

SPINAL CORD INJURY

Clinical Outcomes from the Model Systems

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An Aspen Publication®

Aspen Publishers, Inc.
Gaithersburg, Maryland
1995

Long-Term Survival and Causes of Death

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INTRODUCTION

During the past 50 years, both acute and long-term survival rates for persons with SCI have improved dramatically.¹⁻¹⁶ In fact, although the prognosis for some persons (particularly those injured later in life who sustain neurologically complete tetraplegia) remains relatively poor, the life expectancy of others (e.g., persons with neurologically incomplete motor functional injuries and normal bladder function who survive the initial effects of the injury) now approaches normal. For most individuals with SCI, however, life expectancy remains somewhat below normal.¹⁵

Mortality rates are significantly higher during the first year after injury than during subsequent years, particularly for more severely injured individuals.^{6,12,13,17-20} Not surprisingly, the most significant prognostic factors related to survival are age and measures of injury severity such as neurologic level, degree of injury completeness, and ventilator dependency.^{3,12-16,20-24} Given comparable age and injury severity, females and whites have slightly higher survival rates than males and nonwhites, but the difference is not as great as it would be in the absence of SCI.¹⁵ Undoubtedly, the long-term quality of care received by persons with SCI as well as many psychosocial factors are also important determinants of survival, but these have received relatively little attention.^{25,26}

Until recently, renal failure and other urinary tract complications were reported to be the leading causes of death among persons with SCI.^{13,27-31} This led many clinicians and investigators to focus their attention and research efforts on management of the neurogenic bladder and prevention of renal failure. As a result, enormous progress has been made toward reducing urinary tract-related morbidity and mortality. Studies conducted more recently suggest that respiratory system complications, particularly pneumonia, have surpassed urinary tract

Table 14-3 Life Expectancy for Persons with Spinal Cord Injuries Who Survive at Least 1 Year Postinjury by Current Age and Neurologic Category

Current Age	Life Expectancy (Years)				
	Normal*	C1-C4 (Frankel Grade A, B, C)	C5-C8 (Frankel Grade A, B, C)	T1-S5 (Frankel Grade A, B, C)	Frankel Grade D
5	70.8	45.0	52.0	59.5	63.0
10	65.9	40.5	47.3	53.7	58.2
15	61.0	36.1	42.6	49.0	53.4
20	56.3	32.8	38.6	44.8	49.0
25	51.6	29.9	34.7	40.8	44.7
30	46.9	26.8	30.7	36.7	40.5
35	42.2	23.7	27.0	32.7	36.1
40	37.6	20.9	23.6	28.8	31.7
45	33.0	18.4	20.4	25.1	27.5
50	28.6	15.5	17.0	21.2	23.4
55	24.4	12.8	13.8	17.3	19.5
60	20.5	11.0	11.2	13.8	15.9
65	16.9	8.8	8.8	10.9	13.2
70	13.6	6.6	6.6	8.3	10.4
75	10.7	4.7	4.7	6.1	8.0
80	8.1	3.1	3.1	4.2	6.1

*Normal values are from 1988 U.S. Life Tables for the general population.

for persons injured between 1980 and 1982, by 28% for persons injured between 1983 and 1985, by 37% for persons injured between 1986 and 1988, and by 42% for persons injured between 1989 and 1992 relative to persons injured between 1973 and 1975. This improvement represents one of the major accomplishments of the Model System program.

Table 14-4 also confirms the necessity for taking race and gender into account when projecting life expectancy for individuals with SCIs. While these factors are somewhat less important than neurologic category, the mortality rate for males is 27% higher than that for females, and the mortality rate for nonwhites is 19% higher than that for whites given comparable neurologic category, age, and injury year.

CAUSES OF DEATH

Why is life expectancy below normal, even for persons who survive the initial high-risk period immediately after injury? To answer this question, one must