**Antiepileptic drug treatment after an unprovoked first seizure: A decision analysis**

Erik L. Bao1\*, Ling-Ya Chao1\*, Peiyun Ni1\*, Lidia M.V.R. Moura2, Andrew J. Cole2, Sydney S. Cash2, Daniel B. Hoch2, Matt T. Bianchi2+, M. Brandon Westover2+

1 Harvard-MIT Health Sciences and Technology, Harvard Medical School, Boston, MA, USA.

2 Department of Neurology, Massachusetts General Hospital, Boston, MA, USA.

\* These authors contributed equally to the manuscript.

+ These authors contributed equally to the manuscript.

**Supplemental Data**

**Table e-1. Markov Model Transition Probabilities.**

|  |  |  |
| --- | --- | --- |
| **Transition Probabilities** | **Source** | **Probability (%)** |
| Adverse side effects to AED treatment | Marson et al, 20051: 0.31  FIR.S.T, 19932: 0.07  Chandra et al, 19923: 0.09  Gilad et al, 19964: 0.20  Ruggles et al, 20015: 0.27 |  |
| Death, seizure-free | US life table6 | \* |
| Death, not seizure-free | US life table6  Fazel et al, 20137  Hotan et al, 20168 | \*,  where |
| Seizure recurrence after first seizure, years 0-2 | Marson et al, 20051 |  |
| Seizure recurrence after first seizure, years 2-5 | Marson et al, 20051 |  |
| Seizure recurrence after first seizure, years 5-8 | Marson et al, 20051 |  |
| Seizure recurrence after first seizure, 8+ years | Marson et al, 20051 |  |
| AED treatment efficacy on reducing recurrent seizure rate | Marson et al, 20051 |  |

\* muASR is a function that draws age-specific mortality rates obtained from US life tables.

**References**

1. Marson A, Jacoby A, Johnson A, et al. Immediate versus deferred antiepileptic drug treatment for early epilepsy and single seizures: a randomised controlled trial. The Lancet 2005;365:2007-2013.

2. Randomized clinical trial on the efficacy of antiepileptic drugs in reducing the risk of relapse after a first unprovoked tonic-clonic seizure. First Seizure Trial Group (FIR.S.T. Group). Neurology 1993;43:478-483.

3. Chandra B. First seizure in adults: to treat or not to treat. Clinical neurology and neurosurgery 1992;94 Suppl:S61-63.

4. Gilad R, Lampl Y, Gabbay U, Eshel Y, Sarova-Pinhas I. Early treatment of a single generalized tonic-clonic seizure to prevent recurrence. Archives of neurology 1996;53:1149-1152.

5. Ruggles KH, Haessly SM, Berg RL. Prospective study of seizures in the elderly in the Marshfield Epidemiologic Study Area (MESA). Epilepsia 2001;42:1594-1599.

6. Arias E, Heron M, Xu J. United States life tables, 2012. Hyattsville, MD: National Center for Health Statistics, 2016.

7. Fazel S, Wolf A, Långström N, Newton CR, Lichtenstein P. Premature mortality in epilepsy and the role of psychiatric comorbidity: a total population study. The Lancet 2013;382:1646-1654.

8. Hotan GC, Struck AF, Bianchi MT, Eskandar EN, Cole AJ, Westover MB. Decision analysis of intracranial monitoring in non-lesional epilepsy. Seizure 2016;40:59-70.