JOURNAL OF INSURANCE MEDICINE

J Insur Med 1999;31:104–105

LETTER TO THE EDITOR

Life Tables for People With Traumatic Brain Injury

Address: Department of Statistics (Drs Strauss and Shavell), University of California, Riverside, CA 92521-0137. Spain Rehabilitation Center (Dr DeVivo), University of Alabama, Birmingham, Ala.

Correspondent: David Strauss, PhD, FASA.

To the Editor:

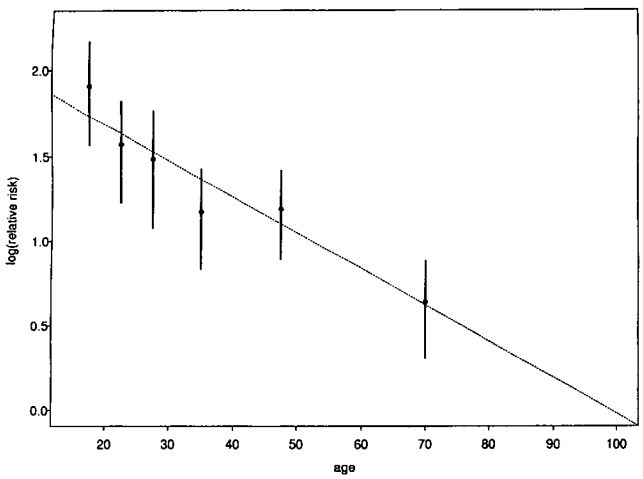
Relatively little is known about long-term mortality of people with traumatic brain injury (TBI). Strauss et al[1] recently reported on the life expectancy of people with TBI, dividing patients into 3 groups on the basis of mobility. This provides a useful approximation but cannot take account of the patient's full profile of mobility, cognitive levels, time since injury, and so on. Such factors are known to be significant predictive factors for people with other disabilities.[2–4]

Given a suitable database, it is possible to estimate a patient's mortality risk over the intermediate term, such as 10 years. This is standard practice for patients with spinal cord injury[5,6] and with cerebral palsy.[7] To obtain a life expectancy or a life table, however, we must estimate the patient's mortality risk over the entire life span. Here, we show how this may be done.

The source of data for the Figure is an expansion of the data used in our previous study.[1] Exposure and mortality information from the first 2 postinjury years has been excluded, as mortality risk is known to be elevated during that period.

The vertical axis in the Figure is the logarithm of the relative risk, that is, the age-specific mortality risk for people with TBI relative to the general population (with the same proportions of men to women). The logarithm of the relative risks appear to decline linearly with age. The extrapolated line intersects the age axis at age 100. This is the parity age—the age at which the mortality rates among people with brain injuries and the general population become equal. The pattern is similar to that found previously for people with cerebral palsy.[7]

To illustrate, consider a 30-year-old man with severe TBI. Suppose that a customized analysis estimates his current mortality risk to be 0.02 (roughly, this means a 2% chance of dying during the next 12 months). Because



Mortality rates for people in California with long-term disability resulting from traumatic brain injury. The graph shows the logarithm of the mortality risk relative to the general population plotted against age. According to the fitted line, parity (ie, a relative risk of 1) is reached at age 100. Vertical bars represent 80% confidence intervals.

Life Table for a Severely Brain-Injured 30-Year-Old Man

Age, y	1 (*x*)	*d* (*x*)	*q* (*x*)	*m* (*x*)	*L* (*x*)	*T* (*x*)	*e* (*x*)
30	96,167	1904	0.01980	0.020000	95,215	2,487,889	25.9
31	94,263	1895	0.02010	0.020303	93,315	2,392,674	25.4
32	92,368	1873	0.02028	0.020485	91,432	2,299,359	24.9
33	90,495	1855	0.02050	0.020713	89,568	2,207,927	24.4
34	88,640	1841	0.02077	0.020992	87,720	2,118,359	23.9
35	86,799	1830	0.02109	0.021314	85,884	2,030,640	23.4
36	84,968	1822	0.02145	0.021682	84,057	1,944,756	22.9
37	83,146	1803	0.02168	0.021920	82,245	1,860,699	22.4
38	81,343	1774	0.02180	0.022045	80,456	1,778,454	21.9
39	79,570	1743	0.02190	0.022146	78,698	1,697,998	21.3
40	77,827	1710	0.02197	0.022212	76,972	1,619,299	20.8
50	60,353	1909	0.03163	0.032140	59,399	926,603	15.4
60	39,381	2253	0.05721	0.058913	38,255	424,784	10.8
70	18,715	1738	0.09288	0.097476	17,846	138,551	7.4
80	5347	817	0.15271	0.165712	4939	26,098	4.9
90	632	155	0.24612	0.282525	554	2003	3.3
100	20	7	0.33505	0.408043	17	45	2.3

the risk in the general population for a 30-year-old man is 0.002, the relative risk is 10.

Using the log-linear relationship with parity age 100, we calculated the mortality risk for ages 30 to 100. That is, the computed risks are such that the log-relative risk decreases linearly from log(10) at age 30 to log (1) = 0 at age 100. These age-specific risks were then used to construct a life (Table) in the standard way.[8] According to the life table, the remaining life expectancy is 25.9 years. This may be compared with the general population, where a 30-year-old man has a life expectancy of 44.5 years.

David Strauss, PhD, FASA
Robert Shavell, PhD
Michael J. DeVivo, PhD

REFERENCES

1. Strauss DJ, Shavelle RM, Anderson TW. Long-term survival of children and adolescents after traumatic brain injury. *Arch Phys Med Rehabil.* 1998;79:1095–1100.
2. Strauss DJ, Shavelle RM, Anderson TW. Life expectancy of children with cerebral palsy. *Pediatr Neurol.* 1998;18:143–49.
3. Strauss DJ, Shavelle RM. Life expectancy of adults with cerebral palsy. *Dev Med Child Neurol.* 1998;40:369–375.
4. DeVivo MJ, Stover SL, Black KJ. Prognostic factors for 12-year survival after spinal cord injury. *Arch Phys Med Rehabil.* 1992;73:156–162.
5. DeVivo MJ, Stover SL. Long-term survival and causes of death. In: Stover SL, JA DeLisa, Whiteneck GG, eds. *Spinal Cord Injury: Clinical Outcomes From the Model Systems.* Gaithersburg, MD: Aspen Publishers Inc; 1995:289–316.
6. DeVivo MJ, Ivie CS. Life expectancy of ventilator-dependent persons with spinal cord injuries. *Chest.* 1995;108:226–32.
7. Strauss DJ, Shavelle RM. Life expectancies of persons with chronic disabilities. *J Ins Med.* 1998;30:96–107.
8. Schoen R. *Modeling Multigroup Populations.* New York: Plenum Press; 1998.