

Spinal Cord Injury in Wisconsin: 1990 to 1994

May 1999

Wisconsin Department of Health and Family Services
Division of Supportive Living
Bureau of Aging and Long Term Care Resources
Office for Persons with Physical Disabilities

Supported by grant H133N50024 of the Model Spinal Cord Injury System from the National Institute on Disability and Rehabilitation Research, Office of Special Education and Rehabilitative Services, U.S. Department of Education, Washington, D.C.

Acknowledgements

This research was supported in part by grant H133N50024 of the Model Spinal Cord Injury System from the National Institute on Disability and Rehabilitation Research, Department of Education, Washington, D.C.

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TABLE OF CONTENTS

PREFACE	INTRODUCTION	9
	Registry Background	11
	Data Sources	13
	<i>Data Security</i>	14
	<i>Other Security</i>	14
	<i>Data Quality</i>	14
	Wisconsin's Population	16
	Glossary of Terms	21
	Introduction to Spinal Cord Injury	23
REPORT	EXECUTIVE SUMMARY	25
	Spinal Cord Injury Events: 1990-1994	27
	<i>Incidence of Spinal Cord Injury</i>	29
	• Sex	29
	• Age	30
	• Ethnicity	31
	<i>Hospitalization and Cost Information</i>	32
	• Admission Day, Month, Type and Source	32
	• Length of Inpatient Stay	34
	• Costs of Inpatient Hospital Care	35
	• Payer Type	36
	• Primary and Secondary Payer	37
	<i>Circumstances of Spinal Cord Injury</i>	37
	• Causes of Injury	37
	• Level and Severity of Injury	41
	<i>Discharge Location</i>	45
	<i>Spinal Cord Injury Rates by County of Residence</i>	45
	<i>Appendix 1.1: Hospitals and E-Codes</i>	49
	<i>Appendix 1.2: Spinal Cord Injuries by Year</i>	57
SUMMARY	CONCLUSIONS	71
	REFERENCES	74

LIST OF MAPS, TABLES AND GRAPHS

Table 1.1	WI Population Projections / County Projections by Total Population	17
Table 1.2	WI Population Projections by Age Group	19
Graph 1.1	Incidence of Spinal Cord Injuries	29
Graph 1.2	Injuries by Gender and Year	30
Graph 1.3	Injuries by Age and Gender	30
Graph 1.4	Average Age by Year and by Gender	31
Graph 1.5	Injuries by Race	32
Graph 1.6	Admission by Day of the Week	33
Graph 1.7	Admission by Month	33
Graph 1.8	Type of Admission	34
Graph 1.9	Average Length of Inpatient Stay	35
Graph 1.10	Average Cost of Inpatient Hospital Care	36
Graph 1.11	Payer Type	36
Graph 1.12	Causes of Injury	37
Table 1.3	Causes of SCI, by Gender	38
Table 1.4	Causes of SCI, by Selected Age Groups	39
Graph 1.13	Severity of Injury	42
Table 1.5	Principal Diagnosis	43
Graph 1.14	Patient Discharge Location	45
Map 1.1	Spinal Cord Injuries by County of Residence	46
Table 1.6	Injuries by Year and County of Residence	47
Table 1.7	Hospitals Reporting SCI	51
Table 1.8	E-Codes	53
Table 1.9	1990 Data	59
Table 1.10	1991 Data	61
Table 1.11	1992 Data	63
Table 1.12	1993 Data	65
Table 1.13	1994 Data	67
Table 1.14	1990-1994 Data	69



Introduction

Registry Background

Data Sources

Wisconsin's Population

Glossary of Terms

Introduction to Spinal Cord Injury

Introduction

The establishment of a statewide registry and surveillance program is necessary in order to clearly identify factors and demographics associated with the population of individuals that sustains spinal cord injuries (SCI). Accurate incidence, prevalence and economic information about disabilities caused by traumatic injuries have been lacking in Wisconsin.

This first Wisconsin Spinal Cord Injury Report represents a historical overview of spinal cord injuries in Wisconsin from 1990 to 1994. The data presented in this report includes hospital discharge data related to spinal cord injuries with ICD-9-CM diagnostic codes 806.00-806.99 (fracture of vertebral column with spinal cord injury) and 952.00-952.99 (spinal cord injury without evidence of spinal bone injury). In analyzing this data, questions arose relevant to the validity of the coding by hospitals. It was questioned whether all injuries with an ICD-9-CM code of 806 and 952 resulted in spinal cord injuries with permanent neurological deficit necessitating an inpatient rehabilitation stay. A process of screening the coding was developed (see Data section) and has resulted in two different data sets. This report presents all data with an ICD-9-CM code of 806 and 952 (the only information needed based on Center for Disease Control and Prevention Guidelines). Once the screening process has been studied and verified, a second report with the data with the 806 and 952 codes screened as injuries resulting in permanent neurological deficit necessitating an inpatient rehabilitation stay will be issued. Additionally, within this data it is possible that the same person could be hospitalized more than once during a particular year. In order to avoid counting duplicate hospital visits, only the initial hospital visit data is included in the report, except for the “length of stay” and “cost of stay” data. These exceptions were figured from all hospital visits resulting from the original injury to give the actual length of stay and cost of stay data for each injury. Spinal cord injury codes were chosen based on Center for Disease Control and Prevention Guidelines. The discharge data presented here included all events occurring in Wisconsin during 1990-1994 to Wisconsin residents only. Non-residents of Wisconsin were not included.

Readers are encouraged to review the entire report and tables before drawing any conclusions from one table or graph within the document. Please contact the Office for Persons with Physical Disabilities for further explanation of the data presented in this report or for additional copies.

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Registry Background

Background

The Wisconsin Council on Physical Disabilities state plan and Council on Physical Disabilities 1993-1995 Biennial Budget Initiatives identified the need for the systematic collection and analysis of data. The high cost of treating disabilities, the savings in human suffering, and the cost-effectiveness of prevention are viable reasons for promoting prevention programs.

Physical injury is costly. The National Safety Council (1989) estimated that in the United States:

drinking is indicated as a factor in at least half of the fatal motor vehicle accidents;

in 40% of motorcycle fatalities, there was a detectable blood alcohol level.

the total lack of crash protection afforded by motorcycles places the motorcyclist at an 80-90% risk of death or injury in any accident;

in six states where helmet laws were required, head injury in helmeted riders was reduced by at least 60%; and

trauma accidents involving the spinal cord have their highest incidence among adolescents.

Current Concerns

The Council identified the need for information about disability etiology, including spinal cord and brain injury, suggesting that a comprehensive program of public education could serve to educate people about specific precautions and thus reduce the incidence of injury. Specific measures such as driving practices, crash helmets, and seat belts and subsequent public awareness programs that focus on youth could have significant influence on reducing such injuries. Knowledge about the etiology of injuries also suggests that a comprehensive public information program must be coordinated with other public and private agencies that also have a significant responsibility for disabilities prevention and related issues.

In 1994 the Wisconsin Council on Physical Disabilities received a planning grant from the Wisconsin Council on Developmental Disabilities to identify opportunities to establish spinal cord injury and brain trauma surveillance. The Office for Persons with Physical Disabilities staff worked with the Council to identify potential funding opportunities.

Spinal Cord Injury Surveillance

In 1995 the Medical College of Wisconsin received a five-year grant from the National Institute on Disability and Rehabilitation Research, Department of Education to become a federally designated Model Spinal Cord Injury Center. As an integral component of the grant, the Department of Health and Family Services, Office for Persons with Physical Disabilities received a subcontract to establish spinal cord injury surveillance. This surveillance has begun to compile statewide data about persons who have sustained spinal cord injuries. This data will enable other investigators to design and implement prevention projects and service projects, which will assist individuals with spinal cord injuries to live at their maximum levels of independence in their communities.

The objectives of the Spinal Cord Injury Surveillance include:

- contribute to and compare Wisconsin data with the national SCI data base;

- identify and track the incidence of spinal cord injury in Wisconsin;

- provide data which will facilitate the development and implementation of effective preventive programs;

- provide data which will facilitate blending the prevention and service aspects of health care for the population with SCI; and

- identify and track the expenditure of treatment and service dollars for persons who are spinal cord injured.

Data Sources

Surveillance opportunities in Wisconsin for injuries, illnesses, and other conditions have increased since the creation of the Office of Health Care Information (OHCI) hospital discharge data system.

The 1987 Wisconsin Act 399 established an Office of Health Care Information. OHCI's responsibilities include collecting, analyzing, and disseminating information on health care from inpatient hospital medical records. Under the statute and administrative rules, hospitals are required to submit specific data to OHCI for the purpose of constructing an inpatient hospital database, using information currently being collected on the Uniform Billing forms (UB-92). Along with a patient's billing information, the diagnosis and treatment of the patient are recorded using standard International Classification of Disease-9th Revision-Clinical Modification (ICD-9-CM) codes. OHCI, at present, collects one principal diagnostic code and has the capability of collecting up to four secondary codes.

Hospitals reporting spinal cord injuries from 1990 to 1994 are shown in **Table 1.7** and the codings used are shown in **Table 1.5**.

The case definition used for this analysis is consistent with current Centers for Disease Control (CDC) guidelines for spinal cord injury surveillance. Included are the hospital discharge records that contain one or more of the following injury codes, which are based on the ICD-9-CM.

Spinal Cord Injury

<u>Code</u>	<u>Description</u>
806	Fracture of vertebral column with spinal cord lesion
952	Spinal cord lesion with evidence of spinal bone injury

[This report does not include persons with spinal cord injuries who died before reaching a hospital.]

When OHCI began collecting data in January 1989, external cause codes (E-codes) for injuries were reported on a voluntary basis, as one of the four secondary diagnoses. Regardless of how many diagnostic codes were collected at individual hospitals, OHCI only analyzes five diagnostic codes. With recent revisions, the OHCI database is able to collect additional secondary diagnoses and provide a field reserved for E-codes. With the national recommendation to change the UB-82 form to the UB-92 form, a designated field is now used for the E-code. The E-codes are shown in **Table 1.8**.

External cause codes for injuries were reported on a voluntary basis until January 1994. Using the voluntary system, only 30 percent of injury diagnoses contained this data element. The inclusion of E-codes and improvement in their reporting is especially important to the

surveillance plan, as these codes classify causative agents and/or activities for disabling injuries. The E-codes provide crucial information to guide, develop and evaluate interventions, as well as initiate preventative activities. Effective January 1994, Wisconsin hospitals were required to report E-codes.

In the early years of hospital data collection, documentation and collection of race codes was not mandatory, therefore the race of some patients from 1990-1994 is “unknown” or documented as “other”.

Data Security

The Spinal Cord Registry maintains confidential data on individuals. This data is only accessible to the individual subject of the data and persons who work directly on the registry. Measures to retain patient confidentiality are outlined in Wisconsin Statutes Chapter 153.45 (Release of Data) and 153.50 (Protection of Patient Confidentiality). Only summary data are accessible to the public to protect individual identities.

All data is protected electronically through password measures, and copies of the data on backup diskettes are kept under lock and key. Any additional information collected from persons with spinal cord injuries (in the form of interviews, phone contact, etc.), for the purposes of prevention and services, will be conducted by persons under the direct supervision of the Director of the Office for Persons with Physical Disabilities.

Other Security

In addition to data password protection, an automatic virus-checking program has been installed on the registry computer in order to safeguard against the possibility of any form of virus infecting the data.

Data Quality

As stated in the introduction, while analyzing the data, questions arose relevant to the validity of coding by hospitals of actual spinal cord injuries resulting in permanent neurological deficit necessitating an inpatient rehabilitation stay. In a recent article in the American Journal of Epidemiology, Vol. 146, pp 266-272, 1997, Johnson et al. raised the issue of accuracy in reporting of spinal cord injury to a statewide database in Colorado. They report a positive predictive value of 0.55, which implies that one can be only 55% certain that an identified case of spinal cord injury is, in fact, a spinal cord injury resulting in permanent neurological deficit. This has obvious impact on the surveillance aspects of any registry that is planning on recording only spinal cord injuries with permanent neurological deficit. It is important to remember that the Center for Disease Control only requires a code of 806 or 952 for its registry. While full medical

chart review of all reported cases would not be feasible due to reasons of cost, time and confidentiality, an attempt is underway to screen the data using the available codes by using a process developed by the Medical College of Wisconsin Model Spinal Cord Injury Center. Diagnoses critical to spinal cord injury including acute paraplegia or tetraplegia, bowel and bladder paralysis and systemic problems typically associated with spinal cord injury were reviewed. Also incorporated in the determination of acuity was the performance of surgery for decompression or stabilization of the spine, placement of a halo, and transfer into a rehabilitation environment. Lengths of stay and outcome data were also considered: if patient demonstrated transient quadriparesis, or was discharged home after one day of inpatient hospital care, it was clear that this was not a permanent neurological deficit. In addition there was the need to verify this process by comparing the results with actual medical records. Several of the coding sheets were compared to the medical records of patients who had been discharged from Froedtert Hospital. Eighty-six percent of the determinations at Froedtert were found to be correct, thereby establishing the validity of the coding by that hospital.

Wisconsin's Population

Tables 1.1 and **1.2** summarize Wisconsin's population by county of residence, age and gender. From the 1990 census data, Wisconsin's population was approximately 49 percent male and 51 percent female. The largest population age groups for both males and females were in the 16-30 and 31-45 age categories, both comprising 23% of the general population. Ages 0-15 (22%), 46-60 (14%), and 61-75 (12%), followed. Those aged 75 and older made up the smallest age group, comprising 6% of the general population (Wisconsin Department of Administration, 1998).

In terms of racial diversity in 1990, 92.2 percent of Wisconsin's population was white, 5 percent black, 1.1 percent Asian or Pacific Islander, 0.8 percent American Indian, and 0.9 percent representing other racial groups. In terms of the data used in this report, some of the identifying race information was not collected when the patient was admitted to the hospital in 1990, but the trend in following years was to identify this data at time of hospital admission.

**Table 1.1
Wisconsin Population Projections / County Projections by Total Population**

County	County Name	1990 Census	1995 Census
01	Adams	15,682	17,494
02	Ashland	16,307	16,440
03	Barron	40,750	42,087
04	Bayfield	14,008	14,557
05	Brown	195,594	206,672
06	Buffalo	13,584	13,679
07	Burnett	13,084	13,640
08	Calumet	34,291	35,689
09	Chippewa	52,360	53,490
10	Clark	31,647	32,216
11	Columbia	45,088	47,168
12	Crawford	15,940	16,154
13	Dane	367,085	393,236
14	Dodge	76,559	80,197
15	Door	25,690	26,525
16	Douglas	41,758	42,007
17	Dunn	35,909	37,001
18	Eau Claire	85,183	88,374
19	Florence	4,590	5,211
20	Fond du Lac	90,083	92,167
21	Forest	8,776	8,980
22	Grant	49,266	50,286
23	Green	30,339	30,593
24	Green Lake	18,651	19,134
25	Iowa	20,150	20,804
26	Iron	6,153	6,400
27	Jackson	16,588	17,122
28	Jefferson	67,783	70,799
29	Juneau	21,650	22,798
30	Kenosha	128,181	138,313
31	Kewaunee	18,878	19,184
32	LaCrosse	97,904	101,596
33	Lafayette	16,074	16,200
34	Langlade	19,505	20,300
35	Lincoln	26,993	28,243
36	Manitowoc	80,421	82,615
37	Marathon	115,400	120,634
38	Marinette	40,548	41,837
39	Marquette	12,321	13,334
40	Menominee	3,890	4,275

County	County Name	1990 Census	1995 Census
41	Milwaukee	959,275	982,097
42	Monroe	36,633	38,343
43	Oconto	30,226	31,594
44	Oneida	31,679	33,563
45	Outagamie	140,510	149,583
46	Ozaukee	72,831	79,894
47	Pepin	7,107	7,115
48	Pierce	32,765	34,209
49	Polk	34,773	36,028
50	Portage	61,405	64,766
51	Price	15,600	15,668
52	Racine	175,034	180,941
53	Richland	17,521	17,867
54	Rock	139,510	143,043
55	Rusk	15,079	15,295
56	St. Croix	50,251	54,282
57	Sauk	46,975	50,607
58	Sawyer	14,181	15,000
59	Shawano	37,157	38,012
60	Sheboygan	103,877	106,179
61	Taylor	18,901	19,325
62	Trempealeau	25,263	25,816
63	Vernon	25,617	26,259
64	Vilas	17,707	18,987
65	Walworth	75,000	80,900
66	Washburn	13,772	14,506
67	Washington	95,328	109,317
68	Waukesha	304,715	336,025
69	Waupaca	46,104	49,105
70	Waushara	19,385	20,192
71	Winnebago	140,320	146,976
72	Wood	73,605	76,026
State Totals		4,891,769	5,124, 971

Table 1.2 Wisconsin Population Projections By Age Group		
Age Group	1990 Census	1995 Census
0-15	1,093,891	1,144,151
16-30	1,113,755	1,064,850
31-45	1,143,869	1,224,285
45-60	681,112	814,583
61-75	567,552	560,357
75+	291,590	316,745
Totals	4,891,769	5,124,971

Glossary of Terms

Central Nervous System (CNS): the brain, spinal cord, and retina.

Cervical Spine: highest level in the spine, the neck region, consisting of seven vertebrae and eight nerve roots.

Clinic Referral: the patient was admitted to a facility upon recommendation of a clinic physician.

Coccyx: the tailbone, with one vertebrae and nerve root.

Complete Injury: injury that leaves no motor function or sensation below the spinal cord injury zone.

Court/Law Enforcement Referral: the patient was admitted to a facility upon direction of a court of law, upon the request of a law enforcement agency representative, or upon referral from a 51.42/51.437 or 46.23 county board.

Elective Admission: an admission that can be delayed without substantial risk to the health of the individual. This means the patient's condition permits adequate time to schedule the availability of a suitable accommodation.

Emergency Admission: the patient requires immediate medical intervention as a result of severe, life threatening or potentially disabling conditions. Usually the patient is admitted through the emergency room.

Emergency Referral: the patient was admitted to a facility upon recommendation of an emergency room physician.

HMO Referral: the patient was referred to a facility upon the recommendation of a health maintenance organization physician.

Incomplete Injury: spinal cord damage leaving some sensation and/or motor control below the injury zone because some nerve pathways remain intact.

Level of Injury: level of injury is determined by which vertebrae of the spinal cord has been injured. The closer the injury is to the brain, the greater the loss of function and feeling will be. C3-T1 will produce tetraplegia. T1 and below will produce paraplegia; C5 and above will produce tetraplegia with reduced respiratory function.

Lumbar Spine: the strongest part of the spine, the lower back, consisting of five vertebrae and nerve roots.

Paraplegia: loss of function below the cervical spinal cord segments, upper body usually retains most function and sensation.

Physician Referral: the patient was admitted to a facility upon the recommendation of his or her physician.

Tetraplegia (formerly quadraplegia): loss of function of any injured or diseased cervical spinal cord segment, affecting all four limbs.

Transfer from Another Health Care Facility: the patient was admitted to a facility as a transfer from a health care facility other than an acute care facility or a skilled nursing facility.

Transfer from a Hospital: the patient was admitted to a facility as a transfer from an acute care facility where he or she was an inpatient.

Transfer from a Skilled Nursing Facility: the patient was admitted to a facility as a transfer from a skilled nursing facility where he or she was and inpatient.

Sacrum Spine: below the lumbar spine, with five vertebrae and nerve roots.

Spinal Cord Injury: any injury of the neural elements within the spinal canal. Can occur from either trauma or disease.

Thoracic Spine: at the level of the chest, has twelve vertebrae and nerve roots.

Urgent Admission: the patient requires immediate attention for the care and treatment of a physical or mental disorder. Generally the patient is admitted to the first available and suitable accommodation.

Ventilator: a mechanical apparatus or machine, which is used for artificially ventilating the lungs.

Introduction to Spinal Cord Injury

The spinal cord is part of the nervous system and is the largest nerve in the body. It is about 18 inches long and extends from the base of the brain, down the middle of the back, to about the waist and is surrounded by protective rings of bone called the vertebral column, or the spinal column. The 33 vertebrae of the spine can be divided into several regions. At the highest level in the spine, the neck region is the cervical spine, consisting of seven vertebrae and eight nerve roots. They are smaller than the other vertebrae, which allows a greater amount of movement. The thoracic spine, at the level of the chest, has twelve vertebrae and nerve roots. The spinal canal in the thoracic region is relatively smaller than the cervical or lumbar areas. This makes the thoracic spinal cord at greater risk if there is a fracture (Maddox, 1993).

Below the thoracic spine is the lumbar spine, the low back region, consisting of five vertebrae and nerve roots and then the sacrum, which also has five fused vertebrae and nerve roots. The coccyx, or tailbone, has one vertebrae and nerve root. Vertebrae increase in size as they go down the column, with the cervical as the smallest and the lumbar the largest.

The *central nervous system* consists of the brain and spinal cord. The nerves that lie within the spinal cord are upper motor neurons and their function is to carry the messages back and forth from the brain to the spinal nerves along the spinal tract. The *peripheral nervous system* consists of spinal nerves that branch out from the spinal cord to other parts of the body, that are called lower motor neurons. These spinal nerves exit and enter at each vertebral level and communicate with specific areas of the body. The *sympathetic nervous system* is a system of nerves that controls involuntary functions such as blood pressure and temperature regulation.

The term *spinal cord injury* or SCI refers to any injury of the neural elements within the spinal column. SCI can occur from either trauma or disease to the vertebral column or the spinal cord itself, though most spinal cord injuries are the result of trauma to the vertebral column. The spinal cord does not have to be severed in order for a loss of functioning to occur. In fact, in most people with SCI, the spinal cord is intact, but the damage to it results in loss of functioning due to bruising or loss of blood supply. These injuries can affect the spinal cord's ability to send and receive messages from the brain to the body systems that control the sensory, motor, and autonomic function below the level of injury.

Typically, the nerves above the injury site continue to function as they always have and the nerves below the site do not. A physician describes an individual as having a certain "level" injury by naming the region affected and the level that corresponds with that region. In general, the higher the level of injury, the greater the functional loss. Damage to the cervical region (C1-C8) usually results in a loss of function in the arms and legs, resulting in tetraplegia. Injury to the thoracic region (T1-T12) usually affects the chest and legs and results in paraplegia. Nationally, the most common types of injury are at the mid-to-low cervical vertebrae (C5-C6), followed by the thoracolumbar junction (T2-L1). Both spots are the spine's areas of greatest flexibility and vulnerability.

Mortality rates are significantly higher during the first year after injury than during subsequent years. The average life expectancy for a person with spinal cord injury continues to increase due to improved technology, but is still somewhat below normal. Spinal cord injuries have profound effects on the public health system because of the young age of those injured, the high cost of acute and rehabilitative care, and the long-term disability.



Executive Summary

Incidence of Spinal Cord Injury

Hospitalization and Cost Information

Circumstances of Spinal Cord Injury

Status at Time of Discharge

Spinal Cord Injury Rates by County of Residence

Executive Summary

From 1990 to 1994, there were 945 spinal cord injury events in Wisconsin with the predominant causes of hospitalizations being motor vehicle crashes, falls, and other injury events. Males disproportionately represented 73% of spinal cord injuries. In Wisconsin, the average age at time of injury was 40.7 (males 38.9 and females 45.5), with the most frequent age at 21 (males 21 and females 25). Males aged 16-30 represented the overall largest group of injury with 281 (30% overall), followed by men in the 31-45 age group with 173 (18% overall). Females aged 16-30 represented the largest group for women with 76 (8% overall) injuries, followed by women aged 31-45 with 52 (5% overall) injuries. Overall, 38% of all injuries (both men and women) occurred between the ages of 16-30. It is interesting to note that 23% of all injuries occurred to individuals who were age 61 or over. This is especially significant with women, as over 35% of all injuries occur to women in that combined age group. Although age and gender are significant risk factors for spinal cord injury, there are other risk factors that contribute such as race, time of year and demographic area.

The majority of individuals admitted for spinal cord injuries during 1990-1994 were white (696 or 74%), followed by 73 (or 8%) being black. Although whites sustain the majority of spinal cord injuries, members of minority groups sustain a disproportionate percentage relative to their numbers.

The warmest months (June through October) had the highest number of spinal cord injury events, with July and September being the leading months. Saturday and Sunday had the highest incidence of spinal cord injuries. It is important to remember that Saturday and Sunday would include any incidences that occurred the "night" before (after midnight). For example, Saturday injuries would include any incidence that occurred after midnight on Friday.

The average length of an inpatient hospital stay from 1990-1994 ranged from 35.2 days in 1990 to 35.9 days in 1994, with an average of 37.9 days. During the five years, over 35,818 days – the equivalent of 98 years – were spent in acute care hospitals by Wisconsin's 945 spinal cord injury survivors. From 1990-1994, acute care hospital charges for treatment for spinal cord injuries totaled more than \$11 million per year. The average charge for a non-fatal spinal cord injury was \$66,642 per year.

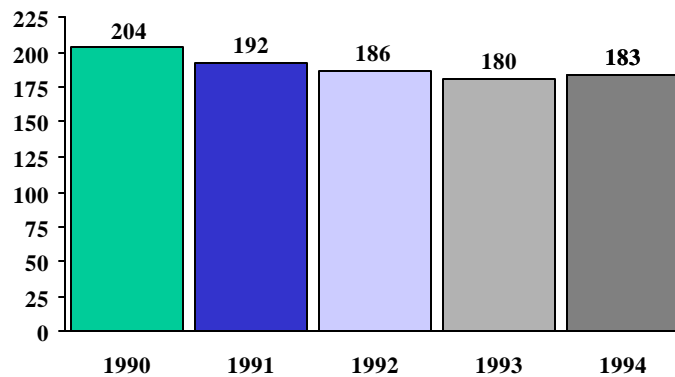
Spinal cord injuries have profound effects on the public health system because of the young age of those injured, the high cost of acute and rehabilitative care, and the long-term disability. Thus, the findings of this and future registries will identify the cost and cause of spinal cord injury, leading to strategies to prevent the injuries from occurring in the first place.

Spinal Cord Injury Events: 1990—1994

The Incidence of Spinal Cord Injury

From January 1, 1990 to December 31, 1994, a total of 945 Wisconsin residents were hospitalized for a spinal cord injury. In 1990, the first year of data for this report, there was a total of 204 injuries, and in 1994, a total of 183 injuries. There was an average of 189 injuries per year. Over the five year period, there was a decrease of an average of four spinal cord injuries yearly (**Graph 1.1**).

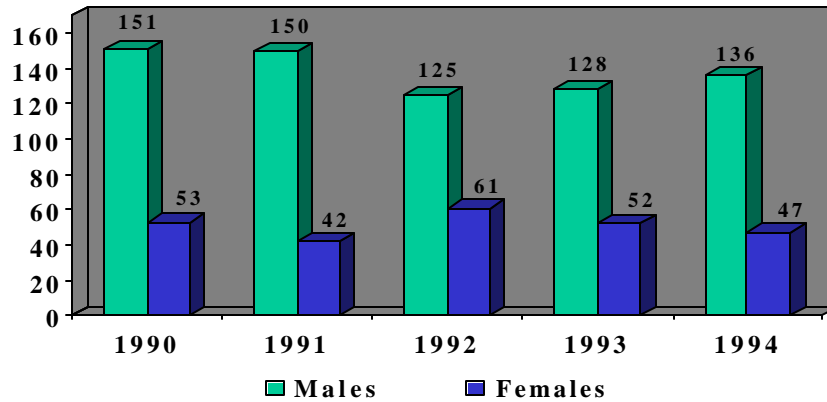
Graph 1.1
Incidence of Spinal Cord Injuries
1990-1994



Demographics

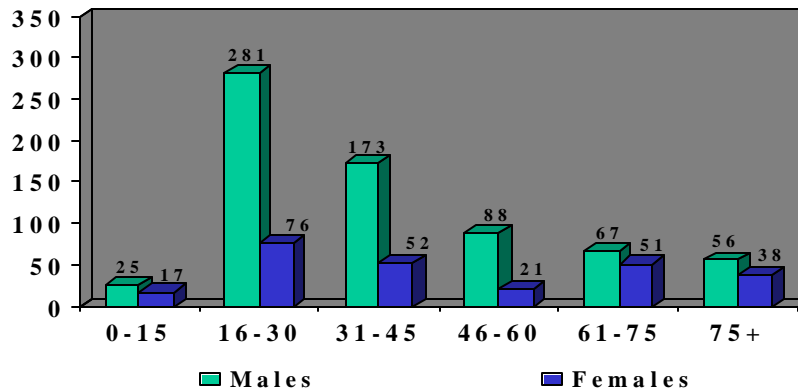
Sex—From 1990-1994, males sustained 690 injuries (73%) and females sustained 255 injuries (27%) (**Graph 1.2**). These percentages did not fluctuate greatly through the years, except for 1991 when males sustained 78% of injuries (females 22%), and 1992 when males sustained 67% of injuries (females 33%).

Graph 1.2
Injuries by Gender and Year
1990-1994



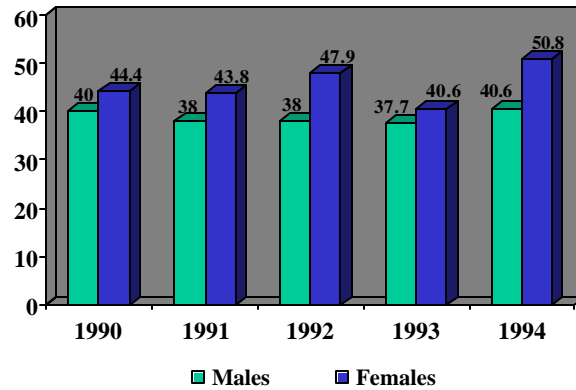
Age—In the Wisconsin 1990-1994 data, the average age at time of injury was 40.7. The most frequent age of injury was 21 overall, with 21 for males and 25 for females. The mean age at injury was slightly higher for females (45.5) than for males (38.9). Ages ranged from 2 to 96. Males aged 16-30 represented the overall largest group of injury (281), followed by men in the 31-45 age group (173). Females aged 16-30 represented the largest group of women with 76 injuries, followed by women aged 31-45 with 52 injuries (**Graph 1.3**).

Graph 1.3
Injuries by Age and Gender
1990 - 1994



There was a slight increase in the mean age of injury for both males and females through the five year period (**Graph 1.4**).

Graph 1.4
Average Age by Year and Gender
1990-1994



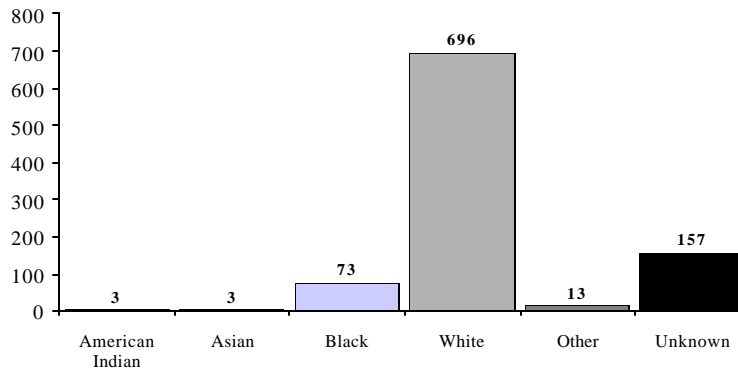
Overall, 38% of all injuries occurred between the ages of 16-30. The next highest age group was 31-45, with 24% of all injuries. Twelve percent occurred between the ages of 46-60 and 61-75, followed by 10% of persons aged 75 and older. Finally, 4% of all injuries occurred between the ages of 0-15. Overall, 38% of all injuries occurred to individuals who were age 61 or over. The number of injuries in this age group increased by 17% over the five-year period. This is especially significant with women, as over 35% of all injuries occurred to women in that combined age group. These numbers are significant because older persons who incur spinal cord injuries tend to have more pre-existing medical conditions and are more likely to sustain an injury resulting in tetraplegia, develop secondary medical complications during acute care and rehabilitation, and have more frequent hospitalizations than their younger counterparts. The total number of spinal cord injuries for each age group and gender is listed in **Table 1.4**.

Among racial/ethnic groups, whites had the highest mean age at injury (41.5 years), while Asians had the lowest mean age at injury (21.7 years). The mean age at injury for Native Americans was 37.0 years, while for blacks it was 33.0 years.

Ethnicity—In the early years of hospital data collection, documentation and collection of race information was not mandatory, therefore the race of some patients from 1990-1994 is unknown (157 or 16%), or documented as “other” (13 or 1%). The majority of individuals admitted for spinal cord injuries during 1990-1994 were white (696 or 74%), followed by 73 or 8% being black (**Graph 1.5**). Although whites sustained the majority of spinal cord injuries, members of minority groups did sustain a disproportionate percentage relative to their numbers in Wisconsin.

In fact, 5% of the Wisconsin population is black, yet this group sustained 8% of all spinal cord injuries in Wisconsin. In addition, there was a steady increase in the incidence of spinal cord injuries among blacks from 1990-1993. The rate of injuries among other racial/ethnic groups remained the same throughout the five-year period.

Graph 1.5
Injuries by Race
1990-1994

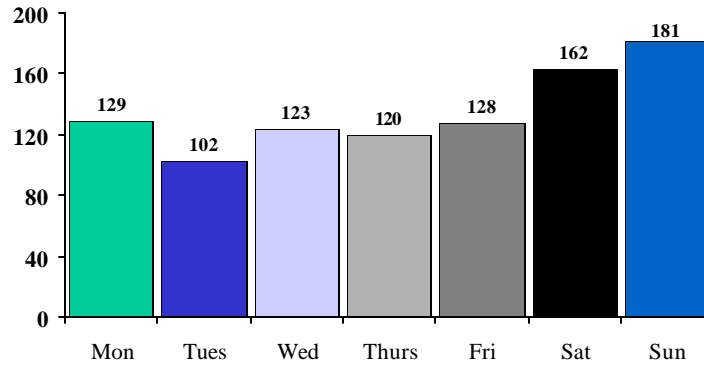


Among blacks, men were twice as likely to acquire spinal cord injuries than females, while among whites, males were three times as likely to acquire spinal cord injuries than females.

Hospitalization and Cost Information

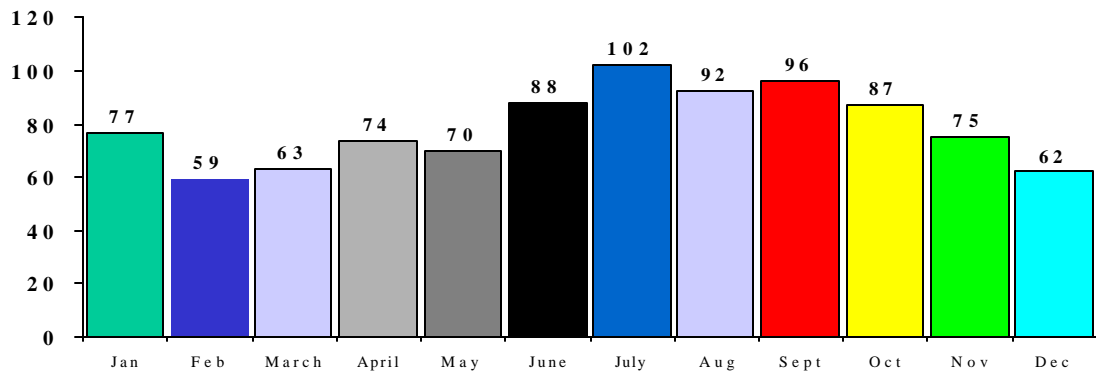
Admission Day, Month, Type and Source—In 1990-1994, the majority of spinal cord injury events occurred during the weekend. Sundays had the highest number of events, but it is important to remember that any admission occurring after midnight on Saturday would be counted as a Sunday admission. This would account for the high number of injuries on Sundays. Tuesdays had the lowest number of injury events (**Graph 1.6**).

Graph 1.6
Admission by Day of the Week
1990-1994



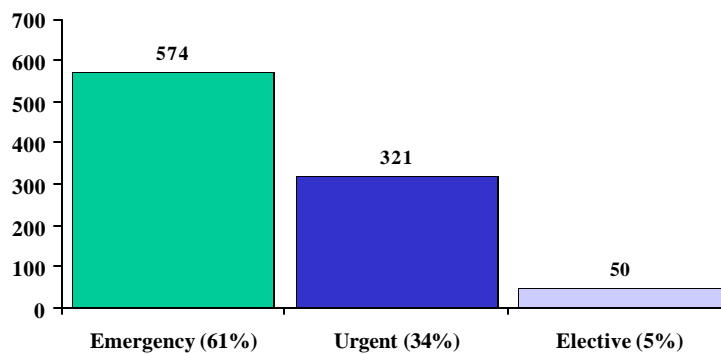
In terms of the month in which individuals were admitted to hospitals in Wisconsin for spinal cord injuries, the months of June through October had the highest number of injuries. Overall, July had the highest number of admissions with 102, followed by September with 96. February had the lowest amount with 59 (**Graph 1.7**). If race becomes a variable, blacks had the highest incidence of injury in October and November.

Graph 1.7
Admission by Month
1990-1994



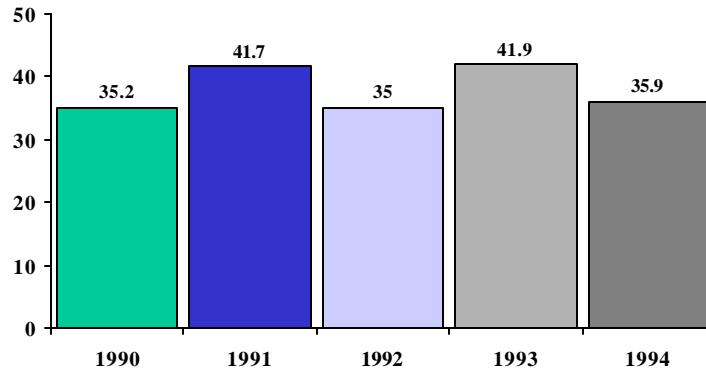
Both the largest type and source of admission to hospitals involving residents with spinal cord injuries occurred during emergency situations, where the patient required immediate medical intervention as a result of severe, life threatening or potentially disabling conditions (**Graph 1.8**).

Graph 1.8
Type of Admission
1990-1994



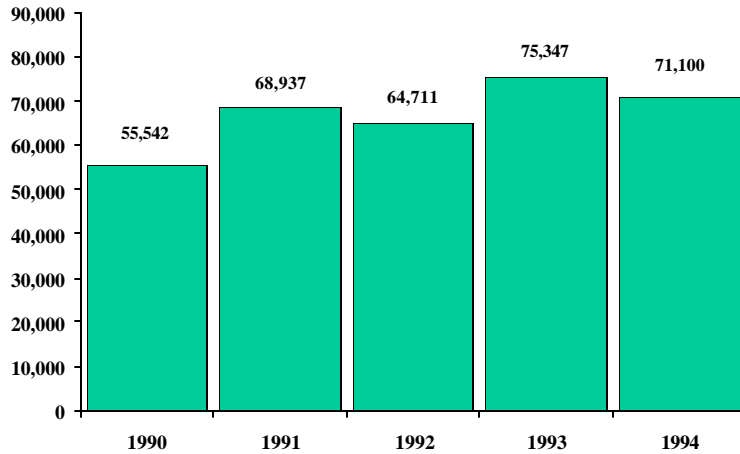
Length of Inpatient Stay—The average length of hospital stay from 1990-1994 ranged from 35.2 days in 1990, to 35.9 days in 1994 (**Graph 1.9**). During the five years, over 35,818 days—the equivalent of 98 years—were spent in acute care hospitals by Wisconsin’s 945 spinal cord injury survivors. During the time period, acute initial hospital stays ranged from 1 to 471 days. The average length of stay for men was 39.9 days, for women 32.3 days. The level and severity of the injury, as well as other injuries, complications and surgical interventions contributed to this wide variation. For instance, the average length of stay for a tetraplegia injury was 40.7 days and for a paraplegia injury, 31.9 days. Above all factors, respiratory complications, including ventilator dependency, were responsible for lengthy hospital stays.

Graph 1.9
Average Length of Inpatient Stay
1990-1994



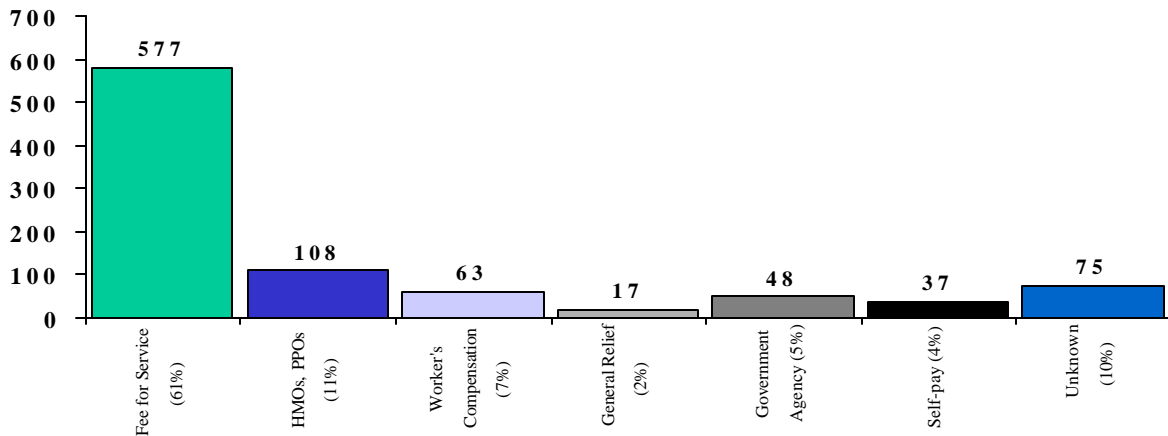
Cost of Inpatient Hospital Care—From 1990-1994, acute care hospital charges for treatment of spinal cord injury totaled more than \$11 million a year. In relation to the time spent in the hospital, the total costs for those stays fluctuated between 1990 and 1994. In 1990, the average cost for a hospital stay was \$55,542. In 1994 the average was \$71,100 (**Graph 1.10**). This is an increase of 28%. In terms of gender differences, the cost of hospitalization was greater for males than females during all five years. Males averaged \$72,096 per year, females averaged \$52,667 per year. Men averaged almost eight more days of acute care, which may account for the difference in average costs. Over the five-year period, the cost of inpatient care for males increased 32% (an average of \$3800 a year), and the cost of care for females increased 12% (an average of \$1000 a year). In addition to lengthier stays, males tended to sustain more severe injuries. Fifty-five percent of all injuries to males resulted in tetraplegia, while just 52% of injuries to females resulted in a tetraplegia diagnosis. It is important to remember that these costs do not reflect the total cost for a spinal cord injury, since medical equipment, ongoing medical care, home and vehicle modifications, and attendant care greatly add to the overall costs of spinal cord injuries.

Graph 1.10
Average Cost of Inpatient Hospital Care
1990-1994



Payer Type—From 1990-1994, the majority of initial inpatient stays (577 or 61%) were paid for by fee-for service insurance. One hundred and eight (11%) initial inpatient stays were paid for by an Alternative Health Care Insurance Plan (HMO, PPO, PPA, etc.). Other payment types included worker's compensation (63 or 7%), general relief (17 or 2%), other government agency or program (48 or 5%), and self-pay (37 or 4%). For ninety-four (10%) inpatient stays, the exact type of payment, either fee-for-service or HMO was unable to be determined (**Graph 1.11**). These payer types did not fluctuate greatly from year to year.

Graph 1.11
Payer Type
1990 - 1994

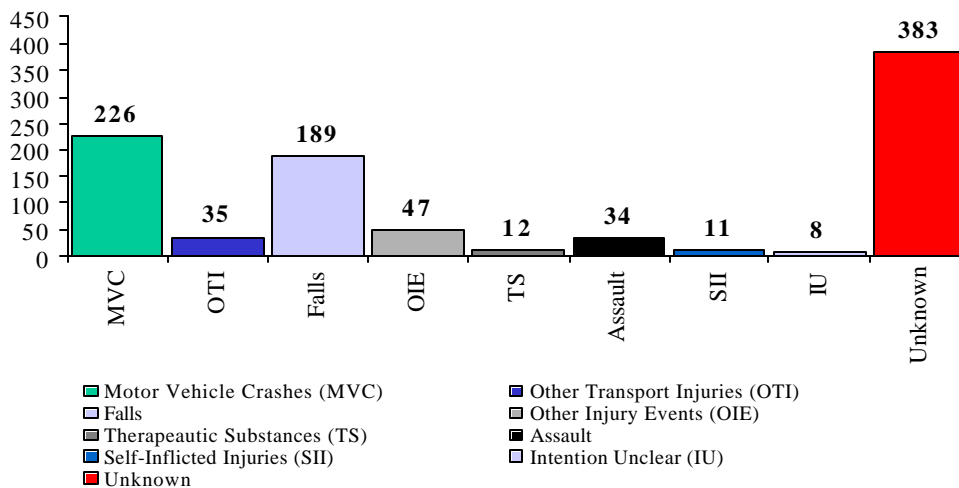


Primary and Secondary Payer— Medicare was the primary payer for 175 initial inpatient stays; Medicaid for 94 stays. Medicare was the secondary payer for 35 initial hospital stays; Medicaid for 58. These payers did not fluctuate greatly from year to year.

Circumstances of Spinal Cord Injury

Causes of Injury—Based on the available information from E-Codes (there were 565 injury events with E-codes listed), the leading cause of spinal cord injury during 1990-1994 was motor vehicle crashes (226), followed by accidental falls (189), and then other injury events (47). After age 46, the leading cause of injury was due to some type of fall (**Graph 1.12**). Causes of spinal cord injury can vary by race. Motor vehicle crashes were the leading cause among whites (182), followed by falls (158). Intentional injuries (assault and self-inflicted) were the leading cause of spinal cord injury among blacks (27), followed by falls (13). In fact, intentional injuries were the cause of 39% of all spinal cord injuries among blacks.

Graph 1.12
Causes of Injury 1990 - 1994



The leading causes of injuries of spinal cord injuries from 1990 through 1994 are listed in **Table 1.3**.

Table 1.3
Causes of SCI, by Gender: 1990-1994

<i>Cause (with E-code)</i>	<i>Male #</i>	<i>Male %</i>	<i>Female #</i>	<i>Female %</i>	<i>Total #</i>	<i>Total %</i>
<u>Unintentional</u>						
Motor Vehicle Crashes (810-819, 929.0)	162	39	64	44	226	40
Other Transport Injuries (820-848, 929.1)	26	6	9	6	35	6
Falls (880-888, 929.3)	141	34	48	33	189	34
Other Injury Events (870-879, 916-928)	37	9	10	7	47	9
Therapeutic Substances (930-949)	10	2	2	1	12	2
<u>Intentional</u>						
Assault (960-969)	27	7	7	5	34	6
Self-inflicted Injuries (950-959)	6	1.5	5	3	11	2
<u>Unclear</u>						
Intention Unclear (980-989)	6	1.5	2	1	8	1
<u>Total With Cause Known</u>	415	100	147	100	562	100
<u>Unknown</u>						
Unknown (no E-code)	275		108		383	
<u>Total SCI</u>	690		255		945	

**Table 1.4
Causes of SCI by Selected Age Groups: 1990-1994**

<i>Age Groups & Causes</i>	<i>Male</i>		<i>Female</i>		<i>Total</i>	
	<i>Number of SCI Events</i>	<i>%</i>	<i>Number of SCI Events</i>	<i>%</i>	<i>Number of SCI Events</i>	<i>%</i>
0-15						
Total All Causes	25	100	17	100	42	100
Motor Vehicle Crashes	5	20	4	23	9	21
Other Transport Injuries	1	4	1	6	2	5
Falls	5	20	2	12	7	17
Other Injury Events	1	4	3	18	4	10
Therapeutic Substances	0	0	0	0	0	0
Assaults	2	8	1	6	3	7
Self-inflicted Injuries	0	0	0	0	0	0
Intention Unclear	0	0	0	0	0	0
Unknown	11	44	6	35	17	40
16-30						
Total All Causes	281	100	76	100	357	100
Motor Vehicle Crashes	77	27	26	34	103	29
Other Transport Injuries	18	6	4	5	22	6
Falls	39	14	7	9	46	13
Other Injury Events	19	7	2	3	21	6
Therapeutic Substances	6	2	0	0	6	2
Assaults	18	6.5	3	4	21	6
Self-inflicted Injuries	2	1	3	4	5	1
Intention Unclear	4	1.5	1	1	5	1
Unknown	98	35	30	40	128	36
31-45						
Total All Causes	172	100	52	100	224	100
Motor Vehicle Crashes	50	29	14	27	64	29
Other Transport Injuries	3	2	3	6	6	3
Falls	41	24	9	17	50	22
Other Injury Events	9	5	3	6	12	5
Therapeutic Substances	2	1	0	0	2	1
Assaults	5	3	3	6	8	4
Self-inflicted Injuries	3	2	1	2	4	2
Intention Unclear	2	1	1	2	3	1
Unknown	57	33	18	34	75	33
46-60						
Total All Causes	89	100	21	100	110	100
Motor Vehicle Crashes	16	18	6	29	22	20
Other Transport Injuries	4	4.5	0	0	4	4
Falls	22	25	7	33	29	26
Other Injury Events	3	3.5	0	0	3	2
Therapeutic Substances	2	2	0	0	2	2
Assaults	1	1	0	0	1	1
Self-inflicted Injuries	1	1	1	5	2	2
Intention Unclear	0	0	0	0	0	0
Unknown	40	45	7	33	47	43

(Table 1.4, Continued)

61-75						
Total All Causes	67	100	51	100	118	100
Motor Vehicle Crashes	9	13.5	12	23	21	18
Other Transport Injuries	0	0	0	0	0	0
Falls	16	24	11	22	27	23
Other Injury Events	4	6	0	0	4	3
Therapeutic Substances	0	0	1	2	1	1
Assaults	1	1.5	0	0	1	1
Self-inflicted Injuries	0	0	0	0	0	0
Intention Unclear	0	0	0	0	0	0
Unknown	37	55	27	53	64	54
75+						
Total All Causes	56	100	38	100	94	100
Motor Vehicle Crashes	5	9	2	5	7	8
Other Transport Injuries	1	2	0	0	1	1
Falls	18	32	12	32	30	32
Other Injury Events	1	2	2	5	3	3
Therapeutic Substances	0	0	1	3	1	1
Assaults	0	0	0	0	0	0
Self-inflicted Injuries	0	0	0	0	0	0
Intention Unclear	0	0	0	0	0	0
Unknown	31	55	21	55	52	55

Motor Vehicle Crashes—Motor vehicle crashes were by far the leading cause of spinal cord injury among Wisconsin residents. From 1990-1994, 226 spinal cord injuries (162 or 39% of injuries to males and 64 or 44% of injuries to females) were sustained in a motor vehicle crash. Overall, males sustained approximately 2.5 times as many spinal cord injury events in motor vehicle crashes as did females. Motor vehicle crashes were the leading cause of spinal cord injury for both genders between 0 to 45, and the second leading cause of injury for persons aged 46 and older.

In the majority of motor vehicle crashes (51%), the driver was the individual to sustain the spinal cord injury. Fourteen percent of motor vehicle injuries occurred to individuals while operating a motorcycle.

Falls—Falls were the second leading cause of spinal cord injury in Wisconsin. There were 189 fall events recorded in Wisconsin from 1990-1994, with seventy-five percent of those events occurring to men. Men sustained 141 spinal cord injuries due to falls, while females sustained 48 injuries. Falls were the leading cause of spinal cord injury for both genders aged 46 and older.

The majority of identified falls (53%) occurred when the individual fell from one level to another (falling down stairs, off ladders and chairs, etc.). Twenty-three (12%) of injuries were sustained from shallow water dives.

Other Injury Events—This was the third leading cause of injury, not related to transport vehicles, including machine injuries, sport injuries, and injuries incurred during medical procedures. There were 47 injuries sustained from 1990-1994 due to these events. Males sustained 37 (79%) of these injuries.

Intentional Injuries—Intentional injuries were the fourth leading cause of spinal cord injury. From 1990-1994, there were 45 intentional events resulting in spinal cord injury. Men sustained 33 (73%) of these intentional events. This total includes self-inflicted injury as well as those inflicted by other persons. The number of intentional injuries did not fluctuate greatly from year to year.

The question of intention is often considered relevant to causation. An injury is categorized as “intention unknown” when it is unspecified or it cannot be determined whether the injuries are accidental (unintentional), suicide (attempted), or assault.

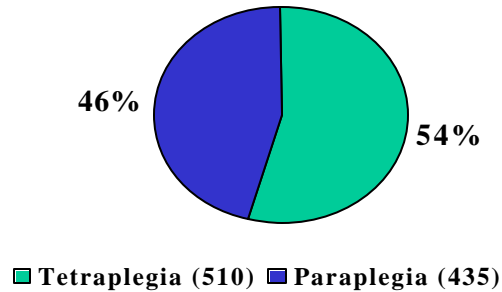
Whether ruled accidental, intentional, or intention unknown, firearms were a recurring cause of spinal cord injury, especially among males. Fifty-three firearm injury events were reported, forty-three (81%) of these to males.

Other Transport Injuries—From 1990-1994, other transport injuries were the fifth leading cause of spinal cord injury, with 35 injuries reported. Other transport injuries include injuries from snowmobiles, watercraft, and aircraft, among others. Males sustained 26 (74%) of these other transport-related events.

The majority of these injuries (12 or 34%) were sustained while operating an off-road motor vehicle (not including snowmobiles).

Level and Severity of Injury—There are two categories of spinal cord injuries: paraplegia and tetraplegia. A person is said to have paraplegia when there is a loss of feeling in the lower portion of the body. Tetraplegia is described as loss of movement in both the upper and lower portions of the body (Maddox, 1993). In the 1990 through 1994 data, 54% of the individuals sustained spinal cord injuries resulting in tetraplegia, and 46% in paraplegia (**Graph 1.13**). Men sustained 378 injuries resulting in tetraplegia and 312 injuries resulting in paraplegia. Women sustained 132 injuries resulting in tetraplegia and 123 injuries resulting in paraplegia.

Graph 1.13
Severity of Injury
1990-1994



The severity of a spinal cord injury is determined by the level of the injury and by the amount of neurological impairment. A spinal cord injury at any level may impair strength, sensation, bowel, bladder, and sexual functioning.

A spinal cord injury can also be described as either complete or incomplete. A complete injury means an individual has no function, sensation, or voluntary movement below the level of injury. In most cases, both sides are equally affected. An incomplete injury means there is some functioning below the primary level of injury. The individual may be able to move one limb more than another, feel parts of the body that cannot be moved, or may have more functioning on one side of the body than the other. Due to advances in medicine, the incomplete injury is more common.

Table 1.5

Principal Diagnosis

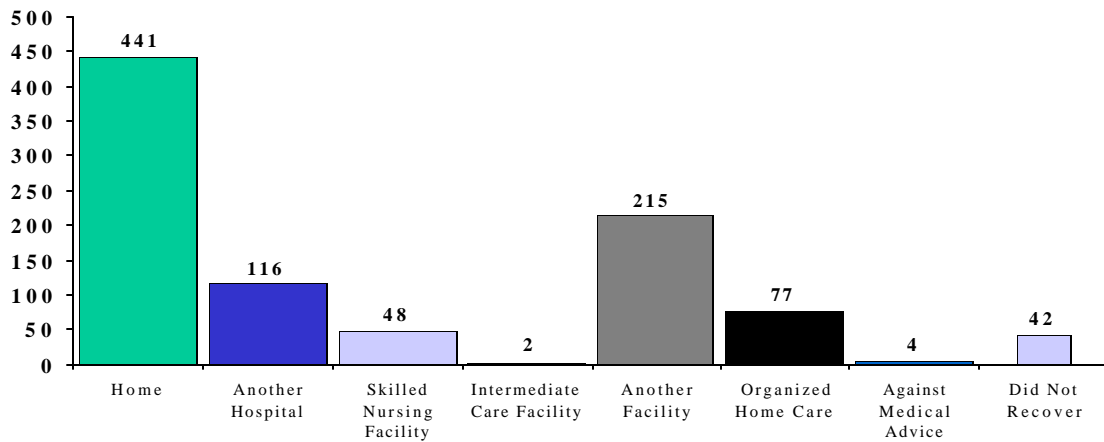
Diagnosis Code	Principal Diagnosis	Male	Female	Total
806	Fracture of vertebral column with spinal cord injury			
806.0	<i>Cervical, closed</i>			
806.00	C1-C4 level with unspecified spinal cord injury	35	13	48
806.01	C1-C4 level with complete lesion of cord	9	1	10
806.02	C1-C4 level with anterior cord syndrome	2	1	3
806.03	C1-C4 level with central cord syndrome	9	5	14
806.04	C1-C4 level with other specified spinal cord injury	18	8	26
806.05	C5-C7 level with unspecified spinal cord injury	51	21	72
806.06	C5-C7 level with complete lesion of cord	29	4	33
806.07	C5-C7 level with anterior cord syndrome	2	2	4
806.08	C5-C7 level with central cord syndrome	23	10	33
806.09	C5-C7 level with other specified spinal cord injury	34	9	43
806.1	<i>Cervical, open</i>			
806.14	C1-C4 level with other specified spinal cord injury	1	2	3
806.15	C5-C7 level with unspecified spinal cord injury	1	0	1
806.2	<i>Dorsal (thoracic), closed</i>			
806.20	T1-T6 level with unspecified spinal cord injury	23	11	34
806.21	T1-T6 level with complete lesion of cord	16	2	18
806.24	T1-T6 level with other specified spinal cord injury	16	4	20
806.25	T7-T12 level with unspecified spinal cord injury	31	20	51
806.26	T7-T12 level with complete lesion of cord	28	2	30
806.27	T7-T12 level with anterior cord syndrome	1	2	3
806.29	T7-T12 level with other specified spinal cord injury	24	10	34
806.3	<i>Dorsal (thoracic), open</i>			
806.30	T1-T6 level with unspecified spinal cord injury	2	0	2
806.31	T1-T6 level with complete lesion of cord	3	1	4
806.35	T7-T12 level with unspecified spinal cord injury	1	1	2
806.36	T7-T12 level with complete lesion of cord	1	1	2
806.39	T7-T12 level with other specified spinal cord injury	1	2	3
806.4	<i>Lumbar, closed</i>	78	29	107
806.5	<i>Lumbar, open</i>	5	1	6
806.6	<i>Sacrum and coccyx, closed</i>			
806.60	With unspecified spinal cord injury	0	3	3
806.62	With other cauda equina lesion	2	3	5
806.69	With other spinal cord injury	2	0	2
806.7	<i>Sacrum and coccyx, open</i>			

806.70	With unspecified spinal cord injury	0	1	1
806.79	With other spinal cord injury	2	0	2
806.8	<i>Unspecified, closed</i>	3	2	5
952	Spinal cord injury without evidence of spinal bone injury			
952.0	<i>Cervical</i>			
952.00	C1-C4 level with unspecified spinal cord injury	75	25	100
952.01	C1-C4 level with complete lesion of spinal cord	2	0	2
952.02	C1-C4 level with anterior cord syndrome	1	0	1
952.03	C1-C4 level with central cord syndrome	23	5	28
952.04	C1-C4 level with other specified spinal cord injury	6	5	11
952.05	C1-C4 level with unspecified spinal cord injury	32	7	39
952.06	C1-C4 level with complete lesion of spinal cord	2	4	6
952.08	C5-C7 level with central cord syndrome	14	6	20
952.09	C5-C7 level with other specified spinal cord injury	9	4	13
952.1	<i>Dorsal (thoracic)</i>			
952.10	T1-T6 level with unspecified spinal cord injury	7	4	11
952.11	T1-T6 level with complete lesion of cord	3	1	4
952.13	T1-T6 level with central cord syndrome	1	0	1
952.14	T1-T6 level with other specified spinal cord injury	2	0	2
952.15	T7-T12 level with unspecified spinal cord injury	13	3	16
952.16	T7-T12 level with complete lesion of spinal cord	1	0	1
952.19	T7-T12 level with other specified spinal cord injury	3	0	3
952.2	<i>Lumbar</i>	15	10	25
952.3	<i>Sacral</i>	3	1	4
952.4	<i>Cauda Equina</i>	5	1	6
952.8	<i>Multiple sites of spinal cord</i>	1	0	1
952.9	<i>Unspecified site of spinal cord</i>	19	8	27

Discharge Location

In terms of patient discharge, the most common discharge location was to the home or to self-care with 441 (47%) of patients returning to their home or the home of another. Discharges to an institution were the second most common with 215 (23%) discharges (**Graph 1.14**). These percentages did not fluctuate greatly from year to year.

Graph 1.14
Patient Discharge Location
1990-1994



Spinal Cord Injuries by County of Residence

Map 1.1 shows the spinal cord injury events by county of residence from 1990-1994. This data reflects the county in which the person lives, not necessarily the county in which the spinal cord injury occurred. As expected, counties with greater population rates had a higher number of injury events occurring to their residents.

Map 1.1
**Spinal Cord Injuries by
 County of Residence,
 1990-1994**



Table 1.6
Injuries by Year and County of Residence for 1990-1994

	County	1990	1991	1992	1993	1994	Totals
01	Adams		3	1	4	3	11
02	Ashland						0
03	Barron	1	2	2			5
04	Bayfield				1		1
05	Brown	6	7	6	13	9	41
06	Buffalo						0
07	Burnett						0
08	Calumet	2	3	1		1	7
09	Chippewa	1	1	3	1	2	8
10	Clark	2	3	1		3	9
11	Columbia	2		2	2	3	9
12	Crawford					1	1
13	Dane	9	10	12	12	11	54
14	Dodge	4	4	6	4	2	20
15	Door			1		2	3
16	Douglas				1		1
17	Dunn	1	1	1	1		4
18	Eau Claire	2	4	6	3	1	16
19	Florence	1					1
20	Fond Du Lac	7	3	2	3	3	18
21	Forest						0
22	Grant	3	1	2		3	9
23	Green			2	1	4	7
24	Green Lake	1	1		1		3
25	Iowa	3	1	3			7
26	Iron						0
27	Jackson		1		2	1	4
28	Jefferson	4	3	5	3	1	16
29	Juneau	2	1	1		1	5
30	Kenosha	3	10	4	4	5	26
31	Kewaunee					2	2
32	LaCrosse	4	1	3	1	2	11
33	Lafayette		1			1	2
34	Langlade	2			1		3
35	Lincoln	2	4	2	2	1	11
36	Manitowoc	3	5	4		1	13
37	Marathon	4	5	6	4	8	27
38	Marinette	1	4	2	5	3	15
39	Marquette	1	2	1	1	4	9
40	Menominee		1				1

	County	1990	1991	1992	1993	1994	Totals
41	Milwaukee	54	43	40	39	32	208
42	Monroe	2	2	1	1	3	9
43	Oconto	4	2	3	2	1	12
44	Oneida	2	3	1	2		8
45	Outagamie	6	8	9	7	10	40
46	Ozaukee	3	2	1	3	2	11
47	Pepin						0
48	Pierce					1	1
49	Polk					1	1
50	Portage	3		1	4	1	9
51	Price		1	2	1	1	5
52	Racine	5	7	6	6	10	34
53	Richland	2	1		2	1	6
54	Rock	2	1	5	9	3	20
55	Rusk		1			2	3
56	St. Croix						0
57	Sauk	5	4		4	2	15
58	Sawyer				1		1
59	Shawano	1	3	2	1		7
60	Sheboygan	4	6	2	3	1	16
61	Taylor	4					4
62	Trempealeau	1	2	1	1		5
63	Vernon	2		1		1	4
64	Vilas	2	2	2	3	1	10
65	Walworth	3	1	2	6	4	16
66	Washburn			1		1	2
67	Washington	5	1	5	4	4	19
68	Waukesha	4	6	11	2	8	31
69	Waupaca	7	2	6	3	4	22
70	Waushara		2			2	4
71	Winnebago	9	5		5	7	26
72	Wood	3	5	5	1	2	16
State Totals		204	192	186	180	183	945



**Appendix 1.1:
Hospitals and E-Codes,
1990—1994**

Hospitals Reporting SCI

Table 1.7 Hospitals Reporting SCI		
HOSPITAL	CITY	COUNTY
Langlade Memorial Hospital	Antigo	Langlade
Appleton Medical Center	Appleton	Outagamie
St. Elizabeth Hospital	Appleton	Outagamie
St. Clare Hospital and Health Services	Baraboo	Sauk
Beaver Dam Community Hospitals, Inc.	Beaver Dam	Dodge
Beloit Memorial Hospital	Beloit	Rock
Elmbrook Memorial Hospital	Brookfield	Waukesha
Memorial Hospital Corp. of Burlington	Burlington	Racine
St. Joseph's Hospital	Chippewa Falls	Chippewa
Clintonville Area Health Center	Clintonville	Waupaca
Trinity Memorial Hospital	Cudahy	Milwaukee
Cumberland Memorial Hospital and ECU	Cumberland	Barron
Memorial Hospital of Iowa County, Inc.	Dodgeville	Iowa
Luther Hospital	Eau Claire	Eau Claire
Sacred Heart Hospital	Eau Claire	Eau Claire
Memorial Community Hospital	Edgerton	Rock
Lakewood Medical Center, Inc.	Elkhorn	Walworth
St. Agnes Hospital	Fond Du Lac	Fond Du Lac
Fort Atkinson Memorial Health Services	Fort Atkinson	Jefferson
Adams County Memorial Hospital	Friendship	Adams
Bellin Memorial Hospital	Green Bay	Brown
St. Mary's Hospital Medical Center	Green Bay	Brown
St. Vincent Hospital	Green Bay	Brown
Hayward Area Memorial Hospital	Hayward	Sawyer
Mercy Health System Corporation	Janesville	Rock
Kenosha Hospital and Medical Center	Kenosha	Kenosha
St. Catherine's Hospital, Inc.	Kenosha	Kenosha
Lutheran Hospital – La Crosse	La Crosse	La Crosse
Franciscan Skemp Medical Center, Inc.	La Crosse	La Crosse
Lancaster Memorial Hospital and Clinics	Lancaster	Grant
Meriter Hospital, Inc.	Madison	Dane
St. Mary's Hospital Medical Center	Madison	Dane
University of Wisconsin Hospital and Clinics	Madison	Dane
Holy Family Medical Center	Manitowoc	Manitowoc
Bay Area Medical Center	Marinette	Marinette
Saint Joseph's Hospital	Marshfield	Wood
Hess Memorial Hospital	Mauston	Juneau
Community Memorial Hospital	Menomonee Falls	Waukesha
Good Samaritan Health Center	Merill	Lincoln

HOSPITAL	CITY	COUNTY
Children's Hospital of Wisconsin	Milwaukee	Milwaukee
Columbia Hospital, Inc.	Milwaukee	Milwaukee
Froedtert Memorial Lutheran Hospital	Milwaukee	Milwaukee
Sacred Heart Rehabilitation Institute	Milwaukee	Milwaukee
St. Francis Hospital	Milwaukee	Milwaukee
St. Joseph's Hospital – Milwaukee	Milwaukee	Milwaukee
St. Luke's Medical Center	Milwaukee	Milwaukee
St. Mary's Hospital – Milwaukee	Milwaukee	Milwaukee
St. Michael Hospital	Milwaukee	Milwaukee
Theda Clark Medical Center	Neenah	Winnebago
Memorial Hospital, Inc.	Neillsville	Clark
New London Family Medical Center	New London	Juneau
Memorial Hospital at Oconomowoc	Oconomowoc	Waukesha
Community Memorial Hospital	Oconto Falls	Oconto
Mercy Medical Center	Oshkosh	Winnebago
Flambeau Hospital, Inc.	Park Falls	Price
Southwest Health Center, Inc.	Platteville	Grant
Valley View Medical Center	Plymouth	Sheboygan
St. Mary's Hospital – Ozaukee	Mequon	Ozaukee
Divine Savior Hospital and NSG Home, Inc.	Portage	Columbia
Sauk Prairie Memorial Hospital	Prairie Du Sac	Sauk
St. Luke's Memorial Hospital	Racine	Racine
Saint Mary's Medical Center	Racine	Racine
Reedsburg Area Medical Center	Reedsburg	Sauk
Saint Mary's Hospital, Inc.	Rhineland	Oneida
Ripon Medical Center	Ripon	Fond Du Lac
Sheboygan Memorial Medical Center	Sheboygan	Sheboygan
St. Nicholas Hospital	Sheboygan	Sheboygan
Franciscan Skemp Healthcare - Sparta	Sparta	Monroe
St. Croix Valley Memorial Hospital	St. Croix Falls	Polk
Saint Michael's Hospital	Stevens Point	Portage
St. Mary's Hospital of Superior	Superior	Douglas
Two Rivers Community Hospital, Inc.	Two Rivers	Manitowoc
Waukesha Memorial Hospital, Inc.	Waukesha	Waukesha
Riverside Medical Center	Waupaca	Waupaca
Wausau Hospital	Wausau	Marathon
Lakeview Hospital	Milwaukee	Milwaukee
John L. Doyle Hospital	Wauwatosa	Milwaukee
West Allis Memorial Hospital	West Allis	Milwaukee
Howard Young Medical Center, Inc.	Woodruff	Oneida
Sinai Samaritan Medical Center	Milwaukee	Milwaukee
Holy Family Memorial Medical Center	Manitowoc	Manitowoc

Table 1.8

E-Codes

<i>E-code</i>	<i>Description</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
8100	Traffic accidents with train, driver	4	4	0
8120	Traffic accidents with motor vehicle, driver	27	20	7
8121	Traffic accidents with motor vehicle, passenger	13	5	8
8122	Traffic accidents with motor vehicle, motorcyclist	4	4	0
8128	Traffic accidents with motor vehicle, other specified person	1	1	0
8129	Traffic accidents with motor vehicle, unspecified person	2	2	0
8130	Motor vehicle with other vehicle, driver	3	2	1
8131	Motor vehicle with other vehicle, passenger	1	1	0
8136	Motor vehicle with other vehicle, pedal cyclist	1	0	1
8147	Motor vehicle collision with pedestrian, pedestrian	9	5	4
8150	Collision on highway accident, driver	7	5	2
8151	Collision on highway accident, passenger	3	1	2
8152	Collision on highway accident, motorcyclist	3	3	0
8159	Collision on highway accident, unspecified person	1	1	0
8160	Motor vehicle-loss of control, driver	54	38	16
8161	Motor vehicle-loss of control, passenger	23	17	6
8162	Motor vehicle-loss of control, motorcyclist	9	9	0
8163	Motor vehicle-loss of control, passenger on motorcycle	2	1	1
8169	Motor vehicle-loss of control, unspecified person	4	3	1
8180	Non-collision motor vehicle, driver	2	1	1
8181	Non-collision motor vehicle, passenger	2	1	1
8182	Non-collision motor vehicle, motorcyclist	2	2	0
8187	Non-collision motor vehicle, pedestrian	1	1	0
8189	Non-collision motor vehicle, unspecified person	1	1	0
8190	Unspecified motor vehicle accident, driver	18	13	5
8191	Unspecified motor vehicle accident, passenger	12	6	6
8192	Unspecified motor vehicle accident, motorcyclist	10	10	0
8193	Unspecified motor vehicle accident, passenger of motorcycle	1	1	0
8199	Unspecified motor vehicle accident, unspecified person	5	3	2
8200	Non-traffic accident (snow vehicle), driver	5	4	1
8209	Non-traffic accident (snow vehicle), unspecified person	1	1	0
8210	Off-road motor vehicle, driver	8	7	1
8212	Off-road motor vehicle, passenger	3	3	0

8217	Off-road motor vehicle, pedestrian	1	0	1
8232	Collision with stationary object, passenger	1	1	0
8251	Unspecified motor vehicle, passenger	1	0	1
8259	Unspecified motor vehicle, unspecified person	1	1	0
8261	Pedal cycle accident, pedal cyclist	4	4	0
8282	Animal being driven, rider of animal	2	1	1
8321	Submersion or drowning in water transport, occupant of small boat	1	0	1
8415	Accident to powered aircraft, occupant	2	1	1
8447	Other specified air transport accidents, parachutist	2	2	0
848	Other vehicles	2	1	1
8760	Misadventures during medical care, mismatched blood	1	1	0
8788	Surgical Ops & Procedures, other specified	1	1	0
8798	Other procedures, blood transfusion	1	0	1
8809	Fall from stairs or steps, other stairs or steps	26	18	8
8810	Fall from ladder	10	9	1
8811	Fall from scaffolding	5	5	0
882	Fall from or out of building	19	16	3
8830	Accident from diving or jumping into water	23	21	2
8841	Fall from cliff	3	2	1
8842	Fall from chair	7	4	3
8849	Fall from one level to another	31	25	6
885	Fall from same level, slip, trip, or stumble	20	13	7
8860	Fall on same level, collision, pushing, or shoving, in sports	3	3	0
887	Fracture, cause unspecified	2	1	1
888	Other & unspecified fall	38	23	15
916	Struck by falling object	9	8	1
9170	Struck by objects or persons – in sports	8	7	1
9179	Struck by objects or persons – other	7	5	2
918	Caught in or between objects	1	1	0
9192	Machinery accident, lifting machine & appliances	2	1	1
9222	Accident caused by firearm, hunting rifle	1	1	0
9228	Accident caused by firearm, other specified firearm	1	1	0
9229	Accident caused by firearm, unspecified firearm	9	7	2
927	Overexertion and strenuous movements	3	2	1
9289	Environmental & accident causes, unspecified accident	3	2	1
9293	Late effects of accidental fall	1	1	0
9305	Antibiotics, Cephalosporin group	1	1	0
9309	Antibiotics, unspecified	2	1	1
9310	Other anti-infectives , sulfonamides	1	1	0
9320	Hormones & synthetic substitutes, adrenal cortical	2	1	1

	steroids			
9363	Anticonvulsants, other and unspecified	1	1	0
9379	Sedatives & hypnotics , unspecified	1	1	0
9382	CNS depressants & anesthetics, gaseous	1	1	0
9390	Psychotropic agents, antidepressants	1	1	0
9460	Anti-infectives & anti-inflammatory drugs, local	1	1	0
9478	Other drugs, unspecified	1	1	0
9550	Suicide/self-inflicted injury, by firearms, handgun	2	1	1
9554	Suicide/self-inflicted injury, other and unspecified firearm	6	3	3
9571	Suicide/self-inflicted injury, jumping from high place, other man-made structure	1	0	1
9585	Suicide/self-inflicted injury, other, crashing of motor vehicle	1	1	0
9600	Fight/ brawl/ rape, unarmed fight or brawl	6	3	3
9650	Assault by firearms, handgun	3	2	1
9654	Assault by firearms, other & unspecified firearms	24	22	2
966	Assault by cutting/piercing instrument	2	1	1
9850	Intention unknown accident, handgun	1	1	0
9854	Intention unknown accident, other & unspecified firearm	5	5	1
9870	Intention unknown accident, fall from high place (residential premises)	1	0	1
9879	Intention unknown accident, fall from high place (unspecified site)	1	1	0



**Appendix 1.2:
Spinal Cord Injuries by Year, 1990—1994**

Table 1.9
1990 Data

<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
INCIDENCE			
Incidence (by gender)	204	151	53
AGE			
0-15	9	5	4
16-30	83	62	21
31-45	42	35	7
46-60	22	19	3
61-75	28	19	9
75+	20	11	9
RACE			
American Indian, Native Alaskan	0	0	0
Asian, Pacific Islander	0	0	0
Black	10	8	2
White	89	70	19
Other	4	3	1
Unknown	23	18	5
Not Reported	78	52	26
ADMISSION MONTH			
January	13	7	6
February	14	10	4
March	14	9	5
April	16	15	1
May	16	10	6
June	24	18	6
July	26	19	7
August	20	15	5
September	15	12	3
October	13	9	4
November	18	13	5
December	15	14	1
ADMISSION DAY			
Monday	32	22	10
Tuesday	22	13	9
Wednesday	26	17	9
Thursday	30	22	8
Friday	22	15	7
Saturday	39	33	6
Sunday	33	29	4
ADMISSION TYPE			
Emergency	134	95	39
Urgent	59	48	11
Elective	11	8	3

(1990 Data, Continued)			
<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
ADMISSION SOURCE			
Physician referral	18	11	7
Clinic referral	0	0	0
HMO referral	0	0	0
Transfer from hospital	18	11	7
Transfer from skilled nursing facility	0	0	0
Transfer from another health care facility	11	11	0
Emergency room	154	116	38
Court, law enforcement	0	0	0
Information not available	3	2	1
LENGTH OF INPATIENT STAY			
Total number of days	7,184	5,515	1,669
Average number of days	35.2	36.5	31.5
COST OF INPATIENT HOSPITAL DATA			
Total	\$11,330,499	\$8,999,212	\$2,331,287
Average	\$55,542	\$59,597	\$43,986
MOST FREQUENT CAUSES OF INJURY			
1. Falls	23	16	7
2. Motor vehicle crashes	22	17	5
3. Other transportation injuries	8	4	4
4. Assault	7	5	2
5. Other injury events	6	5	1
6. Therapeutic substances	2	2	0
7. Intention unclear	2	2	0
8. Unknown	134	100	34
LEVEL OF SEVERITY			
Tetraplegia	110	78	32
Paraplegia	94	73	21
PATIENT DISCHARGE LOCATION			
Discharged to home or self-care	87	61	26
Discharged or transferred to another short-term general hospital	30	24	6
Discharged or transferred to a skilled nursing facility	6	3	3
Discharged or transferred to an intermediate care facility	0	0	0
Discharged or transferred to another type of institution	59	49	10
Discharged or transferred to home under care of organized health service	11	5	6
Expired or did not recover	11	9	2

Table 1.10
1991 Data

<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
INCIDENCE			
Incidence (by gender)	192	150	42
AGE			
0-15	8	5	3
16-30	84	72	12
31-45	48	34	14
46-60	13	12	1
61-75	16	11	5
75+	23	16	7
RACE			
American Indian, Native Alaskan	1	1	0
Asian, Pacific Islander	2	2	0
Black	19	14	5
White	140	113	27
Other	4	3	1
Unknown	26	17	9
Not Reported	0	0	0
ADMISSION MONTH			
January	17	12	5
February	10	10	0
March	8	7	1
April	15	12	3
May	17	10	7
June	20	16	4
July	23	17	6
August	16	12	4
September	22	16	6
October	18	16	2
November	15	13	2
December	11	9	2
ADMISSION DAY			
Monday	33	24	9
Tuesday	25	16	9
Wednesday	24	17	7
Thursday	26	21	5
Friday	29	24	5
Saturday	25	21	4
Sunday	30	27	3
ADMISSION TYPE			
Emergency	108	83	25
Urgent	70	53	17
Elective	14	14	0

(1991 Data, Continued)			
<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
ADMISSION SOURCE			
Physician referral	20	17	3
Clinic referral	0	0	0
HMO referral	1	1	0
Transfer from hospital	15	9	6
Transfer from skilled nursing facility	0	0	0
Transfer from another health care facility	30	24	6
Emergency room	125	98	27
Court, law enforcement	1	1	0
Information not available	0	0	0
LENGTH OF INPATIENT STAY			
Total number of days	8,002	6,519	1,483
Average number of days	41.7	43.5	35.3
COST OF INPATIENT HOSPITAL CARE			
Total	\$13,235,822	\$10,660,211	\$2,575,611
Average	\$68,937	\$71,068	\$61,324
MOST FREQUENT CAUSES OF INJURY			
1. Motor vehicle crashes	45	37	8
2. Falls	32	25	7
3. Other injury events	15	11	4
4. Therapeutic substances	8	7	1
5. Assault	5	3	2
6. Other transportation injuries	4	2	2
7. Self-inflicted injuries	4	2	2
8. Intention unclear	2	2	0
9. Unknown	77	61	16
LEVEL OF SEVERITY			
Tetraplegia	102	83	19
Paraplegia	90	67	23
PATIENT DISCHARGE LOCATION			
Discharged to home or self-care	91	71	20
Discharged or transferred to another short-term general hospital	19	14	5
Discharged or transferred to a skilled nursing facility	11	9	2
Discharged or transferred to another type of institution	41	32	9
Discharged or transferred to home under care of organized health service	16	13	3
Left against medical advice	4	4	0
Expired or did not recover	10	7	3

Table 1.11
1992 Data

<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
INCIDENCE			
Incidence (by gender)	186	125	61
AGE			
0-15	10	5	5
16-30	61	47	14
31-45	49	39	10
46-60	20	13	7
61-75	24	10	14
75+	22	11	11
RACE			
American Indian, Native Alaskan	1	1	0
Asian, Pacific Islander	1	0	1
Black	21	17	4
White	147	96	51
Other	0	0	0
Unknown	16	11	5
Not Reported	0	0	0
ADMISSION MONTH			
January	19	9	10
February	10	8	2
March	8	5	3
April	16	10	6
May	18	10	8
June	17	14	3
July	16	14	2
August	18	10	8
September	21	16	5
October	18	12	6
November	14	11	3
December	11	6	5
ADMISSION DAY			
Monday	30	18	12
Tuesday	22	11	11
Wednesday	31	21	10
Thursday	18	9	9
Friday	28	21	7
Saturday	24	18	6
Sunday	33	27	6
ADMISSION TYPE			
Emergency	119	85	34
Urgent	57	34	23
Elective	10	6	4

(1992 Data, Continued)			
<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
ADMISSION SOURCE			
Physician referral	18	7	11
Clinic referral	3	1	2
HMO referral	0	0	0
Transfer from hospital	15	9	6
Transfer from skilled nursing facility	0	0	0
Transfer from another health care facility	12	10	2
Emergency room	138	98	40
Court, law enforcement	0	0	0
Information not available	0	0	0
LENGTH OF INPATIENT STAY			
Total number of days	6,510	4,629	1,881
Average number of days	35.0	37.0	30.8
COST OF INPATIENT HOSPITAL CARE			
Total	\$12,036,397	\$8,748,209	\$3,308,188
Average	\$64,711	\$69,826	\$54,232
MOST FREQUENT CAUSES OF INJURY			
1. Motor vehicle crashes	43	30	13
2. Falls	29	19	10
3. Assaults	9	7	2
4. Other injury events	9	6	3
5. Other transportation injuries	4	3	1
6. Self-inflicted injuries	3	2	1
7. Therapeutic substances	2	1	1
8. Intention unclear	0	0	0
9. Unknown	87	57	30
LEVEL OF SEVERITY			
Tetraplegia	106	75	31
Paraplegia	80	50	30
PATIENT DISCHARGE LOCATION			
Discharged to home or self-care	92	69	23
Discharged or transferred to another short-term general hospital	24	15	9
Discharged or transferred to a skilled nursing facility	12	5	7
Discharged or transferred to an intermediate care facility	1	1	0
Discharged or transferred to another type of institution	31	19	12
Discharged or transferred to home under care of organized health service	15	6	9
Expired or did not recover	11	10	1

Table 1.12
1993 Data

<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
INCIDENCE			
Incidence (by gender)	180	128	52
AGE			
0-15	12	8	4
16-30	64	47	17
31-45	50	36	14
46-60	22	19	3
61-75	20	11	9
75+	12	7	5
RACE			
American Indian, Native Alaskan	1	0	1
Asian, Pacific Islander	0	0	0
Black	9	4	5
White	162	117	45
Other	2	1	1
Unknown	6	6	0
Not Reported	0	0	0
ADMISSION MONTH			
January	16	9	7
February	12	8	4
March	20	14	6
April	11	6	5
May	8	6	2
June	13	9	4
July	17	13	4
August	13	8	5
September	22	17	5
October	22	17	5
November	17	14	3
December	9	7	2
ADMISSION DAY			
Monday	32	18	14
Tuesday	22	14	8
Wednesday	23	15	8
Thursday	18	12	6
Friday	25	19	6
Saturday	33	27	6
Sunday	27	23	4
ADMISSION TYPE			
Emergency	101	75	26
Urgent	67	45	22
Elective	12	8	4

(1993 Data, Continued)			
<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
ADMISSION SOURCE			
Physician referral	14	8	6
Clinic referral	0	0	0
HMO referral	0	0	0
Transfer from hospital	13	9	4
Transfer from skilled nursing facility	0	0	0
Transfer from another health care facility	14	10	4
Emergency room	139	101	38
Court, law enforcement	0	0	0
Information not available	0	0	0
LENGTH OF INPATIENT STAY			
Total number of days	7,542	5,505	2,037
Average number of days	41.9	43.0	39.2
COST OF INPATIENT HOSPITAL CARE			
Total	\$13,562,531	\$10,668,262	\$2,894,269
Average	\$75,347	\$83,346	\$55,659
MOST FREQUENT CAUSES OF INJURY			
1. Motor vehicle crashes	42	27	15
2. Falls	41	31	10
3. Other transportation injuries	8	7	1
4. Other injury events	6	5	1
5. Assault	5	5	0
6. Intention unclear	3	2	1
7. Self-inflicted injuries	2	1	1
8. Therapeutic substances	0	0	0
9. Unknown	73	50	23
LEVEL OF SEVERITY			
Tetraplegia	93	69	25
Paraplegia	86	59	27
PATIENT DISCHARGE LOCATION			
Discharged to home or self-care	82	56	26
Discharged or transferred to another short-term general hospital	25	16	9
Discharged or transferred to a skilled nursing facility	5	3	2
Discharged or transferred to another type of institution	37	30	7
Discharged or transferred to home under care of organized health service	25	18	7
Expired or did not recover	6	5	1

Table 1.13
1994 Data

<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
INCIDENCE			
Incidence (by gender)	183	136	47
AGE			
0-15	3	2	1
16-30	65	53	12
31-45	36	29	7
46-60	32	25	7
61-75	30	16	14
75+	17	11	6
RACE			
American Indian, Native Alaskan	0	0	0
Asian, Pacific Islander	0	0	0
Black	14	9	5
White	158	118	40
Other	3	3	0
Unknown	2	1	1
Not Reported	6	5	1
ADMISSION MONTH			
January	12	7	5
February	13	9	4
March	13	10	3
April	16	11	5
May	11	9	2
June	14	11	3
July	20	17	3
August	25	21	4
September	16	11	5
October	16	13	3
November	11	7	4
December	16	10	6
ADMISSION DAY			
Monday	27	17	10
Tuesday	27	18	9
Wednesday	22	15	7
Thursday	30	23	7
Friday	16	10	6
Saturday	26	20	6
Sunday	35	33	2
ADMISSION TYPE			
Emergency	112	87	25
Urgent	68	47	21
Elective	3	2	1

(1994 Data, Continued)			
<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
ADMISSION SOURCE			
Physician referral	18	13	5
Clinic referral	0	0	0
HMO referral	0	0	0
Transfer from hospital	27	18	9
Transfer from skilled nursing facility	1	1	0
Transfer from another health care facility	0	0	0
Emergency room	137	104	33
Court, law enforcement	0	0	0
Information not available	0	0	0
LENGTH OF INPATIENT STAY			
Total number of days	6,580	5,390	1,190
Average number of days	35.9	39.6	25.3
COST OF INPATIENT HOSPITAL CARE			
Total	\$13,011,372	\$10,690,564	\$2,320,808
Average	\$71,100	\$78,607	\$49,379
MOST FREQUENT CAUSES OF INJURY			
1. Motor vehicle crashes	74	51	23
2. Falls	64	50	14
3. Other transportation injuries	11	11	0
4. Other injury events	10	9	1
5. Assault	8	7	1
6. Self-inflicted injuries	2	1	1
7. Intention unclear	1	0	1
8. Therapeutic substances	0	0	0
9. Unknown	13	7	6
LEVEL OF SEVERITY			
Tetraplegia	98	73	25
Paraplegia	85	63	22
PATIENT DISCHARGE LOCATION			
Discharged to home or self-care	89	63	26
Discharged or transferred to another short-term general hospital	18	14	4
Discharged or transferred to a skilled nursing facility	14	9	5
Discharged or transferred to an intermediate care facility	1	1	0
Discharged or transferred to another type of institution	47	40	7
Discharged or transferred to home under care of organized health service	10	6	4
Expired or did not recover	4	3	1

Table 1.14
1990 – 1994 Data

<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
INCIDENCE			
Incidence (by gender)	945	690	255
AGE			
0-15	42	25	17
16-30	357	281	76
31-45	225	173	52
46-60	109	88	21
61-75	118	67	51
75+	94	56	38
RACE			
American Indian, Native Alaskan	3	2	1
Asian, Pacific Islander	3	2	1
Black	73	52	21
White	696	514	182
Other	13	10	3
Unknown	73	53	20
Not Reported	84	57	27
ADMISSION MONTH			
January	77	44	33
February	59	45	14
March	63	45	18
April	74	54	20
May	70	45	25
June	88	68	20
July	102	80	22
August	92	66	26
September	96	72	24
October	87	67	20
November	75	58	17
December	62	46	16
ADMISSION DAY			
Monday	129	99	30
Tuesday	102	72	30
Wednesday	123	85	38
Thursday	120	87	33
Friday	128	89	39
Saturday	162	119	43
Sunday	181	139	42
ADMISSION TYPE			
Emergency	574	425	149
Urgent	321	227	94
Elective	50	38	12

(1990-1994 Data, Continued)			
<i>Category of Data</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
ADMISSION SOURCE			
Physician referral	88	56	32
Clinic referral	3	1	2
HMO referral	1	1	0
Transfer from hospital	88	56	32
Transfer from skilled nursing facility	1	1	0
Transfer from another health care facility	67	55	12
Emergency room	693	517	176
Court, law enforcement	1	1	0
Information not available	3	2	1
LENGTH OF INPATIENT STAY			
Total number of days	35,818	27,558	8,260
Average number of days	37.9	39.9	32.3
COST OF INPATIENT HOSPITAL CARE			
Total	\$63,176,621	\$49,746,458	\$13,430,163
Average	\$66,854	\$72,096	\$52,667
MOST FREQUENT CAUSES OF INJURY			
1. Motor vehicle crashes	226	162	64
2. Falls	189	141	48
3. Other injury events	47	37	10
4. Other transportation injuries	35	26	9
5. Assault	34	27	7
6. Therapeutic substances	12	10	2
7. Self-inflicted injuries	11	6	5
8. Intention unclear	8	6	2
9. Unknown	383	275	108
LEVEL OF SEVERITY			
Tetraplegia	510	378	132
Paraplegia	435	312	123
PATIENT DISCHARGE LOCATION			
Discharged to home or self-care	441	320	121
Discharged or transferred to another short-term general hospital	116	83	33
Discharged or transferred to a skilled nursing facility	48	29	19
Discharged or transferred to an intermediate care facility	2	2	0
Discharged or transferred to another type of institution	215	170	45
Discharged or transferred to home under care of organized health service	77	48	29
Left against medical advice	4	4	0
Expired or did not recover	42	34	8

Conclusions

The establishment of this statewide registry and surveillance program was necessary to document factors and demographics associated with the population of individuals that sustains spinal cord injuries. We believe that the data presented in this first historical report clearly indicates the major etiologies of injury, the disproportionate injuries sustained by certain race, age and gender groups, and the cost of these injuries. In the future, we hope to explore the data further to identify the location of injury, the time and the factors surrounding the injuries, and other determinants that are crucial for injury prevention.

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