Examining the Seizure Standard for Commercial Motor Vehicle Drivers: Evidence Report, Systematic Review, and Medical Expert Panel Report

BACKGROUND

Seizures and epilepsy impact an estimated 0.5 percent of the worldwide population, with approximately 2 million individuals affected in the United States. Epilepsy may be associated with cognitive and visual impairments and may be difficult to treat, especially among safety-critical workers such as drivers, because the adverse effects of antiepileptic drugs also include cognitive impairments. Different countries and States have varying requirements regarding driving with a history of seizures. Yet most requirements do not differentiate by seizure type, even while listing different requirements for drivers with epilepsy. A Federal Motor Carrier Safety Administration (FMCSA) regulation states in part that an individual is physically qualified to drive a commercial motor vehicle (CMV) in interstate commerce if the individual has "no established medical history or clinical diagnosis of epilepsy or any other condition which is likely to cause loss of consciousness or any loss of ability to control a commercial motor vehicle." However, FMCSA issues exemptions from this regulation for select drivers who meet criteria based primarily on long periods of medical stability without a seizure.

OBJECTIVES

FMCSA identified seven key questions to address in this study. The first five addressed risk of seizure recurrence over time for individuals who have or have had unprovoked seizures, provoked seizures, a seizure caused by stroke, epilepsy, or surgery for epilepsy. The sixth addressed commercial driving requirements in the United States and driving requirements generally in select countries regarding seizures. The seventh sought expert recommendations for the current processes to address seizures among potential CMV drivers.

METHODS

The first five key questions were addressed with a systematic review, the results of which were incorporated into an evidentiary report. The team searched PubMed, Scopus, Cumulative Index to Nursing & Allied Health, Cochrane Library, and Google Scholar. Key question 6 was addressed for the 50 United States and the District of Columbia (collectively, States) by searching in legal databases and State department of motor vehicle websites and by calling States for additional information. The team addressed international requirements via website searches. Key question 7 was addressed by a medical expert panel.

RESULTS

The risk of seizure recurrence over time after a first unprovoked seizure is a hyperbolic function: a rapid initial decrease in risk followed by a slower decrease. There is a high degree of confidence that the same type of mathematical risk relationship is present regardless of whether the individual is treated with an antiepileptic drug or not. Table 1 shows an example of the data findings for seizure recurrence after a first unprovoked seizure treated and untreated with antiepileptic drugs.

There are no quality data to address risk of seizure recurrence after a provoked seizure.

There is low confidence in a quantitative predictability of seizures after a first seizure caused by stroke, aside from some evidence that late occurrence of seizure after stroke predicts higher risk of recurrence.

Most of the risk for seizure recurrence among individuals diagnosed with epilepsy is in the first year after a seizure. There is a high degree of confidence that the same type of mathematical risk relationship is present regardless of whether the individual is treated with antiepileptic drugs. However, the magnitudes of risks are higher among those untreated.

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Table 1. Relationship of seizure recurrence by time since a first unprovoked seizure.

Time Interval	Sample in this time frame (n)	Number with recurrent seizures	Individual risk estimate at each time point (%)	Predicted risk from equation (%)
6 months	4429	1258	28.50%	25.85%
12 months	4195	794	22.72%	19.73%
18 months	2183	257	11.77%	15.06%
24 months	2450	232	9.77%	11.50%
36 months	1094	84	6.57%	6.70%
48 months	810	19	4.30%	3.90%
60 months	427	10	2.81%	2.28%
72 months	280	3	1.07%	1.33%

There is moderately high confidence that seizure recurrences are common among post-surgical patients treated surgically for refractory epilepsy.

The report lists the requirements for States and select countries for driving in relation to seizures. There are some States that have intrastate commercial driver certification regulations regarding seizures.

EXPERT RECOMMENDATIONS

The medical expert panel determined that the findings did not include evidence strong enough to support major changes to the regulation or exemption criteria, but several minor changes were advised. Multiple recommendations for clarifying definitions and the eligibility criteria for exemptions were developed.

With respect to provoked seizures, the medical expert panel concluded the risk of seizure recurrence for individuals incurring a provoked seizure was not significantly increased if the seizure was due to a reversible factor and that factor is eliminated or avoided. The panel also offered an updated definition of provoked seizure.

Prior to 2014, epilepsy was defined as 2 or more unprovoked or reflex seizures at least 24 hours apart. Since 2014, epilepsy has been defined by the International League Against Epilepsy (ILAE) as a disease of the brain defined by any of the following: (1) at least 2 unprovoked (or reflex) seizures occurring more than 24 hours apart; (2) 1 unprovoked (or reflex) seizure and a probability of further seizures similar to the general recurrence risk (at least 60 percent) after 2 unprovoked seizures, occurring over the next 10 years; or (3) diagnosis of an epilepsy syndrome. Epilepsy is now classified by the ILAE as resolved when an individual has been both seizure free for 10 years and off antiepileptic drugs for 5 or more years.

The medical expert panel advised that FMCSA's regulation be clarified for the prospective driver to not have a "current" diagnosis of epilepsy. It was recommended that FMCSA consider epilepsy to be resolved when an individual has been both seizure free for 10 years and off antiepileptic drugs for 5 or more years. The panel also suggested that FMCSA's exemption criteria for when there is an epilepsy/seizure disorder diagnosis be modified to provide the applicant should be seizure free "for at least 8 years" rather than "for 8 years."

It was noted that there are now many surgical procedures to treat epilepsy, most of which have no quality data to provide risk estimates. The panel stated the studies that provide risk estimates, particularly for temporal lobe epilepsy, show the estimates for seizure recurrence are high.

The medical expert panel found the risks of conversion from sleep epilepsy to a seizure while awake was too high to advise changes to current FMCSA seizure exemption criteria. In contrast, the panel recommended that the issue of multiple epileptogenic foci should be distinguished in the exemption criteria.

To read the complete report, please visit: https://rosap.ntl.bts.gov/view/dot/67563