

Driving and epilepsy: a risk assessment

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Abstract

Every driver has a risk of an accident. People with epilepsy have a higher relative risk, but when does this risk become acceptable? This depends on: the likelihood of a further seizure, the proportion of seizures leading to an accident, the driving time, and the driving task (private versus commercial drivers). Duration of seizure freedom and the risk of seizure recurrence are linked. The risk of seizure recurrence for private motor vehicle driving becomes acceptably low for a first-ever seizure after 6 months of seizure freedom, and for epilepsy after about 12 months of seizure freedom, dependent on several factors. Commercial drivers require a far greater duration of seizure freedom before returning to driving.

INTRODUCTION

Driving restrictions may have an important influence on employment, educational and social opportunities. Dependence on others and public transport may create major difficulties in some remote and rural areas. Driving may also be regarded as a mark of independence or freedom.

Should people with epilepsy be allowed to drive? A number of factors require consideration. Every driver has a risk of an accident. In Australia, insurance claims relating to accidents are lodged by 15% of drivers/year, and crashes bad enough to be reported to police involve about 1% of drivers/year.^{1,2} Some drivers have a higher relative risk of having a motor vehicle accident, and the situation for people with epilepsy is no different to that for many other drivers. The highest accident rate ratio (relative risk) for a driver with epilepsy who is complying with guidelines is about two, comparable to or lower than the increased accident rate the community accepts for many drivers: including younger people (<25 years, especially males), older people (>70 years) and those driving within the legal alcohol limit of <0.5%.³ Fatal accidents are much more commonly related to young drivers (<25 years old, especially males).³ It seems only fair to accept an increased risk for epilepsy that is comparable to that accepted by the community for others.

WHAT FACTORS DETERMINE THE RISK OF DRIVING IN EPILEPSY?^{3,4}

1. Driving time (very important, and highly variable)

2. The Chance of an Occurrence of a Seizure (whilst awake) in the next Year (COSY)
3. Proportion of seizures that leads to an accident: for private licenses the accident rate is about 50%-60% per seizure and for commercial driver about 80%, given the greater risks of controlling heavy vehicles.
4. The likely outcome of an accident: for a private license assume 21% serious (including 3% chance fatality), and for commercial drivers higher given the vehicle size.

Calculating an individual's relative risk compared to general population can use these factors and the formula: **R (Relative risk) = (COSY.D.X) / F+1**

where

COSY = Chance of Occurrence of Seizure/Yr

D = Driving time/yr (as a proportion)

X = probability of a seizure at the wheel causing a fatal accident

compared to:

F = overall community Fatal (or other) accidents per driver/yr

When licensing authorities and the community determine what the acceptable relative risk will be, then the formula can be rearranged to derive the acceptable COSY {COSY = (R-1).F / (D.X)}

WHEN IS IT ACCEPTABLE TO RETURN TO DRIVING?

For a driving time of 1 hour per day (D, 1 hour per day as a proportion/year = 0.042); a 60% chance of causing an accident, 3% fatal (X =

0.018); an acceptable relative risk of three ($R = 3$); and overall community fatal accident per driver/yr of 1 in 7,000 ($F = 0.00014$), then for private motor vehicle licensing the acceptable Chance of Occurrence Seizure/Yr (COSY) = 0.37 (37%), or a monthly risk of 3%. Similar results are obtained using reportable accidents in Australia rather than road fatalities.

A longer seizure-free interval correlates with less chance of seizure recurrence. Whilst recurrence rate varies depending on the epilepsy syndrome, a pragmatic approach is to use overall figures.

After a first-ever seizure, the cumulative probability of seizure recurrences is 23% at 3 months, 33% at 6 months and 41% at 12 months.⁵ The risk of recurrence falls with time, to become acceptable after about 6 months. For epilepsy, after 2 or 3 seizures, about 75% have further seizures within 3-4 years (45% within 6 months, 14% from 6 - 12 months, and 16% after 12 months).⁶ The residual risk of seizure recurrence becomes acceptable for a private motor vehicle license after about 12 months of seizure freedom. However, these calculations are based on a driving time of 1 hour per day, and increasingly longer driving times require increasingly longer seizure-free intervals to achieve an acceptable conditional probability of seizure recurrence.

Commercial drivers require an even longer seizure-free time to achieve an acceptable conditional probability of seizure recurrence. Commercial drivers use heavier vehicles, with a potentially higher danger from accidents, and drive for longer periods. The overall risk is increased about 20 fold, therefore a COSY of 2% is acceptable (a 2% seizure risk in the next year, or 0.17% per month).³ For commercial licenses, after a first seizure, 5 years of seizure freedom is recommended, and for epilepsy a conditional license may be issued with: seizure freedom for 10 years; or a past single seizure due to exceptional and non repeatable circumstances.

The specific epilepsy syndrome is relevant to prognosis, but not to overall regulations. Important other factors to consider are the effects of the underlying cause of epilepsy are associated problems, if any (cognitive, visual and physical disabilities; progressive neurologic disorder; alcohol overuse). These will add to or even multiply risks.

Most importantly, patients must demonstrate personal accountability for epilepsy treatment; with honesty, compliance with medications, adequate sleep, avoiding alcohol and other drugs

when driving and with regular medical follow-up. Seizure freedom should be verified by others who know the patient.

CONCLUSION

Many people with epilepsy will be able to drive a private motor vehicle with appropriate management and accurate risk assessment, including an adequate seizure-free interval.

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