

# Driving Risk Among Seniors with Hearing and Vision Loss

By Dennis A. Colucci, AuD, MA, ABA, FAAA

Driving mobility is essential to maintaining independence and quality of life, regardless of age. As we get older, age-related changes encroach upon important physical and psychological abilities, diminishing our senses, cognition, and mobility. Because of these issues, driving concerns increase with age. Allen, et al., analyzed the driving concerns of 751 older adults (65-97 years old) against driving skill, behavior, and experience,<sup>1</sup> and found that 84 percent had at least one driving concern. Specifically, 44 percent were concerned with other's driving, 34 percent about their own driving, and 24 percent about driving conditions. Noting age-related changes and resulting apprehensions, it is not surprising that falls and automobile crashes are the leading causes of injury and death in seniors.<sup>2</sup> From the audiologist's viewpoint, understanding how hearing loss and dual sensory impairments increase this risk is crucial to patient care, especially counseling.

## SENIOR DRIVING & ACCIDENT

In 2017, 44 million licensed drivers in the United States were 65 years and older.<sup>2</sup> By 2025, seniors are projected to make up 25 percent of the driving population.<sup>3</sup> These cohorts are also reported to be 16 percent more likely to cause an automobile accident than adults aged 25-64 years, and 573 percent more likely to cause death from a car accident. The National Highway Traffic Safety Administration reported these

About nine to 17 percent of older drivers have a dual sensory impairment, putting them at a much higher risk for motor vehicle accidents and injury.

motor vehicle accidents (MVA) are primarily due to changes in physical ability, cognitive decline, and visual impairment. Others point to the impact of medications on driving.<sup>4</sup> Fournier, et al., evaluated 373,818 seniors matched with 744,663 controls who demonstrated increased risks of MVA from long-acting



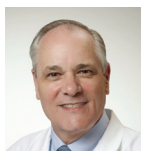
Shutterstock/Lisa F. Young

benzodiazepines (tranquilizers) and antidepressants. Of note, concurrent intake of these drugs was reported to increase MVA risk by 37 percent. Other medical conditions also affect driving, such as post-traumatic brain injury,<sup>6</sup> Parkinson's disease,<sup>7</sup> dementia, or eye diseases such as glaucoma,<sup>9</sup> diabetic retinopathy, age-related macular degeneration, and cataracts.<sup>9</sup> Eye diseases can impact visual acuity, but impairment of the "visual field" or "visual contrast" results in the greatest degree of risk for MVA, self-restriction, and driving cessation. Adding hearing loss to these issues increases MVAs and fatalities.

The primary issues for senior drivers are believed to be related to "...higher cognitive functioning, vision, motor control, intact coordination, and an ability to maintain attention."<sup>10</sup> But what about hearing loss? Research on older adults has shown that hearing impairment, vision impairment, and dual sensory impairments are independently correlated to cognitive decline, which, when significant, also diminishes driving performance. About nine to 17 percent of older drivers have a dual sensory impairment, putting them at a much higher risk for MVA and injury.<sup>9</sup> In general, fatal-crash driver-involvement rates per 100,000 licensed seniors 85 years and older were 34.30 percent for males and 12.41 percent for female drivers compared with 11 percent for those below 65.<sup>4</sup>

## HEARING LOSS, MVA & AT-FAULT RISK

A disabling hearing loss is defined by average thresholds (0.5, 1, 2, and 4 kHz) of greater than 40 dB HL in the better hearing ear.<sup>11</sup> This "better hearing ear" cutoff is universally accepted because significant functional effects of hearing impairment are generally considered to occur beyond this point.<sup>12</sup> This is different from ratings for whole person impairment (WPI) and worker's compensation, which use a four-frequency average (0.5, 1, 2, 3 kHz) cutoff starting above 25 dB.<sup>13</sup> At 40 dB of hearing loss in both ears, the WPI is 22.5 percent. These



Dr. Colucci is a clinical and forensic audiologist in private practice in Laguna Hills, CA.

standards are designed to evaluate the impact of hearing loss on daily activities centering on the ability to hear speech. In the case of seniors, what is the degree of hearing loss that does not significantly increase MVA risk, at-fault risk, or death? Is it normal hearing, hearing loss in one ear, both ears, or various frequency combinations?

When hearing is significantly impacted, a burden is placed on the brain's neural networks and aspects of driving performance. In a study by Hickson, et al., 107 seniors between 62 and 88 years old were evaluated for driving performance using auditory and visual distractions.<sup>12</sup> Hearing level was reported for the better hearing ear using a four-frequency (0.5, 1, 2, and 4 kHz) average. They found "... a significant interaction between hearing impairment and distracters, such that people with moderate to severe hearing impairment had significantly poorer driving performance in the presence of distracters than those with normal or mild hearing impairment."<sup>12</sup>

**Helping older patients understand the impact of aging and sensory impairments on driving abilities can go a long way in ensuring their safety.**

Green, et al., evaluated 2,000 licensed seniors aged 70 years and older with hearing loss only, vision loss only, and dual sensory impairments.<sup>9</sup> When hearing was within normal limits or mild hearing loss (< 40 dB HL) was measured in the better hearing ear, this group had essentially no increased risk for MVC (relative risk[RR] of 1.03; 95% CI 0.86-1.24). However, at-fault collisions for drivers with "visual contrast sensitivity" (makes objects distinguishable) alone had an RR of 1.42 (95% CI 1.00-2.02). For those with moderate or greater hearing loss and contrast sensitivity loss, the RR was 2.41 (95% CI 1.62–3.57). Remarkably, the researchers found "no significant elevation in adjusted MVC rates in older drivers with hearing loss or visual acuity (ability to discern letters/numbers) impairment alone."<sup>9</sup> However, those with visual contrast sensitivity issues and moderate or greater hearing loss were nearly 2.34 times more likely to get into an accident than those with good hearing.

In another study, Edwards, et al., did a secondary analysis of 500 seniors between 63 and 90 years old to evaluate their driving mobility and answer this question: Do hearing impaired seniors change driving habits as they age?<sup>14</sup> Hearing

loss was evaluated in the better ear using the three-frequency average (.5k – 2 kHz) divided between normal (< 25 dB), mild (26 – 40 dB), and moderate and above (> 41 dB). Visual field testing was used to estimate the risk for adverse motor vehicle events. Remarkably, regardless of the degree of hearing impairment, driving mobility was not altered, although the risk of MVA was proportionally higher in those with moderate or greater degrees of hearing loss and advanced age. It is clear: Seniors continue to drive regardless of hearing impairment unless absolutely necessary. Among those with moderate to severe hearing loss, only 55 percent wore hearing aids.

When considering senior driving, vision and hearing are primary senses. As impairments become moderate to severe, concerns over safety ensue. Changes to one's vision, especially the visual field and contrast sensitivity, impact driving abilities more than hearing loss alone, and dual sensory impairment poses an even more substantial risk. Unfortunately, the National Institute of Deafness and Other Communication Disorders states that "among those age 70 and older who could benefit from wearing hearing aids, fewer than 30 percent have ever used them" and the incidence of vision loss is more prevalent in those 65 years, but is an area of care neglected in the senior population.<sup>15</sup> Encouraging seniors to seek out vision care and wear hearing aids is more than improving communication alone.

## ROLE OF TECHNOLOGY & AUDIOLOGY

Identify warning signals while driving is challenging for those with hearing, visual, or dual sensory impairment. To address these concerns, automobile innovations are being developed, such as Hyundai's alerting devices that provide visual and tactile cues for emergency vehicles, distance between obstacles, and accident avoidance. Hyundai has a prototype with colored LEDs and vibration points on the steering wheel capable of navigational information.<sup>16</sup>

Audiologists have the opportunity to discuss driving safety and provide guidance to concerned seniors. In addition to hearing and balance-related questions, patient intake forms should include a self-assessment for driving concerns and vision impairment. Audiologists can provide patients with helpful resources such as safety tips from AARP<sup>17</sup> or the CDC's MyMobility Plan,<sup>2</sup> which outlines alternative mobility methods for those who are unable to drive safely but want to maintain their independence. Helping older patients understand the impact of aging and sensory impairments on driving abilities can go a long way in ensuring their safety. 