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The Effects of Medical Conditions on Driving

Drivers must draw upon a range of visual, cognitive, and physical abilities to operate a motor vehicle safely, and some chronic medical conditions have the potential to compromise these functional capabilities. The prevalence of medical conditions increases sharply with advancing age (National Center for Health Statistics, 2010), and the proportion of the U.S. population 65 and older has grown by a third in the past decade (U.S. Census Bureau, 2020). Older people continue to rely on driving to maintain independence in their communities, but only half of health care professionals are comfortable with their knowledge of medical-related driving impairments (Meuser et al., 2010). This Traffic Tech summarizes findings from a systematic literature review on the effects of chronic medical conditions on driving. For a detailed review of each condition, as well as more information about the Methods and supporting references, please see the associated final report.

Methods

The research team conducted a preliminary search for research that examined the effects of medical conditions or associated functional impairments on driving performance and safety. The research team then used the search results as a guide for discussions among professionals in the fields of driver rehabilitation, medicine, medical fitness to drive, geriatrics, and polypharmacy. Finally, the team selected a set of 10 medical conditions for the systematic review.

The search included six databases (TRID, PsycINFO, PubMed, SafetyLit, Web of Science, Google Scholar) for research published from 2012 to 2020 in peer-reviewed journals, technical reports, and government reports. The primary criterion for inclusion was that a study related one of the selected medical conditions to driving safety, performance, or indirect measures linked to safety (e.g., functional abilities). The research team also evaluated the quality of each study included in the review using a rubric based on existing instruments.

Results

Attention Deficit Hyperactivity Disorder

ADHD is a neurodevelopmental disorder that often results in impulsiveness, attention difficulty, and hyperactivity.

The research team reviewed 27 studies. Overall, the studies found that drivers with ADHD had higher crash risk, were more likely to engage in risky driving behaviors, and had worse driving performance than drivers without ADHD, and risk may increase with symptom severity. However, some research found that medications to treat ADHD reduced driver risk.

Autism Spectrum Disorder

ASD is a chronic developmental disability that generally appears before the age of 3 and affects social interaction, verbal and non-verbal communication, and cognitive function. The research team reviewed six studies. The studies indicated that drivers with ASD differ from neurotypical drivers in driving behaviors like gaze orientation, reaction time, and vehicle maneuvering, but drivers with ASD were also more likely to exhibit some safe behaviors like checking for cross-traffic and using turn signals. No studies published in the review period examined the crash risk of drivers with ASD.

Cardiovascular Disease

CVD, also called heart disease, affects the heart and its blood vessels and is the leading cause of death in the United States. The research team reviewed 10 studies. Some research indicated that drivers with CVD perform worse than healthy controls on measures of driving performance and cognitive function. While fatal crashes involving drivers experiencing acute CVD events are almost always single-vehicle crashes, no studies published in the review period examined the effects of chronic CVD (outside of acute events) on crash risk.

Diabetes

Diabetes affects levels of glucose in the blood. Prolonged diabetes can result in neuropathy, CVD, foot damage, hearing impairment, and Alzheimer's disease. The research team reviewed 14 studies that indicated shifts in glucose level can affect driving performance for drivers with diabetes. However, evidence that diabetes generally increases crash risk was mixed, and no studies specifically examined the impact of hypoglycemic (low blood sugar) or hyperglycemic (high blood sugar) events on crashes.

Mild Cognitive Impairment

MCI affects memory and cognitive performance and may develop with increased age. The research team reviewed 11 studies. Evidence that drivers with MCI differ on measures of driving performance from those without was mixed, and there were no studies published within the review period that examined crash risk. Variability in how MCI presents between individuals and the presence of co-morbidities affect the quality and quantity of research in this area.

Obstructive Sleep Apnea

OSA affects airflow during sleep. Noticeable symptoms include snoring, excessive daytime sleepiness, and morning headaches. The research team reviewed 15 studies that suggested a higher risk of crash among both commercial and non-commercial drivers with OSA. However, heterogeneity in driving performance among drivers with OSA makes it difficult to discern the mechanisms that may underlie increased risk. The use of positive airway pressure (PAP) treatment improved driving performance and safety among drivers with untreated OSA.

Peripheral Neuropathy

PN affects nerves in the body, most often the hands and feet. Symptoms include loss of sensation and pain in the affected areas. The team reviewed six articles that suggested that drivers with history of PN differed from healthy controls or patients without PN on measures of driving performance. However, no studies published in the review period examined whether these performance differences translated to increased crash risk. There was some evidence that drivers with PN improved their driving performance with practice or a reduction in the distance between the accelerator and brake pedals.

Stroke

A stroke interrupts blood supply to the brain, causing cell death. Symptoms can include face drooping, arm weakness, and speech difficulty. The research team reviewed 14 studies. Cognitive impairments associated with stroke were more likely to affect driving performance than vision or motor impairments. However, drivers with prior stroke did not appear to have increased crash risk compared to drivers with other medical conditions (e.g., diabetes and CVD). There was also evidence that drivers with prior stroke used self-regulation and compensatory techniques to maintain the ability to drive safely.



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Syncope

Syncope is when a person faints or loses consciousness from a sudden drop in blood pressure but recovers quickly. The research team reviewed three articles. While one study suggested increased crash risk for drivers with history of syncope, others found that the likelihood of fainting while driving was low. The small number of studies included in the review do not permit any firm conclusions about the effects of syncope on driving.

Traumatic Brain Injury

TBI is caused by a blow or other traumatic injury to the head or body. The research team reviewed 15 articles. Overall, the studies suggested that drivers who experience TBI have increased crash risk, particularly when driving during higher-risk scenarios (e.g., at night, when impaired by drugs or alcohol). Drivers with TBI also show reduced driving performance and slower reaction times. However, many drivers with TBI self-restrict their exposure to challenging driving situations.

References

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- Download a copy of *Updated Literature Review of the Effects of Medical Conditions on Driving* (DOT HS 813 503) from the National Transportation Library (https://rosap.nhtl.bts.gov/collection/nhtsa_bsr).

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