effectively address the needs of the older driver, further research is needed to identify which visual and perceptual skills actually decrease in the older population, and of these, which are related to driving performance. With this information, better screening instruments and intervention programs can be devised which will more accurately identify and rehabilitate those drivers who are not safe to be on the road.

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In the profession of optometry, practitioners are responsible for correcting the vision of their patients in order for them to comply with driving licensure standards. In spite of having these responsibilities, few practitioners are entirely knowledgeable of their state licensing policies. In addition, because of the frequent travel by automobile between states it is helpful that the practitioner be familiar with driving licensure requirements and policies of other states.

In the popular media, attention has been increasingly placed on the elderly driver. This is partly due to the well publicized reporting of recent vehicle accidents caused by older drivers. For example, in July of 2003 an elderly driver in Santa Monica, California drove through a farmers market killing ten and injuring dozens more (McReynolds, 2004). The older driver is also drawing attention in the media because of the fact that the number of older drivers is increasing rapidly, with the population over age 65 increasing by 60% in the next 20 years (U.S. Department of Transportation, 1999). The purpose of the following review is five-fold: 1) educate the practitioner as to the visual components of driving licensure, 2) compare driving licensure requirements between states, 3) discuss other factors of the older driver which can lead to decreases in driving ability, 4) present examples of driver safety enhancement programs, and 5) discuss future policy considerations directed at improving driving safety of the older driver.

Visual Components of Driver's Licensure

All states require testing of knowledge, skill, and vision for a driver's license to be issued. Although the tests that comprise the vision screening required to obtain a drivers license vary among states, common tests include: static visual acuity (distance

and near), horizontal visual field, color vision, binocularity / depth perception, and lateral and vertical phorias (Shipp, 1995).

Static visual acuity is the only universal test to be administered by all states. To determine an individual's best static visual acuity, well illuminated high contrast targets are placed at a predetermined actual or simulated distance and the patient is asked to identify the smallest target he or she can recognize (Shipp, 1995). Although the visual acuity criteria vary among states (see table 1), Snellen visual acuity of 20/40 in the best eye is generally considered the "passing" level for issuance a driver's license. It is unclear why Snellen visual acuity was chosen, but it may have been selected since it was the most common method in clinical use at the time (Owsley, 1999). Despite this universal acceptance of Snellen visual acuity, research is scarce defining 20/40 as the passing criteria.

Although static visual acuity determines an important visual skill, in isolation this may not be sufficient to adequately determine the necessary abilities for driving. According to Owsley, "It has long been recognized that visual acuity testing is not a good technique for identifying unsafe drivers" (1999). Visual acuity is thought to be the most ubiquitous visual screening test used by licensing agencies (Owsley, 1999). Shipp (2000) noted that "to date, there is a lack of empirical evidence of significant predictive relationships between contemporary visual screening tests and automobile crashes."

Not only do the visual acuity requirements vary for initial driving licensure between states, but the visual screening battery and renewal frequency for re-licensure also vary significantly from state to state (Shipp, 2000; Owsley. 1999). As of 2003 there were ten states that did not even require a vision screening for re-licensure at any age (Table 2) (Fischer, 2003). In addition, there are three states that require vision screenings

at license renewal only after a certain age. For example, in the state of Nevada, vision screening at license renewal is required after the age of 70. Concerning renewal interval, some states have different renewal intervals depending on age while other states have one renewal interval regardless of age (see Table 3). Thirty-four states, including Alabama, District of Columbia, New York, Oregon, and Wisconsin, only have one renewal frequency whereas 17 states have multiple renewal frequencies depending on the age of the driver.

Many states also provide different levels of licensure. If a driver does not meet the vision requirements for a standard license they may be able to qualify for a restricted driver's licensure. Some examples of restrictions include: use of corrective lenses, modified outside mirrors, daytime driving only, driving within city limits only, no freeway driving, re-testing yearly, or other specific restrictions determined by the state Department of Motor Vehicles (DMV) (AARP, 1992). All states, except Vermont, allow restrictions on a drivers license (Fischer, 2003).

Many states are beginning to take advantage of new technologies for visually impaired drivers. Bioptic and telescopic lenses are allowed in certain states to enhance an individual's vision while driving. Bioptic lenses are composed of carrier lenses which contain the patient's best distance prescription and a small telescope mounted onto the carrier lens above the patient's visual axis. The carrier lens portion of the bioptic system is used for general scanning when driving while the telescope portion of the system is used to see detail such as street signs. As of 2003, 31 states allow drivers to utilize bioptic and telescopic lenses (see Table 4) (Fischer, 2003).

Characteristics of the Aging Driver

Why is it so important to consider elderly drivers as a population? The older driver is the fastest growing segment of the driving population. The number of older drivers is predicted to more than double by the year 2030 (National Safety Council, 1993; Griffin, 2004). In addition, automobile travel by seniors is projected to increase 4-5 times in that same time period (National Safety Council, 1993; National Center for Statistics and Analysis, 2002). Senior drivers also have been found to suffer a disproportionately high rate of traffic fatalities compared to other populations. There were found to be 15.43 deaths per 100,000 of the total population whereas the population of 65+ had 19.14 deaths per 100,000 (Wang, 2003). This higher mortality rate is partly due to the increased susceptibility of injury in elderly (Li, et al., 2001; Griffin, 2004).

Physiological changes that occur with the normal aging process may contribute to impairment in the ability to drive. Visual acuity has been found to decrease with aging, although, it may or may not impact driving ability and crash rates (Brown, 1991). Several studies have found no relationship between decreased visual acuity and crash risk, while several others have found a positive relationship, although the correlation appears to be low (Owsley and McGwin, 1999; Owsley, et al., 1991).

Another physiological change that accompanies aging is a decrease in the ability to differentiate low contrast targets (Brown, 1991). Poor contrast sensitivity may result in difficulty in low light or poor environmental conditions, such as fog or snow. Rubin et al. studied the relationship between contrast sensitivity ability and crash rates. Individuals with impaired contrast sensitivity have been linked to a higher number of at-fault crashes compared with individuals with normal contrast sensitivity (Rubin et al., 1994). But, as with visual acuity, some studies have found no correlation between poor

contrast sensitivity and increased crash rates (Owsley and Sloane, 1987). The research appears to be inconclusive as to the influence of age-related physiological changes on driving performance.

A major concern surrounding the debate relative to safe driving by elderly individuals centers on the increasing incidence of medical conditions, which may impair their driving abilities. As the population ages the incidence of medical conditions that can affect driving abilities increases (Griffin, 2004; Koepsell et al., 1994; Gresset, J. & Meyer, F., 1994; Foley, et al., 1995). According to the National Highway Traffic and Safety Administration (NHTSA), by the age of 55 there are more drivers on the road with a medical condition that could compromise their driving performance than there are drivers without such conditions (1998). Health issues thought to effect driving performance include: cataracts, glaucoma, diabetes, heart conditions, neurological conditions, stroke sequelae, memory problems, and polypharmacy (Campbell et al., 1993). In a recent study, those individuals who elected to have cataract surgery had a crash rate that was 50% less than those who did not have the surgery. Subjects noted less driving difficulty following cataract surgery compared to before (Owsley, 2003).

It is also known that functional abilities tend to decrease with age. These functional abilities include: visual acuity, attention, perceptual skills, memory, decision making, reaction time, and different aspects of physical fitness and performance (U.S. Department of Transportation, 1999; Griffin, 2004). Older drivers may attempt to adjust to functional difficulties by driving less and avoiding difficult driving conditions. Despite such adjustments drivers still have a heightened risk of traffic accidents (Griffin, 2004). Deterioration in visual perceptual skills and information processing speed has been found to correlate with driving behavior, specifically poor judgment in making left-

hand turns, drifting within the traffic lane, and inability to appropriately react in response to an unexpected or rapidly changing situation (Strano, 1997; NHTSA, 2002). An increasing body of evidence shows that impairments in one or more areas of functional ability significantly increase a driver's risk for a crash (U.S Department of Transportation, 1999).

Programs to Enhance Driver Safety

Many states are working on strategies intended to improve the safety of their older drivers. Maryland is developing a program whose goal is to properly identify at-risk older drivers and refer those individuals for remediation and counseling. The Maryland Program has four key initiatives: 1) identification and assessment of functional capacity, 2) remediation strategy and counseling for safety, 3) creation and development of feasible economic transportation options, and 4) provision of public information and education. Some of the tests utilized in the Maryland Program include the Motor Free Visual Perception Test (MVPT), Scan Test, Trail-Making Test, and Visual Acuity. The Motor Free Visual Perception Test is a test of visual perception and measures the ability of the individual to perceive positions of objects in relation to oneself and other objects, the ability to distinguish an object from its background, and the ability to identify incomplete figures when fragments are presented. In terms of driving ability, the Motor Free Visual Perception Test is thought to predict the drivers' ability to recognize a sign from partial view, to anticipate unseen hazards, and to visualize routes through a city. The Scan Test and Trail-Making Test measure the individual's search and scanning abilities. Related to driving ability, these tests are purported to evaluate how well the individual detects safety threats both centrally and peripherally, and how well they shift

their attention to identify signs, landmarks, and other relevant sources of information. Visual acuity, both standard Snellen and low contrast are also included. The Snellen Visual Acuity test evaluates how likely the driver will have problems reading signs under good visibility conditions, and the low contrast visual acuity test evaluates if the driver will be able to see such details as lane lines, curbs, or medians in the fog, at dusk, or at dawn (Raleigh, 2000).

Some states are working on legislation to determine which drivers may pose a threat to themselves or others. As of 2004, ten states have passed laws requiring mandatory reporting of individual's medical conditions that could interfere with safe driving performance. Most recently, a lawmaker in the state of Washington introduced a bill aimed at identifying drivers over the age of 75 who are not fit to be behind the wheel (McReynolds, 2004).

Private interest groups have also been developing programs aimed to address safety issues of older drivers. One such program is entitled "DriveAble." The DriveAble evaluation is specifically designed for one whose driving competence is questionable due to a medical condition, medications, or natural decline in mental processing abilities. DriveAble evaluates drivers on the basis of referrals from licensing authorities, physicians, insurance agencies, or private individuals. The DriveAble evaluation is a two part program consisting of a competence screening and a road test. The competence screening consists of computer presented tests that evaluate memory, judgment, decision-making, attention, and motor-speed abilities. If the competence screening is not conclusive the subject is administered a road test (Dobbs, 2000).

The Driver Safety Program, offered by the American Association of Retired Persons (AARP) since 1979, also aims to enhance older driver's safety. This eight

hour/two day program is specifically designed for individuals over the age of 50. Educational topics covered include: age-related vision, hearing, and reaction time changes, medication side effects, common difficulties encountered in left turns and other right-of-way situations, how to handle hazardous driving situations, and new laws and how they affect the older driver (www.aarp.com).

Some organizations have also developed public educations campaigns. The American Administration of Motor Vehicle Administrators (AAMVA) has recently released "GrandDriver," an information and awareness campaign to educate about the effects of age on driving ability (www.aamva.com).

Policy Changes

When evaluating driving policies it is important to remember that driving provides independence for all individuals. Physical and mental health problems appear to occur at a younger age in individuals deprived of their right to drive (U.S. Department of Transportation, 1999). It is necessary to determine which individuals are safe to drive and those who pose a threat to their own safety and the safety of others without depriving anyone unnecessarily of these privileges. Since drivers cross state lines, public policy must be evaluated nationally to ensure that testing adequately assess the functional ability of these drivers.

If public policy changes are warranted, the relative difficulty and expense of such change are a major concern. According to Owsley, "Changing policy would be expensive, as it would require retraining of personnel and re-instrumentation at every licensing site, as well as a public education campaign. Therefore, the public policy change would take years" (1999). There are a number of considerations that must be

addressed such as: what portion of policy governing licensure should be changed and should it be done at the state or national level? If policies are changed at the state level then inconsistencies may still remain between states. As stated what should these changes entail? Should visual acuity standards be changed or the frequency of license renewal be altered, or both? Would it be more beneficial to change the specific testing procedures used to evaluate an individual's driving ability? The American Administration of Motor Vehicle Administrators (AAMVA) recommends that driving policies be consistent across the country (aamva.com). All of these issues need to be considered but must be evaluated using valid information.

Individual states have made an effort to address the issue of older drivers by introducing legislation. In 2003 and 2004 multiple states have introduced legislation aimed at the older driver. Some notable examples include Virginia which enacted legislation that required applicants for issuance or renewal of driver's license and learner's permit who are 65 years old or older to pass a vision exam and Florida which passed a law requiring individuals over the age of 79 to pass a vision exam or submit a vision test administered by a licensed physician (www.nhsta.dot.gov).

The American Optometric Association Environmental and Occupational Vision Committee developed five options in addressing the future of driving policy in the United States (Shipp et al., 2000). The first option was to maintain "status quo" and retain current state-level vision related driver licensing and re-licensing requirements. A second option was to mandate vision testing for re-licensure in all states. Specifically, states not presently requiring vision testing for renewal would be required to adopt some level of vision screening as a condition for driver's license renewal. Those individuals who do not meet state-specific minimum vision requirements could be denied driving privileges

or granted a restricted or limited driver's license. Third, states could establish uniform vision requirements and would require enhanced vision testing or proof of a recent comprehensive eye examination for re-licensure. Those individuals who do not meet minimum vision standards for licensing would be counseled about their functional limitations and available rehabilitative services. Another option was a mandatory comprehensive eye examination for high risk individuals, which include: 1) persons seeking initial licensure, 2) individuals involved in traffic crashes or moving violations, and 3) individuals >60 years of age. This option was the one recommended by the American Optometric Association Environmental and Occupational Vision Committee. The final option for policy change is to require mandatory eye examinations for all individuals eligible at the initial license application and upon renewal. The final option was not recommended by the American Optometric Association Environmental and Occupational Vision Committee because it is neither efficient nor cost effective (Shipp, et al., 2000).

The variability of vision testing and lack of consensus regarding licensing requirements between the states suggests the need for modification in this area given the popularity of interstate automobile travel. As mentioned previously, measurement of visual acuity may not be indicative of driving ability (Owsley, 1999; Shipp, 2000). However, another screening method that assesses the functional visual field has demonstrated a relationship with driving performance. The Useful Field of View (UFOV) test evaluates the size of the visual field area in which useful information can be acquired in a single glance (Shipp and Penchansky, 1995). In other words, UFOV is a measure of the effective field of view. A reduction in UFOV has been demonstrated in elderly individuals, and has been found to be a strong predictor of vehicle accidents, as

compared to Snellen visual acuity which has shown no correlation (Owsley, et al., 1991). Therefore, measurement of UFOV may be a beneficial addition to the driving standards.

Another screening tool used to evaluate driver competency is the Gross Impairments Screening (Ball, 2003). The Gross Impairments Screening (GRIMPS) is an 11-minute assessment that assesses lower limb mobility, upper limb mobility, head and neck rotation, immediate memory and working memory, understanding of spatial relationships, visual field neglect, and visual search and sequencing abilities. Research has found that portions of the GRIMPS test independently predict future crashes (MVPT and Trails B) (Ball, 2003). Additional research is needed to determine a battery of tests that best identify those drivers who may not have the skills necessary for safe driving.

Conclusions

As eye care practitioners, it is important to have a thorough understanding of state driver's licensing requirements. Since the various aspects of driver's licensing can vary considerably between states, this can be confusing for practitioners, particularly those in locales with state boundaries nearby. In terms of driving policy much attention has been paid to the older driver. As the population of elderly drivers increases drastically over the next 20 years attention must be drawn to problems facing that group. The physiological changes that occur with aging, the increases in the incidence of medical conditions, and the decreases in functional abilities may affect the older driver's performance. Therefore, developing policies to improve the safety of elderly drivers is an important issue that must be addressed throughout the country.

Many states are developing policies and programs aimed at identifying at-risk older drivers, while other states have ignored the issue. Private interest groups have

developed programs designed to improve driving skills of the older driver. Lastly, new comprehensive screening tests are being developed and evaluated in hope of better identifying those drivers who may be at risk to themselves and others on the road.

In order to effectively address the issues above, further research is needed to identify which visual and perceptual skills actually decrease in the older population, and of them which are related to driving performance. With this information, better screening instruments and intervention programs can be devised which will more accurately identify and treat those drivers who are not safe to be on the road.

Table 1: Minimal Visual Acuity Needed For Driving Licensure by State

US States	Visual acuity with or without correction		Absolute minimum with restricted licensure
	With	Without	
Alabama	20/60	20/60	20/60
Alaska	20/40	20/40	20/40
Arizona	20/40	20/40	20/60
Arkansas	20/50	20/40	20/50
California	20/40	20/40	20/200
Colorado	20/40	20/40	20/40
Connecticut	20/40	20/40	20/70
Delaware	20/40	20/40	20/50
District Of Columbia	20/40	20/40	20/70
Florida	20/40	20/40	20/40
Georgia	20/60	20/60	20/60
Hawaii	20/40	20/40	20/40
Idaho	20/40	20/40	20/70
Illinois	20/40	20/40	20/70
Indiana	20/40	20/40	20/50
Iowa	20/40	20/40	20/70
Kansas	20/50	20/50	20/50
Kentucky	20/40	20/40	20/80
Louisiana	20/40	20/40	20/100
Maine	20/40	20/40	20/70
Maryland	20/40	20/40	20/70
Massachusetts	20/40	20/40	20/70
Michigan	20/40	20/40	20/70
Minnesota	20/80	20/80	20/80
Mississippi	20/40	20/40	20/70
Missouri	20/40	20/40	20/40
Montana	20/40	20/40	20/100
Nebraska	20/40	20/40	20/70
Nevada	20/40	20/40	20/50
New Hampshire	20/40	20/40	20/40
New Jersey	20/40	20/40	20/50
New Mexico	20/40	20/40	20/80
New York	20/40	20/40	20/40
North Carolina	20/40	20/40	20/70
North Dakota	20/40	20/40	20/100
Ohio	20/40	20/40	20/70
Oklahoma	20/60	20/60	20/100
Oregon	20/40	20/40	20/70
Pennsylvania	20/40	20/40	20/70
Rhode Island	20/40	20/40	20/40
South Carolina	20/40	20/40	20/70
South Dakota	20/40	20/40	20/60
Tennessee	20/40	20/40	20/60
Texas	20/50	20/40	20/70
Utah	20/40	20/40	20/40
Vermont	20/40	20/40	20/40
Virginia	20/40	20/40	20/70
Washington	20/40	20/40	20/200
West Virginia	20/40	20/40	20/40
Wisconsin	20/40	20/40	20/100
Wyoming	20/40	20/40	20/80

Source: Fischer, B. (2003) International Vision and Renewal Standard for Driver's Licensure; A Proposal. Pacific University thesis.

Table 2: States Requiring Vision Screening for New and Renewal Licenses

US States	Vision Screening	
	New Driving License	Renewal Driving License
Alabama	√	
Alaska	√	√
Arizona	√	√
Arkansas	√	√
California	√	√
Colorado	√	√
Connecticut	√	
Delaware	√	√
District Of Columbia	√	√
Florida	√	√
Georgia	√	√
Hawaii	√	√
Idaho	√	√
Illinois	√	√
Indiana	√	√
Iowa	√	√
Kansas	√	√
Kentucky	√	
Louisiana	√	√
Maine	√	40+
Maryland	√	√
Massachusetts	√	√
Michigan	√	√
Minnesota	√	√
Mississippi	√	
Missouri	√	√
Montana	√	√
Nebraska	√	√
Nevada	√	70+
New Hampshire	√	√
New Jersey	√	
New Mexico	√	√
New York	√	√
North Carolina	√	√
North Dakota	√	√
Ohio	√	√
Oklahoma	√	
Oregon	√	50+
Pennsylvania	√	
Rhode Island	√	√
South Carolina	√	√
South Dakota	√	√
Tennessee	√	
Texas	√	√
Utah	√	√
Vermont	√	
Virginia	√	√
Washington	√	√
West Virginia	√	
Wisconsin	√	√
Wyoming	√	√

Source: Fischer, B. (2003) International Vision and Renewal Standard for Driver's Licensure; A Proposal. Pacific University thesis.

Table 3: Driving License Renewal Interval by State

US States	Renewal Interval (Years)								
	1	2	3	4	5	6	8	10	12
Alabama				√					
Alaska					√				
Arizona					60+				√
Arkansas				√					
California					√				
Colorado						61+		√	
Connecticut		65+		√					
Delaware					√				
District of Columbia					√				
Florida						√			
Georgia				√					
Hawaii		72+				√			
Idaho				63+			√		
Illinois	87+	81-86		16-80					
Indiana			75+	√					
Iowa		70+		√					
Kansas				65+		√			
Kentucky				√					
Louisiana				√					
Maine				65+		√			
Maryland					√				
Massachusetts					√				
Michigan				√					
Minnesota				√					
Mississippi				√					
Missouri			70+			√			
Montana				75+			√		
Nebraska					√				
Nevada				√					
New Hampshire					√				
New Jersey				√					
New Mexico	75+			√ or			√		
New York							√		
North Carolina					√				
North Dakota				√					
Ohio									
Oklahoma				√					
Oregon							√		
Pennsylvania		65+		√					
Rhode Island		68+			√				
South Carolina					√				
South Dakota					√				
Tennessee					√				
Texas						√			
Utah					√				
Vermont		√ or		√					
Virginia					√				
Washington					√				
West Virginia					√				
Wisconsin							√		
Wyoming				√					

Source: Fischer, B. (2003) International Vision and Renewal Standard for Driver's Licensure; A Proposal. Pacific University thesis.

Table 4: States Allowing Bioptic/Telescopic Lenses

US States	Yes	No
Alabama		√
Alaska	√	
Arizona		√
Arkansas		√
California	√	
Colorado	√	
Connecticut		√
Delaware		√
District of Columbia		√
Florida		√
Georgia	√	
Hawaii	√	
Idaho	√	
Illinois	√	
Indiana	√	
Iowa		√
Kansas	√	
Kentucky	√	
Louisiana		√
Maine		√
Maryland	√	
Massachusetts	√	
Michigan		√
Minnesota		√
Mississippi	√	
Missouri	√	
Montana	√	
Nebraska	√	
Nevada	√	
New Hampshire	√	
New Jersey	√	
New Mexico		√
New York	√	
North Carolina		√
North Dakota	√	
Ohio	√	
Oklahoma		√
Oregon	√	
Pennsylvania		√
Rhode Island		√
South Carolina	√	
South Dakota	√	
Tennessee	√	
Texas	√	
Utah		√
Vermont	√	
Virginia	√	
Washington	√	
West Virginia		√
Wisconsin		√
Wyoming	√	

Source: Fischer, B. (2003) International Vision and Renewal Standard for Driver's Licensure; A Proposal. Pacific University thesis.

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