



# **SENIOR DRIVER ISSUES: UPCOMING CHALLENGES AND SOLUTIONS**

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## **SENIOR DRIVER ISSUES: UPCOMING CHALLENGES AND SOLUTIONS**

During the next 30 years, the United States will face increasing challenges concerning the burgeoning number of senior drivers. According to the U.S. Department of Transportation, there are 35 million Americans age 65 and older, approximately 13 percent of the population. By 2030, this figure will double to 70 million persons, projected to be 20 percent of the population.<sup>1</sup> This trend is a major concern because drivers age 65 and older experience higher crash death rates per mile driven than all age categories, other than teenagers.<sup>2</sup> In addition, many studies show that these drivers, particularly those age 80 and over, also pose higher risks to other persons on the road and pedestrians.

Safe driving requires a variety of key skills, including visual, cognitive, and physical abilities. Decreases in these capabilities can occur at any stage in life, but are especially prevalent for elderly persons. A copious body of research over the past several years indicates that these decreased skills can contribute to more automobile accidents. Fortunately, many elderly drivers recognize their decreased ability and reduce their driving under certain conditions or stop driving completely.

This issue is a multifaceted one, in which the goal is to provide a safe driving environment for all persons but also to recognize seniors' important need for independence, greatly enhanced by their automobiles. Fortunately, there are many measures society can take to strike the right balance. For example, proper treatment of functional impairments, including visual problems is a key ingredient. A re-examination of licensing laws for seniors is important in determining methodologies for seniors to keep their driver's licenses as long as safely possible. Improvements in highway design, with a focus on an increasingly aging American population, are another important facet of the issue. Enhancements to intersections, interstate access and egress, roadway curvatures, and construction zones can

all make a difference in reducing senior driver accidents. Safety advances in vehicle design, particularly in the area of crashworthiness and improved airbags, will assist in reducing senior deaths on the highways. Intervention issues involving family members, physicians, and the state departments of motor vehicles (DMVs) also need to be addressed. In addition, elevated efforts in the area of public education need to be undertaken.

At some point, the decision is made that a senior should not drive. This result, however, can lead to increased isolation and depression in elderly persons, especially when there are weaknesses and gaps in alternative transportation. These problems can cascade into even greater health problems and more incidents of the elderly being placed in nursing homes at younger ages. Improvements in mass transit, alternative community service transportation, and enhanced land use and community design can assist seniors who no longer drive.

There is additional research to be performed on this complex issue. More studies are needed on the relationship between mobility and age-related limitations. Research on the societal costs of lost mobility to seniors also needs to be conducted. In addition, technology's role in assessing drivers, improving mobility, and safety needs to be more thoroughly explored. Finally, more analysis is also necessary regarding the results of more lenient driver's license renewal laws. All of this research is particularly urgent due to the aging baby boomer generation.

There is no consensus among transportation experts, social workers, psychologists, physicians, and the general public concerning this problem. Reviewing this issue from various angles is essential in developing solutions. As a result, this debate focuses on the issues of older drivers and their involvement in auto accidents, recommendations and steps society should take to reduce these types of accidents while prolonging seniors' ability to drive safely, developing alternative transportation means for seniors when it is determined that they can no longer drive safely, and exploring and recommending additional research on this topic.

## **Older Drivers and Automobile Accidents**

Numerous studies have focused on senior driver involvements in automobile accidents. The conclusions are not always consistent, but the statistical datum generally shows a positive link between older drivers and higher fatality rates, primarily due to greater fragility in this age group. Other research has focused on the types of accidents seniors tend to be involved in and the kinds of functional impairments they often face. It is important to recognize, however, that many elderly drivers become aware of their limitations on their own and reduce their driving exposures accordingly. Automobile insurers should also keep abreast of the latest analytical data on senior drivers and not categorically deem them unsafe.

### **Statistics**

According to the National Highway Traffic Safety Administration (NHTSA), drivers age 70 years and older account for approximately 9 percent of the United States population.<sup>3</sup> However, these older drivers, who drive far less frequently than other age groups, still account for 12 percent of all traffic fatalities, 12 percent of all vehicle occupant fatalities, and 17 percent of all pedestrian fatalities.

As people age, their reflexes, motor skills, and senses slowly deteriorate. Some studies indicate that drivers over age 75 are involved in more car crashes than any other age group except for teenagers. The National Center for Injury Prevention and Control (NCIPC) found that the crash fatality rates and the incidents increased with age, while the exposure prevalence decreased. To paraphrase, although elderly drivers drove less frequently, they were more likely to crash and to die in an accident.<sup>4</sup>

The Insurance Institute for Highway Safety (IIHS) published a major study in 2002 concerning senior drivers and automobile accidents. IIHS calculated driver involvement rates for all police-reported accidents by age group, on a per capita, per licensed driver, and per vehicle-mile of travel for 1990 and 1995. They also reviewed driver involvement rates

for fatality-related accidents for 1983, 1990, and 1995. The results indicated that driver crash involvement rates per capita decreased with age when comparing younger drivers to middle age drivers, but automobile accident and death rates per capita increased at age 70 and beyond.<sup>5</sup>

Using demographic statistics, this same study also forecast projections of crashes involving senior drivers for years 2010, 2020, and 2030. The study estimated that there would be a 34 percent increase for all age groups in police-reported accidents from 1999 to 2030. These projections also estimated that there would be a 39 percent increase for all age groups in fatal crashes from 1999 to 2030. However, for drivers age 70 and older, the projected rates increased dramatically. The study projected that police-reported crashes for seniors would increase 178 percent and fatal involvements would increase by 155 percent by 2030. Further, drivers age 65 and older are projected to account for nearly 25 percent of total driver fatalities in 2030, in contrast with 14 percent in 1999.

The American Automobile Association (AAA) Foundation for Traffic Safety published a 2004 study conducted by the Texas Transportation Institute at Texas A&M that analyzed all injury accidents in Texas between 1975 and 1999. (This study consisted of a review of 4 million accident records.) According to the study, drivers age 65 to 74 are nearly twice as likely to die as a result of an injury accident as those ages 55 to 64. For motorists age 75 and older, the proportion increases to 2.5 times. For drivers age 85 and above, the proportion skyrockets to nearly 4.0.<sup>6</sup>

## **Accident Types and Factors**

Various studies indicate that senior drivers tend to become involved in certain types of automobile accidents. For example, because older people lose some of their functional capabilities, intersection-related crashes are relatively more frequent for this age group.<sup>7</sup> In particular, left turns appear problematic for seniors. Research also indicates more difficulties for senior drivers when entering and exiting freeways.

The Texas A&M study analyzed the relationship between driver age and four key factors, including the following:

- Fragility—the statistical probability of death in automobile accidents
- Illness—the statistical probability that drivers were ill or experiencing a physical defect when the accident occurred
- Perceptual lapses—the statistical probability that drivers involved in accidents failed to yield the right of way or failed to recognize traffic signs or signals
- Left turns—the statistical probability that left turns were involved in injury-related accidents<sup>8</sup>

As people age, their bodies become increasingly fragile and more subject to serious injury or death in automobile accidents. This study indicated that young drivers, who tend to speed more than other drivers, may be involved in more severe crashes than older drivers. If this is the case, older drivers may be even more fragile than the data suggests. One factor to consider, however, is that the higher death rates of seniors may not be solely due to their greater fragility. The types of vehicles driven and the circumstances of crashes vary with driver age.

Illness and driver defect information, such as eyesight problems, hearing problems, fatigue, falling asleep, or missing limbs, was included in the Texas crash database. The most frequent driver defect cited was “fatigued” or “asleep,” which was more commonly associated with younger drivers. In contrast, drivers age 65 to 74 are 1.78 times as likely compared to the control group of drivers age 55 to 64 to be impaired by illness or some other physical defect. For drivers in the 75 to 84 age group, the relative likelihood of impairment is 2.28 and in the age 85 and older category, the relative likelihood of impairment is 2.97.<sup>9</sup>

Perceptual lapses are more common in older drivers than in the control group, primarily regarding the adherence to traffic lights and signs. Drivers in the 65 to 74 age group were 1.73 times as likely to suffer a perceptual lapse in an accident compared to

those in the control group. For drivers in the 75 to 84 age group, the figure is 2.2 and for drivers 85 years and older, the figure is 2.59.<sup>10</sup>

Making successful left turns at intersections requires a combination of solid visual and cognitive abilities. According to NHTSA, left turns require strong spatial vision, strength, coordination, and depth and motion perception, abilities that decrease as people age.<sup>11</sup> The Texas A&M study indicates that drivers in the 65 to 74 age group were 1.26 times as likely to be involved in left turn accidents compared to the control group. For drivers in the 75 to 84 age group, the figure is 1.41 and for drivers 85 and older, the figure is 1.51.<sup>12</sup>

## **Functional Impairments**

Senior drivers tend to experience more functional impairments, as compared to other age groups. Functional impairments include visual, visual/cognitive, cognitive, and physical.

Measuring visual acuity is the most common test state DMVs use. Although this is an area that has been the subject of over 200 articles, the studies have provided a mixture of findings with some finding strong correlations and others finding none at all.<sup>13</sup> Earlier research conducted in the 1970s in California found a strong correlation between poor visual acuity and elevated crash rates.<sup>14</sup> More recent datum indicated slightly positive correlations between visual acuity and crash involvement or no association at all.<sup>15</sup> Several reasons might explain the mixed results of these studies. Letter-acuity testing at DMVs was designed for clinical diagnosis and detection of eye diseases, but not for evaluating visual performance skills in more complicated tasks such as driving. Another reason is that drivers with poor visual abilities may not be driving because of state licensing requirements.<sup>16</sup>

Safe driving requires a mixture of good visual and cognitive abilities. During the late 1980s, the Useful Field of View test was developed to evaluate higher-order processing

skills, including selective and divided attention and rapid visual-processing speed. Many studies have indicated that a decrease in Useful Field of View findings in older drivers is strongly correlated to higher accident rates.<sup>17</sup>

Senior drivers with cognitive impairments, such as poor visual attention, memory, and reasoning, are at least twice as likely to be involved in a crash as compared to drivers without these types of impairments.<sup>18</sup> The Useful Field of View Test is also used to study accident proneness in drivers suffering from the early and middle stages of Alzheimer's disease. Virtually all experts concur that driving is dangerous and unwarranted in persons with moderate to severe cases of Alzheimer's. There is a lack of consensus, however, concerning whether persons in the early stages of this disease should drive.<sup>19</sup>

Poor physical abilities are another functional impairment some senior drivers experience. Several facets of motor skills for driving include strength; gross and fine coordination; range of motion of the head, neck, arms, and legs; and balance. One study found that range of motion is particularly important in avoiding auto accidents. Older drivers with lessened abilities to turn their heads, such as sufferers of arthritis, are limited in the distances at which approaching vehicles are brought into the central visual field. This reduced ability correlates to increasing accidents.<sup>20</sup> However, more research comparing other physical problems in the elderly driver with accident rates is warranted.

### **Senior Driver Awareness and Adaptation**

Fortunately, many senior drivers become aware of their decreasing driving abilities as they age and adapt their driving exposures accordingly. Modeling driving behavior is often organized into three levels—strategic, tactical, and operational. Strategic behavior deals with high-level decisions, including whether to cease driving, what time of day to drive, and what weather conditions to drive in, all decisions to make before the drive begins. Tactical behavior concerns decisions such as driving speed and gaps between

automobiles. Operational behavior incorporates driving details, such as how to see the roadway, steering movements, and braking motions.<sup>21</sup>

Most studies indicate that seniors tend to drive less as they age. An Ontario study emphasized that not only is exposure reduced overall, but high-risk exposure is reduced even more.<sup>22</sup> Some senior drivers, particularly those with acute visual problems, make the strategic decision to stop driving. Others will successfully self-regulate their driving, by driving only during the day, only during non-rush hour times, and only on familiar streets while avoiding freeways. Older drivers with mild to moderate cognitive impairments often recognize these disabilities and drive less, particularly upon their physician's recommendation.<sup>23</sup>

Some surveys, however, indicate that older drivers are not always cognizant of their visual, cognitive, and physical disabilities. For instance, many do not link their visual problems with an increased chance of accidents.<sup>24</sup> Other studies indicate similar findings among seniors with various cognitive disabilities. Thus, society clearly cannot depend solely on the judgment of elderly drivers to make strategic driving behavior decisions. More research and education in this area are essential.

### **Insurer's Approach to Elderly Drivers**

Personal automobile insurers need to regularly review the latest research on elderly drivers and automobile accidents. This relationship is complex and insurers would be remiss by assuming that elderly drivers, as a whole, are inherently dangerous and should pay much higher automobile insurance rates. This situation was often the case in the 1970s and 1980s when many insurers even refused to insure new automobile insurance applicants over age 75 or 80. With elderly drivers often reducing their driving exposures voluntarily, the pure number of accidents, as the evidence suggests, are fewer than many other age groups. Insurers should look at rating plans that would decrease premiums for seniors who drive a very small number of miles (e.g., 2,000) per

year. In addition, since seniors are less likely to speed, their chances of seriously injuring other parties is less, as compared to young operators. Individualized underwriting approaches to senior drivers, such as looking closely at prior accidents and violations and annual driving distances is the wise and fair approach for insurers to take.

### **Recommendations for Reducing Senior Driver Accidents**

Seniors need to maintain their independence, especially regarding their driving, as long as they can safely do so. When the elderly lose their driving privileges and their mobility, they often experience increased isolation, resulting in higher incidents of depression and other health problems. Thus, with the baby boomer generation approaching their senior years, this issue becomes even more critical and it becomes essential to find ways to lessen elderly drivers' frequency and severity of automobile accidents. This issue needs to be addressed from a variety of angles, including the following:

- Treatment of functional impairments
- Elderly driver licensing laws
- Highway design
- Vehicle types, design, and adaptations
- Intervention issues
- Public education

### **Treatment of Functional Impairments**

There are numerous treatments available to reduce visual, cognitive, and physical impairments of elderly drivers. However, there are obstacles in overcoming these problems. As respects visual problems, elderly drivers often fail to recognize their declining vision, since symptoms can develop slowly. For example, senior drivers with cataracts, a slowly-evolving disease common to this age group, experience a restriction in their driving mobility and an increased chance for accidents, especially at night.<sup>25</sup>

However, chronic eye conditions such as cataracts and refractive error can normally be remedied through surgery and corrective glasses or contacts. Unfortunately, in some cases, treatment is not sought due to lack of health insurance and financial difficulties.

Research has also been conducted regarding improving cognitive abilities in senior drivers. Cognitive training methodologies were developed to improve memory, processing speed, and problem-solving skills. Laboratory research indicated that improvements occurred in some cases. In one study, intensive training in these areas resulted in improved visual-processing speed up to 300 percent.<sup>26</sup>

Concerning physical impairments and reduce driving abilities, there is less understanding of the relationship between the two. Fortunately, some physical limitations in seniors, such as decreased arm strength, were overcome with improvements in power steering and maneuverability of automobiles.<sup>27</sup> More research is needed to determine if physical training and exercise programs positively affect seniors' driving abilities.

One other facet of this issue concerns improving functional impairments through the use of educational programs for the elderly. These programs focus on presenting information to seniors about how the aging process affects visual, cognitive, and physical abilities related to driving.<sup>28</sup> Coping strategies including adaptations to strategic, tactical, and operational driving behaviors are also an integral part of these training programs. Although these programs appear to provide excellent information to seniors, they have not proved that they reduce senior driver accident rates, particularly in the long run. In fact, one recent study of 403 older drivers found that educational programs for visually impaired, high-risk older drivers did not improve driver safety, although it did lead to improvements in increased self-regulation and avoidance of certain driving situations.<sup>29</sup>

## **Elderly Driver Licensing Laws**

Although state DMVs have increased graduated driving privileges for younger drivers, less action has occurred concerning older drivers. However, tougher renewal restrictions for older drivers, often called de-licensing laws, are gaining momentum in some states. Some of the areas the states are focusing on for elderly drivers include the following:

- In-person renewal only
- Renewal length period
- Vision testing
- Field driver testing
- Simulating driving tests
- Physician roles and medical advisory boards

### ***In-Person Renewal Only***

During the last decade, more states have allowed drivers to renew their driver's licenses over the mail or via the Internet. For example, Wyoming allows drivers of any age to renew via mail every other 4-year renewal cycle, with visual acuity documentation. Thus, a driver aged 76 could drive until age 84 before they have to appear at the state DMV.<sup>30</sup>

More states, however, have recently imposed stricter renewal requirements on seniors. For example, Virginia has a 5-year renewal cycle and drivers may use alternative methods of renewing their license every other cycle. Alternative methods include mail-in, Internet, touch-tone telephone, and fax. Until July 1, 2004, persons of any age could renew every other cycle via these alternative ways. On this date, however, drivers age 80 and older are required to appear in person every 5 years to renew their license at the Virginia DMV and pass a visual test.<sup>31</sup>

More states need to consider stricter renewal requirements for seniors, based on the results of certain studies. One study released in 2004 indicated that states with stricter renewal procedures for elderly drivers reported lower driver fatality rates.<sup>32</sup> This correlation was especially prevalent in drivers over age 85. The study found that a longer time period between in-person license renewals led to higher accident and fatality rates, concluding that there were fewer opportunities for license officials to observe the physical and mental conditions of senior drivers whose abilities may have decreased over time.

### ***Renewal Length Period***

Additionally, a more frequent renewal interval may discourage older drivers with visual, cognitive, or physical disabilities to renew their license. Fifteen states, including Arizona, Colorado, Illinois, Indiana, Missouri, and others now require accelerated license renewal periods for senior drivers. Illinois has one of the strictest renewal requirements for elderly drivers, requiring drivers ages 81 to 86 to renew their licenses every 2 years rather than the standard 4 years for other drivers. Drivers age 87 and older must renew their licenses annually. Arizona drivers have renewal periods of 12 years: however, at age 65, the cycle is reduced to 5 years. Despite all the statistical data on elderly drivers and auto accidents, over 20 states still have no special renewal requirements for elderly drivers.<sup>33</sup> Some states, such as Indiana, have even reduced tighter restrictions for seniors. This state dropped its road test requirement for elderly drivers in 1998 after its DMV decided it did not have the authority to single out and perhaps discriminate against older drivers.<sup>34</sup>

### ***Vision Testing***

Although some states such as Kentucky do not require vision tests to renew licenses, even for elderly drivers, other states are beginning to place stricter vision testing for seniors. For example, Florida requires vision testing at each renewal for drivers over age 79 effective January 2004.<sup>35</sup> Studies indicate that tougher vision testing for seniors

does eliminate some risky drivers. An Illinois study indicated that approximately 1,200 drivers in the state ultimately failed their vision test during a 3-year study period.<sup>36</sup> A national study reviewing 10 years of motor vehicle fatality information (1990 to 2000) indicates that states with vision test laws were associated with lower fatality rates for drivers age 65 to 74 as compared to states without vision tests.<sup>37</sup>

### ***Field Driver Testing***

Some jurisdictions require field driving tests for senior driver's licenses renewals under certain conditions. For example, Washington, D.C. may require seniors to take the road test on an observational basis. Illinois, however, requires a road test for all drivers age 75 and older. One study compared accident rates of seniors in two states that required road tests at license renewal for drivers age 75 and older to accident rates in two states without such tests. The researchers found a 6 percent lower accident rate for seniors in the states with the road tests.<sup>38</sup> Yet other research, such as the 1998 Illinois study, has drawn no such correlations.<sup>39</sup>

### ***Simulated Driving Tests***

There is a promising movement toward the use of simulated testing for functional impairments among senior drivers. The Useful Field of View test has been instrumental in this process. One study indicated that older drivers with a 40 percent or greater impairment in their visual processing speed as measured by this test were more than twice as likely to be involved in a crash as drivers with no impairments.<sup>40</sup>

NHTSA initiated a major project in 1996 to study the feasibility and the scientific validity of performing functional capacity screening tests for senior drivers. This project, entitled the Model Driver Screening and Evaluation Program, provided strong evidence that functional capacity screening, conducted quickly and efficiently in office settings, could yield valid predictions about driving impairments and accident rates. A Maryland pilot study included measures that motor vehicle administrators manually collected. Most of the measures collected were elements of the Gross Impairments Screening

(GRIMPS) battery of tests, developed earlier. The GRIMPS battery included a test kit for administrators. Computer software that automated screening procedures was also developed for this project, initiated by Maryland motor vehicle administrators. In this study, a combination of manual and automated tests measured the following abilities:

- Visual Acuity (Near and Far)
- Visual Contrast Sensitivity
- Field of View
- Working Memory
- Directed Visual Search
- Visual (Divided) Attention Processing Speed
- Visualization of Missing Information
- Lower Limb Strength and Mobility
- Head-Neck Rotation<sup>41</sup>

Most of these tests took approximately 1 minute, with a few taking 3 or 4 minutes. The results of the Maryland Pilot Older Driver Study indicate that functional ability screening can effectively and inexpensively spot defects in the ability to drive safely. More efforts and improvements in the use of driver assessment technologies are important to pursue, particularly since the median age of American drivers continues to increase.

### ***Physician Roles and Medical Advisory Boards***

State DMVs take widely different positions about the role of physicians in restricting or eliminating senior driving privileges. For example, Alabama state law simply encourages, but does not require, doctors to notify the DMV about patient impairments that may adversely affect the patient's ability to drive.<sup>42</sup> In other states, such as New York and South Carolina, physicians are permitted but not required to report this information. Conversely, states like Nevada and New Jersey require physicians to report patients who have conditions characterized by a lapse of consciousness, such as epilepsy.

There is also no consistency among states concerning the role of Medical Advisory Boards (MABs). By law or administrative authority, MABs advise state DMVs on the medical aspects of driver deficiencies. These boards are often composed of several physicians with a variety of specialties and may also include a highway safety expert. MABs often advise state DMVs on medical reports submitted regarding the mental or physical disabilities of individual drivers, especially for borderline cases. Presently, over a dozen jurisdictions do not have MABs, often due to budgetary constraints. The AMA and NHTSA encourage all states to develop, maintain, and enlarge the role of MABs to enhance the assessment, rehabilitation, and support for senior drivers with functional weaknesses.

## **Highway Design**

The increasing numbers of older drivers presents special challenges for traffic engineers and highway designers. Engineering improvements and enhanced highway design will not only benefit older drivers but younger ones as well. The Federal Highway Administration (FHWA) has taken the lead in this critical area by developing a comprehensive set of guidelines and recommendations for improving the automobile transportation infrastructure. This effort led to FHWA's publication in 2001 of the *Highway Design Handbook for Older Drivers and Pedestrians*. This publication advocated a series of recommendations in special areas such as intersections, freeway interchanges, roadway curvature and passing zones, and construction/work zones.

### ***Intersections***

FHWA reported that for drivers age 80 and older approximately 50 percent of fatal crashes occur at intersections, compared with 23 percent or less for drivers under age 50.<sup>43</sup> This statistic is based on 2000 data from IIHS. Intersection operations, particularly left turns, involve complex speed/distance judgments under time constraints that can pose difficulties for elderly drivers. The largest reduction in senior driver

fatalities will likely occur with improvements in this area. Recommendations from FHWA regarding intersections include the following:

- Better nighttime visibility of signs, including larger font sizes and more distinct font types
- Improved pavement markings, including the use of retro reflective materials on the markings which clearly indicate the path through left turns
- Improvements in intersection geometry based on the latest engineering studies
- Widen lanes under certain circumstances to provide a margin of safety for older drivers, who tend not to position themselves properly within the intersection before taking a left turn
- Use protected-only signal operations for left turns
- Prohibit right turns on red lights at skewed intersections, in which the intersection angle is less than 75 degrees or more than 105 degrees
- Enhanced lighting for night-time exposures to intersections<sup>44</sup>

### ***Freeway Interchanges***

Freeway interchange improvements can also play a substantive role in reducing senior accidents and fatalities. Entering and exiting freeways requires drivers to process a great deal of directional information during a short period of time and at higher speeds, while modifying their position without disrupting the traffic flow. The FHWA referenced several studies that elderly drivers are over represented in these types of interchange crashes.<sup>45</sup>

Freeway interchange improvement recommendations from the FHWA include the following:

- Modify diagrammatic signs for exiting so that the number of arrow shafts on the sign clearly match the number of lanes on the roadway
- Increase the font size and improve lighting on freeway exit signs

- Expand the distance of entrance lanes onto the freeway
- To assist drivers who rely solely on mirrors (when merging onto freeways) because of decreased neck flexibility, implement parallel rather than taper design for entrance ramp geometry
- Improve pavement markings on exit ramps

### ***Roadway Curvatures and Passing Zones***

The FHWA cites research indicating that elderly drivers tend to be more involved in accidents on horizontal curves due to driving too fast for the curve or being surprised at the sharp degree of the curve. Recommendations for improvements in roadway curvatures and passing zones include the following:

- Enhance the lumination of white edgelines on horizontal curves
- Increase the width of the curving lane, including the paved shoulder, to at least 18 feet
- Add, improve, and increase the size of warning signs advising motorists of upcoming curves and no passing zones. An example is a sign with the message "SLOW/HILL BLOCKS VIEW."
- Increase the minimum required passing sight distances

### ***Construction/Work Zones***

Construction zones pose unique challenges to older drivers due to the zone's greater potential to violate driver expectancy in unfamiliar settings. Studies indicate that quick changes in highway geometry and operations require good visual and cognitive skills, which are lacking for some older drivers. Improvement recommendations include the following:

- Increased use of flashing arrow signs located at the taper for each lane closure

- Utilization of changeable and portable message signs displaying one phrase message (e.g., left lane closed ahead) should be located between 2,625 feet and 5,250 feet before the lane closure
- Increased utilization and enforcement of reduced speed zones in construction areas
- Use of positive barriers in transition zones between opposing two-lane traffic

This list is a small sampling of recommendations. For an exhaustive and detailed list, the *Highway Design Handbook for Older Drivers and Pedestrians* should be consulted.<sup>46</sup>

## **Vehicle Types, Design, and Adaptations**

Vehicle selection by seniors and automobile design improvements and adaptations can both play a significant role in reducing injuries and fatalities for elderly drivers.

### ***Vehicle Selection***

IIHS has conducted numerous studies concerning the crashworthiness of various vehicle types and sizes. Crashworthiness of automobiles is a critical area, especially for senior drivers due to their increased fragility. IIHS found that drivers and occupants of small two- and four-door cars involved in accidents typically experience higher death rates.<sup>47</sup> Some advocates of smaller cars claim that these vehicles have greater maneuverability and thus can more easily avoid accidents. The insurance claims data, however, does not support this opinion. Overall research suggests that seniors should drive sturdy mid-size or larger automobiles to reduce their vulnerability to serious injuries or fatalities in automobile accidents.<sup>48</sup> In addition, newer vehicles offer advantages over older vehicles with features such as driver and passenger frontal and side air bags and strengthened doors. Unfortunately, many seniors on limited incomes are unable to afford these newer and safer vehicles.

### ***Automobile Design and Adaptation Improvements***

There are a host of automobile design improvements that can reduce senior driver frequency and severity rates. For example, improvements in air bags and brake assistance systems are areas in which researchers are currently working.<sup>49</sup> Other areas for improvements and adaptations include the following:

- Improved steering wheel grips for persons with arthritis and spinal cord injuries
- Left foot accelerators for amputees
- Hand controls for those with post-polio weakness, spinal cord injuries, and multiple sclerosis
- Steps or running boards and assist handles to improve ingress into and egress out of automobiles for those with a variety of disabilities
- Dashboard and lighting enhancements for those with visual problems
- Improved rear and side view mirrors, perhaps with sensor devices, to reduce problems with nearby cars in the driver's blind spots<sup>50</sup>

More research is needed in these and other automobile adaptations.

### **Intervention Issues**

Removing a senior's driving privileges is a dramatic and life-altering event that can cause a host of resulting problems for seniors, such as isolation, loneliness, and depression. These can increase the likelihood of other health problems. It can also place further burdens on family members and friends, particularly those who are not geographically close to the senior. However, at some point despite all efforts to mitigate the driving weaknesses, some party must step in to intervene and take control of the situation before the senior is severely injured or killed in an automobile accident or seriously injures another person. Checklists may be used to initially determine whether

intervention is necessary. Family members and friends, physicians and DMVs may all be involved in the intervention process.

### ***Checklists***

Some experts believe the use of a checklist regarding an elderly person's driving abilities is the appropriate first step in this process. One company, Aging Solutions Financial Safeguards, Inc., has developed such a checklist. A sampling of such questions includes the following:

Does the elderly driver . . .

- Drive either too fast or too slow for the appropriate conditions?
- Ignore or misinterpret stop signs and traffic lights?
- Fail to yield the right of way to other vehicles or pedestrians?
- Fail to judge spacing in between cars?
- Have one or more accidents or near accidents in the recent past?
- Bump into curbs and inadvertently cross lane markings?
- Have difficulty turning his or her head, neck, or shoulders while driving?
- Become easily confused, frightened, or angry behind the wheel?
- Constantly become lost, even in familiar locales?<sup>51</sup>

If the answers to several of these questions are yes, intervention efforts may become necessary.

### ***Family Members and Friends***

If the family members and friends believe the senior involved should no longer drive, this issue must be addressed with him or her. In some cases, the elderly person may readily agree, but this is often not the case. If the elderly person still incorrectly believes he or she can drive safely, most experts and health care professionals believe intervention efforts should be undertaken. This approach entails confronting the senior driver as a group of concerned caregivers, including close family members, friends,

clergy, and other persons the senior respects and trusts. This intervention needs to be handled firmly but compassionately in order to overcome the driver's denial.

### ***Family Physician***

In many cases, the senior's physician should be contacted. In an extensive series of focus group meetings with senior citizens who had given up driving, nearly all agreed that the family physician should talk to the elderly person. As one panelist explained, "when the doctor says you can't drive anymore, that's definite." This study indicated that while family influence was somewhat limited, most agreed that if their doctor advised them to stop, then they would do so.<sup>52</sup>

To address the physician's involvement in this process comprehensively, the AMA, with support from the NHTSA, published the *Physician's Guide to Assessing and Counseling Older Drivers* in 2003. Doctors are encouraged to assess the seniors' visual, cognitive, and physical deficiencies as related to their driving abilities. Some of these limitations can be ameliorated. The physician is also encouraged to utilize the services of a driver rehabilitation specialist (DRS). The DRS develops and implements driver services and training for persons with disabilities. This specialist normally has a background in occupational therapy.<sup>53</sup>

For drivers with more severe disabilities, this training has not normally proven effective. If, after this process, the physician still believes the patient should cease driving, the physician should tactfully but firmly advise the patient accordingly. In many cases, seniors will voluntarily give up their driving privileges. If not, the physician may be required to report this situation to the state DMV for testing and the possible removal of the driver's license. This action can create liability problems for physicians if state law does not provide them legal immunity for such actions. For example, several states encourage or require doctors to report impaired drivers without explicitly offering them legal protection.<sup>54</sup>

The AMA has developed a series of recommendations regarding this complex issue, including the following:

- Improve physician's tools for accurately and efficiently assessing driving skills
- Increase availability and affordability of driver rehabilitation programs
- Increase research into the use of driver simulators for use at DMVs
- Enhance the role of state DMVs in promoting safety of senior drivers
- Increase legal protection for physician's good faith reporting of impaired drivers to state DMV's
- Develop, fund, and increase the role of MABs in every jurisdiction
- Increase public awareness of side effects of medicines known potentially to impair driving ability<sup>55</sup>

### ***Department of Motor Vehicles***

The state DMVs need to play a more active role in assessing driver abilities. There is a wide variation in DMV laws concerning renewal processes, assessment procedures, MABs, vision testing, road testing, and the use of driving simulators. In particular, state DMVs should take an individualized approach to removing a senior's driving privileges. MABs have proven invaluable in this process; however, many states do not utilize these boards or have abandoned them due to budgetary constraints.

### **Public Education**

The general public, and seniors in particular, need more information on how older people can safely maintain their driving privileges as late in life as safely possible. Driving rights represent independence, which promotes health and happiness. A national social marketing program providing this much needed information could assist elderly people in driving longer. It could also educate the general public of the common misconception that all drivers over age 75 are a menace to the highways. Personal automobile insurers should also play an active role in this educational process.

In addition to providing this information to older drivers and their family members, this same information should be shared among health care providers, transportation specialists, and state and local communities that deal with this issue.

### **Alternative Transportation Issues**

Once seniors lose their driving privileges, a heightened effort is necessary to provide them with as much mobility as possible. This benefits society as a whole because seniors that have been driving all of their lives can suffer emotionally and physically when they completely lose their driving rights unless efforts are made to mitigate this loss of independence. Alternative transportation options and issues to address include the assistance of family and friends, mass transit, volunteer and community services, improved land use and community design, and coordination of services.

#### **Family and Friends**

The first alternative transportation choice for most seniors who lose their driver's licenses remains riding in a family member or friend's automobile. This preference reflects the desires of seniors to share the company, security, comfort, and convenience of riding with family and friends. Unfortunately, with families more dispersed throughout the United States, this option is not always available. In addition, senior citizen's friends are often in the same age group and may not be driving either. Family members may also not be available to transport their parents to the doctor's office or for other reasons due to inflexible work schedules. Other transportation options must often be pursued.

#### **Mass Transit**

According to the Transportation Research Board of the National Academies (TRB), senior citizens use public transit for approximately 3 percent of their trips. Less than 12 percent of elderly persons have used public transportation during the last 12 months.<sup>56</sup> Older persons in the future are likely to travel more frequently and farther than the older

persons of today. In addition, these seniors tend to be residents of suburban or rural communities, where mass transit services are minimal or nonexistent. Most of the seniors in the next 20 or 30 years will have driven all their adult lives and will expect high-quality and convenient mass transit when they lose their driving privileges. This combination of factors presents unique challenges to mass transit planners today and in the near future.

Looking at the difficulties senior citizens currently face with mass transit, addressing user preferences and user needs, and developing short-run and long-run strategies are important in improving the entire mass transportation system for society's changing demographics.

### ***Mass Transit Difficulties***

The current mass transit system poses many challenges to senior citizens who are unable to drive. According to focus group studies in Florida, California, and Michigan, seniors often eschew mass transit services for various reasons, including health and mobility difficulties, heat, long waits, walking distance, the need to make appointments, logistics, and lack of information about available options.<sup>57</sup> Some seniors are also concerned about crime at bus stops and stations and subway systems. Due to delays, some have difficulty standing outside for long periods of time in a variety of uncomfortable weather conditions. Many bus stops are not covered and are without seating. Some seniors have physical limitations that make it difficult to climb on buses and have cognitive difficulties in understanding bus and train routes and schedules.

### ***Addressing User Preferences and Meeting User Needs***

Seniors desire transportation services that are reliable, frequent, convenient and close-by, comfortable, and low cost. TRB believes that mass transit agencies should focus on the following:

- Improving reliability
- Increasing flexibility
- Enhancing comfort<sup>58</sup>

The reliability of mass transit lies near the top of seniors' needs. Delayed buses and trains can lead to missed doctor's appointments and shaken confidence in the system. To improve the reliability of each system, mass transit administrators should focus on reconfiguring schedules to meet senior needs more flexibly, increase the monitoring of on-time performance, and implement technologies that give seniors real-time arrival information. On this latter point, the services of the U.S. Department of Transportation are being used to provide instant information on actual, and not scheduled, vehicle locations and arrival times through the use of electronic signs at transit stops and shelters as well as being posted on the Internet.<sup>59</sup>

Senior citizens of the future will have high expectations regarding the flexibility of mass transit systems because most are accustomed to owning and driving their own cars for their full adult lives. One strategy many experts recommend is to expand the use, emphasis, and funding of paratransit services. According to the Community Transportation of America, paratransit services are defined as kinds of "passenger transportation that are more flexible than conventional fixed-route transit but more structured than the use of private automobiles. Paratransit includes demand-response transportation services, subscription bus services, shared ride taxis, car pooling and vanpooling."<sup>60</sup> These are services that extend beyond standard bus services. Other strategies regarding enhanced flexibility include extending service hours and expanding service locations.

If the comfort of using mass transit services is improved, seniors will more likely utilize this option. Many elderly persons have never or rarely used bus services, believing the buses may not be clean or the drivers unfriendly. Thus, the problem may be one of seniors' preconceived notions of mass transit, assumptions transit agencies must overcome. Key strategies for increasing the comfort of mass transit for seniors include the following:

- Conduct travel training workshops with seniors to familiarize them with various mass transit services
- Train drivers to be more sensitive to the needs of older passengers
- Add shelters and seating at bus stops
- Improve the quality of the seating
- Assist the elderly with boarding onto and alighting from mass transit vehicles
- Assist seniors with their packages and other items<sup>61</sup>

### ***Short-Run and Long-Run Improvement Strategies***

TRB has developed a list of short-run and long-run strategies to increase seniors' mass transit usage. In the short-run, the following strategies should be adopted:

- Improve schedule reliability and supply real-time arrival and departure schedule information using state-of-the-art technologies
- Provide fully guaranteed ride home services
- Develop customer relations and "politeness" training for drivers, travel training for the elderly, and "bus buddies"
- Provide boarding and alighting assistance for disabled persons
- Expand reserve seats for the elderly
- Provide extra assistance for special events
- Minimize physical barriers, such as steep steps on buses or in subway stations<sup>62</sup>

In the long run, the mass transit agencies should offer an expanded array of services geared to seniors, offered at varying prices, to replace the “one-size-fits-all” methodology currently in use.

## **Volunteer and Community Services**

Communities need to develop unique approaches to this problem outside traditional mass transit services. For example, Maine has implemented the Independent Transportation Network (ITN). The use of volunteer car drivers for Maine’s seniors comes close to matching the services that friends and family members provide. ITN looks at the transportation needs of seniors as a consumer demand issue, rather than a social service.<sup>63</sup>

Other communities have utilized “car trade programs.” These consist of automobile trade-in programs in which participants donate the cars they no longer drive to the program in exchange for trips equaling the total value of the vehicle.<sup>64</sup>

Churches, temples, and volunteers can provide a foundation of support in many regions, especially in suburban and rural areas of the country. For instance, some religious organizations make available phone chains of volunteers that can take the elderly to the store, church or temple, medical and dental appointments, and to run simple errands. These services provide a side benefit of increasing social contact for the elderly and involving them more in community activities.

Businesses such as grocery stores, department stores, and drug stores should be more proactive in response to this problem by providing free or low cost delivery services. In addition, more seniors are feeling comfortable in the use of the Internet and an increasing number of products can now be purchased on line with low delivery charges.

The elderly, particularly in suburban areas, vastly underutilize taxi services. Many seniors avoid taxis due to seemingly high costs, but compared to all the various costs of

car ownership, they can be a real bargain. For example, car ownership costs include the following:

- Depreciation, often thousands of dollars annually
- Interest on car loans
- Car maintenance
- Gasoline
- Automobile insurance
- Parking or storage costs
- Safety inspections
- License tags

According to the Department of Labor's Bureau of Labor Statistics, car ownership costs are the second largest household expense in the United States. The Bureau's 2002 figures indicate that the average household spends slightly over \$7,000 per year on automobile-related costs.<sup>65</sup> In fact, the average household spends almost as much on their cars as they do on food and health care combined for their entire family. In addition, many of these costs continue regardless of how many miles are driven per year. The use of taxis makes particular sense, from a financial perspective, when the number of annual miles driven is very low, such as 2,000 or 3,000 miles. Efforts at subsidizing taxi rides for the elderly poor, especially where mass transit is limited or unavailable, should also be encouraged.

### **Improved Land Use and Community Design**

The fast growth of suburban communities, which skyrocketed after World War II, resulted in homes scattered across the city and beyond. This phenomena has left seniors remaining in those communities, completely automobile-dependent and thus often stranded when they lose their driving privileges. New land use approaches should be considered, where neighborhood living can lessen the dependency on the automobile.

Land use/planning and zoning and community designs with seniors in mind can help integrate services, such as medical and dental facilities, houses of worship, shopping, assisted living facilities, and social centers that seniors depend upon.

### **Coordination of Services**

Many types of specialized transportation services for the elderly rely on federal, state, and local funds. These services, however, may be fragmented and improperly coordinated and often unavailable. Partnerships among these providers should be developed, often merged with private and volunteer efforts, to reduce service inefficiencies, redundancies, and gaps to better serve elderly persons who no longer drive.<sup>66</sup>

### **Further Research**

As an overview, the U.S. Department of Transportation advocates key research initiatives and efforts in three vital areas:

- Determine the relationships between driving skills and age-related visual, cognitive, and physical limitations
- Establish the relationship between the loss of driving privileges, aging, and societal costs for the elderly
- Determine technology's role in improving mobility and safety for the elderly<sup>67</sup>

On a more specific level, additional research is needed to answer the following questions:

- Has the relaxation of driver's license renewal standards such as longer renewal periods and renewals via the mail and the Internet resulted in more accidents for senior drivers?
- What are the costs and the potential benefits of significantly improving the nation's highways and roads to reduce automobile accidents for seniors?

- Do physical training and exercise programs positively affect seniors' driving abilities?
- Do automobile adaptations for senior drivers result in lower accident rates?

## **Conclusion**

In one study, a health maintenance organization in California asked senior citizens their greatest fears for the future. *Parade Magazine* published these findings and their answers were surprising.<sup>68</sup> The respondents discussed personal security issues, such as robbery and assault, and financial security, such as the loss of savings and health insurance. Health-related issues, such as cancer, heart problems, and Alzheimer's were mentioned even more frequently, including health concerns about spouses. Yet at the top of the list, ahead of all other concerns, was the loss of driving privileges.

This issue will become even more important during the next 30 years when the number of elderly drivers is expected to double. To alleviate these concerns, increased efforts must be made to gauge more accurately the effects of aging on driving abilities. Improvements in health care for the elderly will also play a pivotal role in improving their driving ability. Advances in highway design with an aging population in mind are necessary. Enhancements in vehicle design may also reduce the frequency and severity of senior driver accidents. In addition, when a senior citizen loses his or her driver's license, strong efforts must be made to provide them safe, affordable, comfortable, and reliable transportation.

A balancing act is required for this multi-faceted issue. On one hand, American streets, highways, and freeways need to be safe, and removing severely impaired drivers from the roadways is an important step in this process. Conversely, most senior drivers cherish their independence, and a loss of driving privileges often results in a host of other personal and societal problems. Society needs to assist the elderly in driving as long as safely possible. However, when driving skills continue to deteriorate, individual

assessments of each person's ability with involvement from family members, the family physician, MABs, and state DMVs are essential in making these critical decisions.

This effort should be pursued now, attacking this complex issue from a variety of angles. Proactively addressing this challenge in the near future and not in 30 years will result in great strides toward resolving one of the most important transportation and safety issues the United States will face in the coming decades.

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