ACRM
AMERICAN CONGRESS OF REHABILITATION MEDICINE

Archives of Physical Medicine and Rehabilitation

journal homepage: www.archives-pmr.org

Archives of Physical Medicine and Rehabilitation 2014;95:230-5

ORIGINAL ARTICLE

Suicide Mortality After Spinal Cord Injury in the United States: Injury Cohorts Analysis

Yue Cao, PhD,[a] James F. Massaro, BS,[a] James S. Krause, PhD,[a] Yuying Chen, PhD,[b] Michael J. Devivo, PhD[b]

From the [a]Department of Health Sciences and Research, Medical University of South Carolina, Charleston, SC; and [b]Department of Physical Medicine and Rehabilitation, University of Alabama-Birmingham, Birmingham, AL.

Abstract

Objectives: To compare 12-year suicide-specific mortalities of 3 different injury cohorts, identify the risk factors for suicide mortality after spinal cord injury (SCI), and investigate whether suicide mortality is higher among those with SCI than in the general population.

Design: Retrospective cohort study.

Setting: United States hospitals (n=28) designated as SCI Model Systems.

Participants: Participants (N=31,339) injured between January 1, 1973, and December 31, 1999.

Interventions: Not applicable.

Main Outcome Measure: Suicide death after SCI.

Results: The crude annual suicide mortality rate during the first 12 years after SCI was 91 per 100,000 person-years for 1973 to 1979 injury cohort, 69 per 100,000 person-years for 1980 to 1989 injury cohort, and 46 per 100,000 person-years for 1990 to 1999 injury cohort. Suicide mortality was associated with race, injury severity, and years since injury. The standardized mortality ratios for the 3 cohorts were 5.2, 3.7, and 3.0, respectively.

Conclusions: Suicide mortality among those with SCI decreased over 3 injury cohorts, but it still remained 3 times higher than that of the general population.

Archives of Physical Medicine and Rehabilitation 2014;95:230-5

Suicide is a salient problem among people with spinal cord injury (SCI). As suicide has been associated with sudden and depressed life events, persons with SCI may have a higher suicide rate than the general population.[1] Previous studies provide empirical support for this hypothesis. In comparison to the United States (U.S.) general population, those with SCI in the U.S. have a suicide rate 2 to 6 times higher.[2-5] One study[6] conducted in Denmark found the suicide rate of persons with SCI was about 5 times greater than that of the general population. An Australian study[7] reported the estimated suicide rate among persons with SCI was 4.4 times greater than that among the general population. Another Norwegian study[8] remarkably reported a suicide rate that was 37.6 times greater among women with SCI and 3.7 times greater among men with SCI. Studies also show that 50% of people with SCI have had suicidal thoughts,[9] and 10% to 15% report having suicidal plans during the first 6 months after their injury.[10]

Except for a few studies,[2,6,11,12] our knowledge regarding suicide after SCI is still limited. Meanwhile, no studies have investigated cohort differences in suicide mortality after SCI. In the general population, suicide rates increased during the early 1990s, but a decline occurred thereafter.[13] The overall U.S. suicide rate decreased 11.1% (from 12.4 per 100,000 to 11.0 per 100,000) between 1990 and 2005. During the same time, we saw the passage of the Americans with Disabilities Act in 1990 aimed at prohibiting discrimination based on disability, and social movements advocating for legislative rights of better living conditions, social changes of equal opportunity, and independent living for

Supported by the Department of Education, National Institute on Disability and Rehabilitation Research (grant nos. H133B090005, H133A110002). However, the contents do not necessarily represent the policy of the Department of Education, and you should not assume endorsement by the Federal Government.

No commercial party having a direct financial interest in the results of the research supporting this article has conferred or will confer a benefit on the authors or on any organization with which the authors are associated.

0003-9993/14/$36 - see front matter © 2014 by the American Congress of Rehabilitation Medicine
http://dx.doi.org/10.1016/j.apmr.2013.10.007

people with disability throughout the U.S. This raises the question of whether suicide rates among the SCI population have changed over different injury cohorts.

To bridge the gap in the literature, we compared 12-year suicide-specific mortalities of 3 different injury cohorts and identified the risk factors for suicide mortality using the largest SCI database in the world. In addition, we addressed whether suicide deaths were higher after SCI than in the general population and whether the observed suicide mortality differences between the SCI population and the general population were noted across injury cohorts.

Methods

Data sources

This study retrieved data from the National Spinal Cord Injury Statistical Center (NSCISC) database, which contains data reported from 28 U.S. hospitals designated as SCI Model Systems (SCIMS) of care since 1973. NSCISC Database Institutional Review Board approval was obtained locally at each hospital before data collection. This database has the largest SCI sample in the world and captures an estimated 13% of new SCI cases every year in the U.S.[14,15]

Measures

Our outcome variable was a dichotomous event, suicide death or not. First, we identified the deceased cases by routine follow-up with personnel at each SCIMS center and supplemented this with searches of the National Death Index and Social Security Death Index. Second, the cause of death was determined from death certificates, autopsy reports, hospital discharge summaries, or the *International Classification of Diseases* codes provided by a National Death Index search. The mortality information was recently updated at the end of 2011. Based on their year of injury, we divided all participants into 3 cohorts: injured between 1973 and 1979, injured between 1980 and 1989, and injured between 1990 and 1999. Because suicide mortality varies with years postinjury,[2] we gave each cohort exactly 12 years of follow-up to achieve comparable suicide rates.

The following independent variables were measured at the time of injury: sex (female vs male), race (non-Hispanic white, non-Hispanic black, Hispanic, others), education (college education vs others), age, injury etiology, and injury severity. Injury etiology was grouped into motor vehicle collisions, violence, sports, fall, and all others. Injury severity information was collected at discharge from the initial hospital care. It was classified as follows: C1-4 level with American Spinal Injury Association Impairment Scale (AIS) A, B, or C injuries; C5-8 level with AIS A, B, or C injuries; T1-S3 level with AIS A, B, or C injuries; and all levels with AIS D injuries (functional motor recovery). All ventilator-dependent cases were included in the first group. This is the typical scheme used in previous SCIMS research.[16-18] For injury severity information, because 2305 participants are unknown, we added a new category "unknown" to the injury severity variable. We also found missing values for race and education, and we categorized them into "others" in the analysis. The year since injury was a time-variant predictor, increasing by 1 for each additional person-year. In our logistic regression analysis, we treated it as a 6-category variable (1−2y, 3−4y, 5−6y, 7−8y, 9−10y, >10y).

List of abbreviations:

AIS	**American Spinal Injury Association Impairment Scale**
NSCISC	**National Spinal Cord Injury Statistical Center**
SCI	**spinal cord injury**
SCIMS	**Spinal Cord Injury Model Systems**
SMR	**standardized mortality ratio**
U.S.	**United States**

Analysis

We first estimated the crude annual suicide-specific mortality rate based on the person-year denominator for each of the 3 injury cohorts. Multivariate analysis was conducted using a logistic regression model on person-year observations.[19-21] Every participant was followed up beginning with the date of injury up to 12 years. If participants were still alive after the 12-year follow-up, they were regarded as withdrawn alive at that point. Each year of follow-up was counted as a separate observation (1 person-year) for each participant. For example, an individual who was followed up for 10 years and died during the 10th year would contribute a total of 10 person-year observations to the data set. For each of these person-years, we coded the outcome variable as "1" if the person committed suicide during that year and "0" otherwise. Except for year since injury, all the other predictors were time-invariant variables, whose values did not change across the person-years for the same participant. For each categorical predictor in the logistic regression model, we provided a *P* value of global Wald test, and a 95% confidence interval of odds ratio for each category.

We next calculated standardized mortality ratios (SMRs) for each cohort by using the U.S. general population as the anchor. There are 2 reasons to use the SMR method. First, the crude suicide rates may overestimate the actual effect of SCI because of the disproportionally larger high-risk group—that is, males in the SCI population.[2] Second, SMRs can present the differences between persons with SCI and the general population regarding suicide mortality. We calculated the SMR as a ratio of the number of observed deaths in our SCI sample to the number of expected deaths if our SCI sample had the same suicide mortality rate as the general population. The total number of deaths expected was estimated separately for each cohort by applying the age-sex-race−specific suicide mortality rates for the general U.S. population. We retrieved the U.S. suicide mortality rates from the Centers for Disease Control and Prevention.[22] We used the suicide mortality rates of the U.S. general population in 1982 for the first injury cohort SMR calculation, the mortality rates in 1990 for the second injury cohort, and the rates in 2000 for the third injury cohort because they are the midyear of follow-up for each cohort. All analyses were conducted using SAS version 9.3.[a]

Results

We identified a total of 31,339 participants injured between January 1, 1973, and December 31, 1999. Among them, 5124 were injured between 1973 and 1979, 12,120 between 1980 and 1989, and 14,095 between 1990 and 1999. The demographic and injury characteristics of each injury cohort are shown in table 1.

Table 1 Demographic and injury characteristics of participants by injury cohorts

	Injury Cohorts		
Characteristics	1973–1979 (n=5124)	1980–1989 (n=12,120)	1990–1999 (n=14,095)
Age at injury (y)	28.45±14.11	30.78±15.39	33.82±17.42
Female	18.83	18.62	21.16
Race			
Hispanic	5.84	8.07	12.30
Non-Hispanic white	77.11	69.46	60.82
Non-Hispanic black	14.01	19.51	23.09
Others	3.04	2.96	3.79
College education	6.38	6.25	4.95
Etiology			
Vehicular collisions	47.5	44.49	41.32
Violence	13.08	16.04	20.98
Sports	14.13	12.41	8.83
Fall	16.24	18.54	19.92
Others	9.06	8.52	8.95
Injury severity			
C1-4 ABC	10.30	11.93	15.33
C5-8 ABC	26.48	22.69	18.35
T1-S3 ABC	34.58	32.00	33.41
AIS D	27.60	29.13	20.59
Unknown	1.03	4.25	12.32

NOTE. Values are mean ± SD or percentages.

After the 12-year follow-up, among the 5167 deceased participants, 198 died from suicide, with 51 in the first injury cohort, 85 in the second cohort, and 62 in the third cohort (table 2). The suicide cases accounted for 6.72%, 4.71%, and 2.38% of the total deaths in the 3 injury cohorts, respectively. By using total follow-up person-years as the denominator, the crude suicide mortality rates for the 3 injury cohorts were as follows: 91 per 100,000 person-years, 69 per 100,000 person-years, and 46 per 100,000 person-years, respectively. The 1990 to 1999 injury cohort had a lower crude suicide mortality rate and lower suicide percentage than the prior 2 cohorts.

The adjusted odds ratios of the multivariate logistic regression model suggest the same decreasing trend in suicide mortality over the 3 injury cohorts after adjusting for sex, race, education, injury age, etiology of injury, severity of injury, and years since injury (table 3). Compared with the 1973 to 1979 cohort, the odds of committing suicide were reduced by 20% for the 1980 to 1989 cohort, and by 46% for the 1990 to 1999 cohort, with the latter finding being statistically significant. The logistic regression analysis also showed that for people with SCI, non-Hispanic whites were more likely to commit suicide. Persons with T1-S3 injuries with AIS A, B, or C had higher suicide odds than persons with AIS D injuries at any level. Compared with years 1 and 2 postinjury, suicide odds did not change between years 3 and 6, and started to decrease from year 7, although not statistically significant until reaching 10 years postinjury. The odds of suicide decreased significantly by almost 60% after 10 years. To control for the nesting effects of participants clustered within hospitals, we also tried to enter 27 dummy variables for SCIMS hospitals into the logistical model. However, we did not find a significant difference compared with the model without inclusion of the treating hospital. Therefore, we removed the hospitals from our model for parsimonious consideration (the results are available on request). The SMRs for the 3 cohorts are 5.24, 3.65, and 2.98, respectively (table 4). This can be interpreted to mean that the first SCI injury cohort was 5.24 times more likely to die from suicide than the U.S. general population after controlling for age, sex, and race; the second cohort was 3.65 times more likely; and the third cohort was 2.98 times more likely.

Table 2 Crude suicide-specific mortality rates and percentage of deaths by injury cohorts

	Injury Cohorts		
Measures	1973–1979	1980–1989	1990–1999
Suicide cases (n)	51	85	62
Total deaths (n)	759	1804	2604
Total person-years	56,013	123,572	136,250
Suicide percent of deaths	6.72	4.71	2.38
Suicide mortality rate ($/10^5$ person-years)	91.05	68.79	45.50

Discussion

Suicide is a major public health problem within the U.S. as well as around the world. In 2011, suicide was the 10th leading cause of death in the U.S.[23] Globally, suicide is also one of the leading causes of death, and there is a suicide every 40 seconds.[24] As a result, the World Health Organization[25] and the U.S. Surgeon General[26] have emphasized the need for more comprehensive data and studies for the purpose of planning national health care policy and prevention strategies. One of the official national health objectives in the U.S. is to reduce suicide and suicide-related behaviors.[27]

Given the public health importance of suicide, this study contributes to the suicide literature in 3 areas. First, we found a decreasing trend of suicide mortality over 3 SCI cohorts. Specifically, the 1990s cohort had significantly lower odds of suicide than the 1970s cohort. Second, in comparison with the U.S. general population, all 3 injury cohorts had higher suicide mortality. This highlights the need for prevention and intervention for suicide to improve life expectancy after SCI. Third, we identified 3 risk factors for excessive suicide mortality among people with SCI: non-Hispanic white, the first 6 years after SCI, and T1-S3 injury levels with AIS A, B, or C.

The race effects we found are consistent with research based on the general population.[28,29] Although general population studies[29-31] also suggest age and education are related to suicide, their effects were not statistically significant in our model, perhaps because we measured age and education at the time of injury rather than at the time of suicide. Previous research has also shown that the risk of suicide declines with advancing time after injury as persons with SCI become better adjusted to their injury. Our study suggests that the decline of suicide risk is likely to happen at least 6 years postinjury.

Contrary to intuitive sense, we found the most severe injury group (C1-4 level of injury or ventilator dependent) had lower odds of suicide than other levels of injury (odds ratio, .58),

Table 3 Multivariate logistic regression analysis of suicide death

Variables	OR	95% CI	*P* of Global Wald Test
Injury cohort (vs 1973–1979)			.005
1980–1989	0.80	0.56–1.13	
1990–1999	0.54	0.37–0.79	
Age at injury	1.01	1.00–1.02	.244
Sex (vs male)			.063
Female	0.69	0.46–1.02	
Race (vs non-Hispanic black)			<.001
Hispanic	1.51	0.73–3.13	
Non-Hispanic white	2.95	1.72–5.04	
Others	1.54	0.51–4.63	
Education (vs others)			.897
College	0.96	0.54–1.71	
Etiology (vs vehicular collisions)			.293
Violence	1.33	0.84–2.10	
Sports	1.02	0.63–1.67	
Fall	1.45	0.99–2.11	
Others	0.96	0.56–1.66	
Injury severity (vs AIS D)			.004
C1-4 ABC	0.58	0.29–1.16	
C5-8 ABC	1.33	0.87–2.04	
T1-S3 ABC	1.72	1.18–2.50	
Unknown	1.28	0.62–2.67	
Years since injury (vs years 1 and 2)			.012
Years 3 and 4	1.02	0.67–1.56	
Years 5 and 6	0.99	0.64–1.53	
Years 7 and 8	0.74	0.46–1.19	
Years 9 and 10	0.80	0.50–1.29	
Years >10	0.41	0.24–0.70	

Abbreviations: CI, confidence interval; OR, odds ratio.

although this finding was not statistically significant. This contradiction is actually supported by some literature that suggests the severity of SCI is not a good predictor for life satisfaction, perceived well-being, or psychological distress.[32-34] Some studies[32,35,36] found that ventilator-dependent persons with tetraplegia often claim to have a high quality of life and are happy to be alive. The marginally disabled persons with SCI may also have a greater burden of coping than their severely injured counterparts because of less physical or social support and higher expectations of recovery.[2,6] Meanwhile, persons with high-level tetraplegia often receive more and various forms of general surveillance than persons with low-level injuries, making them less likely to be alone short term or long term and making the act of suicide much less likely. Persons with high-level tetraplegia also are physically less able to commit suicide. Another possibility is competing mortality risk in that this group typically has a shorter life expectancy and may die earlier from other competing causes.

Table 4 SMR by injury cohorts

	Injury Cohorts		
Variables	1973–1979 (n=5124)	1980–1989 (n=12,120)	1990–1999 (14,095)
Total person-years	56,013	123,572	136,250
Observed suicide (n)	51	85	62
Expected suicide (n)	10	23	21
SMR of suicide	5.24	3.65	2.98
95% CI of SMR	3.80–6.68	2.87–4.42	2.24–3.72

Abbreviation: CI, confidence interval.

Our research cannot provide empirical evidence on why the trend occurred for suicide rates to decline over the 3 injury cohorts, but there are some possible explanations in the literature. One is the use of newer antidepressants such as selective serotonin reuptake inhibitors, in use since the 1970s.[13] Olfson et al[37] found increasing use of selective serotonin reuptake inhibitors was negatively related to adolescent suicide rates. The inverse association between exposure to newer antidepressants and suicide rate was reported in the U.S. from 1985 to 1999,[38] in Australia from 1991 to 2000,[39] and in Scandinavia from 1978 to 1996.[40]

Another potential explanation is advancement in physical and societal accessibility, which improved social participation and social support for people with SCI. These advancements are considered as protective factors for suicide.[41-43] From a social policy perspective, the Americans with Disabilities Act is an important policy to provide qualified disabled persons with equal employment opportunities. Previous studies[31,44,45] suggest that being unemployed is a risk factor for suicide. In the past 20 years, physical accessibility in the U.S. has improved dramatically with the increased presence of curb cuts, elevators, and accessible public transportation systems in many communities.[46] Reducing physical barriers for people with mobility impairments helps people in wheelchairs participate in society. Since social integration has protective effects on suicide behavior, all these changes promoting reintegration into communities after injury may reduce the suicide rate.[47,48]

Although declining, the observed suicide rate was still at least 3 times that of the general population. Therefore, an elevated risk of suicide after SCI continues to be a problem. If the diagnosis of depression, aggressive treatment, and post–suicide attempt care are contributing to the decline, early clinical interventions need to be considered to minimize this preventable cause of death.

Study limitations

This study has some methodological limitations. First, it is possible the suicide mortality rates are underestimated because we did not consider passive or indirect suicide methods in our study, such as being noncooperative with caretakers, refusing eating and treatment, misusing medications, or not paying attention to skin care. One study[49] reported the prevalence of these self-neglect suicides as 9%. Moreover, the Social Security Death Index has been shown to be only 92.4% sensitive in identifying deaths among persons with SCI, so some deceased persons may be misclassified as alive.[50] Also, approximately 1% of all deaths are due to external causes where the nature of death (accident, suicide, or homicide) is reported as unknown, and approximately 6% of all deaths where the cause of death remains unknown. Some of these may be suicides. Second, the cohort of SCIMS centers has changed every SCIMS grant cycle (5y), which could lead to differences in our injury cohorts beyond those controlled for in the logistic regression analysis. Third, the observed trend could be influenced by changes in identification methods and classification criteria for suicide cases. Fourth, since the NSCISC database is not a population-based sample and captures about 13% of new SCI cases in the U.S., the incomplete coverage may limit our ability to generalize our

findings. Fifth, our model did not include some important predictors of suicide risk such as alcohol abuse, other substance abuse, psychosis or behavioral disorders, suicide history, use of antidepressant medication, and/or psychotherapy services. This information is not available for most of our participants. Lastly, our study is limited to the first 12 years of suicide mortality after SCI, which might not represent the long-term survivors.

Conclusions

This study is the first empirical research focusing on changes in suicide rates among different injury cohorts. Our findings suggest suicide mortality decreased over 3 SCI injury cohorts even after controlling for sex, education, race, injury etiology, injury severity, and years postinjury. However, suicide mortality after SCI still remains higher than in the general population. Risk of suicide is greatest among the following groups: non-Hispanic whites, males, and those persons with T1-S3 injury levels with AIS A, B, or C, especially during the early years after injury.

Supplier

a. SAS System for Windows (version 9.3); SAS Institute Inc, 100 SAS Campus Dr, Cary, NC 27513.

Keywords

Mortality; Rehabilitation; Spinal cord injuries; Suicide

Corresponding author

Yue Cao, PhD, Department of Health Sciences and Research, 77 President St, Rm 207, MSC 700, Charleston, SC 29425. *E-mail address:* caoyu@musc.edu.

References

1. Krysinska K, Lester D, Martin G. Suicidal behavior after a traumatic event. J Trauma Nurs 2009;16:103-10.
2. DeVivo MJ, Black KJ, Richards JS, Stover SL. Suicide following spinal cord injury. Paraplegia 1991;29:620-7.
3. Frisbie JH, Kache A. Increasing survival and changing causes of death in myelopathy patients. J Am Paraplegia Soc 1983;6:51-6.
4. Geisler WO, Jousse AT, Wynne-Jones M, Breithaupt D. Survival in traumatic spinal cord injury. Paraplegia 1983;21:364-73.
5. Nyquist RH, Bors E. Mortality and survival in traumatic myelopathy during nineteen years, from 1946 to 1965. Paraplegia 1967;5:22-48.
6. Hartkopp A, Bronnum-Hansen H, Seidenschnur AM, Biering-Sorensen F. Suicide in a spinal cord injured population: its relation to functional status. Arch Phys Med Rehabil 1998;79:1356-61.
7. Middleton JW, Dayton A, Walsh J, Rutkowski SB, Leong G, Duong S. Life expectancy after spinal cord injury: a 50-year study. Spinal Cord 2012;50:803-11.
8. Hagen EM, Lie SA, Rekand T, Gilhus NE, Gronning M. Mortality after traumatic spinal cord injury: 50 years of follow-up. J Neurol Neurosurg Psychiatry 2010;81:368-73.
9. Pinkerton AC, Griffin ML. Rehabilitation outcomes in females with spinal cord injury: a follow-up study. Paraplegia 1983;21:166-75.
10. Kishi Y, Robinson RG. Suicidal plans following spinal cord injury: a six month study. J Neuropsychiatry Clin Neurosci 1996;8:442-5.
11. Charlifue SW, Gerhart KA. Behavioral and demographic predictors of suicide after traumatic spinal cord injury. Arch Phys Med Rehabil 1991;72:488-92.
12. Giannini MJ, Bergmark B, Kreshover S, Elias E, Plummer C, O'Keefe E. Understanding suicide and disability through three major disabling conditions: intellectual disability, spinal cord injury, and multiple sclerosis. Disabil Health J 2010;3:74-8.
13. McKeown RE, Cuffe SP, Schulz RM. US suicide rates by age group, 1970-2002: an examination of recent trends. Am J Public Health 2006;96:1744-51.
14. Stover SL, DeVivo MJ, Go BK. History, implementation, and current status of the National Spinal Cord Injury Database. Arch Phys Med Rehabil 1999;80:1365-71.
15. DeVivo MJ, Go BK, Jackson AB. Overview of the National Spinal Cord Injury Statistical Center Database. J Spinal Cord Med 2002;25:335-8.
16. Devivo MJ. Epidemiology of traumatic spinal cord injury: trends and future implications. Spinal Cord 2012;50:365-72.
17. Cao Y, Chen Y, DeVivo M. Lifetime direct costs after spinal cord injury. Top Spinal Cord Inj Rehabil 2011;16:10-6.
18. Krause JS. Accuracy of life expectancy estimates in life care plans: consideration of non-biographical and injury related factors. Top Spinal Cord Inj Rehabil 2002;7:59-68.
19. Strauss D, Shavelle R, DeVivo MJ, Day S. An analytic method for longitudinal mortality studies. J Insur Med 2000;32:217-25.
20. Allison PD. Survival analysis using the SAS system: a practical guide. Cary: SAS Institute; 2010.
21. Krause JS, DeVivo MJ, Jackson AB. Health status, community integration, and economic risk factors for mortality after spinal cord injury. Arch Phys Med Rehabil 2004;85:1764-73.
22. Centers for Disease Control and Prevention. National Center for Health Statistics. Underlying causes of death, 1999-2009. CDC WONDER online database. Available at: http://wonder.cdc.gov/ucd-icd10.html 2012. Accessed May 7, 2012.
23. Hoyert DL, Xu J. Deaths: preliminary data for 2011. Natl Vital Stat Rep 2012;61:6.
24. World Health Organization. Suicide prevention (SUPRE). Geneva: World Health Organization; 2009.
25. World Health Organization. Prevention of suicide: guidelines for the formulation and implementation of national strategies. Geneva: World Health Organization; 1996.
26. US Public Health Service. The Surgeon General's call to action to prevent suicide. Washington (DC): US Public Health Service; 1999.
27. US Department of Health and Human Services. Healthy people 2010: with understanding and improving health and objectives for improving health. Washington (DC): US Government Printing Office; 2000.
28. Vijayakumar L, John S, Pirkis J, Whiteford H. Suicide in developing countries (2): risk factors. Crisis 2005;26:112-9.
29. Bertolote JM, Fleischmann A. A global perspective in the epidemiology of suicide. Suicidologi 2002;7(2):6-8.
30. Szanto K, Gildengers A, Mulsant BH, Brown G, Alexopoulos GS, Reynolds CF III. Identification of suicidal ideation and prevention of suicidal behaviour in the elderly. Drugs Aging 2002;19:11-24.
31. Weissman MM, Bland RC, Canino GJ, et al. Prevalence of suicide ideation and suicide attempts in nine countries. Psychol Med 1999;29:9-17.
32. Whiteneck GG, Charlifue SW, Frankel HL, et al. Mortality, morbidity, and psychosocial outcomes of persons spinal cord injured more than 20 years ago. Paraplegia 1992;30:617-30.
33. Gerhart KA, Weitzenkamp DA, Kennedy P, Glass CA, Charlifue SW. Correlates of stress in long-term spinal cord injury. Spinal Cord 1999;37:183-90.
34. Richards JS. Psychologic adjustment to spinal cord injury during first postdischarge year. Arch Phys Med Rehabil 1986;67:362-5.
35. Bach JR, Tilton MC. Life satisfaction and well-being measures in ventilator assisted individuals with traumatic tetraplegia. Arch Phys Med Rehabil 1994;75:626-32.
36. Gardner BP, Theocleous F, Watt JW, Krishnan KR. Ventilation or dignified death for patients with high tetraplegia. Br Med J (Clin Res Ed) 1985;291:1620-2.

37. Olfson M, Shaffer D, Marcus SC, Greenberg T. Relationship between antidepressant medication treatment and suicide in adolescents. Arch Gen Psychiatry 2003;60:978-82.
38. Grunebaum MF, Ellis SP, Li S, Oquendo MA, Mann JJ. Antidepressants and suicide risk in the United States, 1985-1999. J Clin Psychiatry 2004;65:1456-62.
39. Hall WD, Mant A, Mitchell PB, Rendle VA, Hickie IB, McManus P. Association between antidepressant prescribing and suicide in Australia, 1991-2000: trend analysis. BMJ 2003;326:1008.
40. Isacsson G. Suicide prevention—a medical breakthrough? Acta Psychiatr Scand 2000;102:113-7.
41. Meadows LA, Kaslow NJ, Thompson MP, Jurkovic GJ. Protective factors against suicide attempt risk among African American women experiencing intimate partner violence. Am J Community Psychol 2005;36:109-21.
42. Resnick MD, Bearman PS, Blum RW, et al. Protecting adolescents from harm. Findings from the National Longitudinal Study on Adolescent Health. JAMA 1997;278:823-32.
43. O'Donnell L, O'Donnell C, Wardlaw DM, Stueve A. Risk and resiliency factors influencing suicidality among urban African American and Latino youth. Am J Community Psychol 2004;33:37-49.
44. Chang SS, Sterne JA, Huang WC, Chuang HL, Gunnell D. Association of secular trends in unemployment with suicide in Taiwan, 1959-2007: a time-series analysis. Public Health 2010;124:49-54.
45. Nock MK, Borges G, Bromet EJ, et al. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. Br J Psychiatry 2008;192:98-105.
46. Scelza WM, Kirshblum SC, Wuermser LA, Ho CH, Priebe MM, Chiodo AE. Spinal cord injury medicine. 4. Community reintegration after spinal cord injury. Arch Phys Med Rehabil 2007;88(3 Suppl 1): S71-5.
47. Duberstein PR, Conwell Y, Conner KR, Eberly S, Evinger JS, Caine ED. Poor social integration and suicide: fact or artifact? A case-control study. Psychol Med 2004;34:1331-7.
48. Fernquist RM, Cutright P. Societal integration and age-standardized suicide rates in 21 developed countries, 1955-1989. Soc Sci Res 1998;27:109-27.
49. Macleod AD. Self-neglect of spinal injured patients. Paraplegia 1988;26:340-9.
50. DeVivo MJ, Stover SL, Black KJ. Prognostic factors for 12-year survival after spinal cord injury. Arch Phys Med Rehabil 1992;73: 156-62.