Spinal Cord Injury in Wisconsin: 1995 to 1996

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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

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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 Wisconsin Spinal Cord Injury Report represents a historical overview of spinal cord injuries in Wisconsin from 1995 to 1996. 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). 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 include all events occurring in Wisconsin during 1995-1996 to Wisconsin residents only. Non-residents of Wisconsin are 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 motor-cyclist 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 1995 to 1996 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

Code	Description
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 1995-1996 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 Statues 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 1995 census data, Wisconsin's population was approximately 49 percent male and 51 percent female. The largest population age groups for both males and females was in the 31-45 age category, comprising 24% of the general population. Ages 0-15 (22%), 16-30 (21%), 46-60 (16%), and 61-75 (11%), 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 1995, 92.3 percent of Wisconsin's population was white, 5.4 percent black, 1.4 percent Asian or Pacific Islander, and 0.9 percent American Indian. 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 1995 and 1996.

Table 1.1

Wisconsin Population Projections / County Projections by Total Population

County	County Name	1995 Census
01	Adams	17,494
02	Ashland	16,440
03	Barron	42,087
04	Bayfield	14,557
05	Brown	206,672
06	Buffalo	13,679
07	Burnett	13,640
08	Calumet	35,689
09	Chippewa	53,490
10	Clark	32,216
11	Columbia	47,168
12	Crawford	16,154
13	Dane	393,236
14	Dodge	80,197
15	Door	26,525
16	Douglas	42,007
17	Dunn	37,001
18	Eau Claire	88,374
19	Florence	5,211
20	Fond du Lac	92,167
21	Forest	8,980
22	Grant	50,286
23	Green	30,593
24	Green Lake	19,134
25	Iowa	20,804
26	Iron	6,400
27	Jackson	17,122
28	Jefferson	70,799
29	Juneau	22,798
30	Kenosha	138,313
31	Kewaunee	19,184
32	LaCrosse	101,596
33	Lafayette	16,200
34	Langlade	20,300
35	Lincoln	28,243
36	Manitowoc	82,615
37	Marathon	120,634
38	Marinette	41,837
39	Marquette	13,334
40	Menominee	4,275
41	Milwaukee	982,097

County	County Name	1995 Census
42	Monroe	38,343
43	Oconto	31,594
44	Oneida	33,563
45	Outagamie	149,583
46	Ozaukee	79,894
47	Pepin	7,115
48	Pierce	34,209
49	Polk	36,028
50	Portage	64,766
51	Price	15,668
52	Racine	180,941
53	Richland	17,867
54	Rock	143,043
55	Rusk	15,295
56	St. Croix	54,282
57	Sauk	50,607
58	Sawyer	15,000
59	Shawano	38,012
60	Sheboygan	106,179
61	Taylor	19,325
62	Trempealeau	25,816
63	Vernon	26,259
64	Vilas	18,987
65	Walworth	80,900
66	Washburn	14,506
67	Washington	109,317
68	Waukesha	336,025
69	Waupaca	49,105
70	Waushara	20,192
71	Winnebago	146,976
72	Wood	76,026

State Totals	**5,124, 971**

Table 1.2
Wisconsin Population Projections by Age Group

Age Group	1995 Census
0-15	1,144,151
16-30	1,064,850
31-45	1,224,285
45-60	814,583
61-75	560,357
75+	316,745
Totals	**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 1995 to 1996, there were 327 spinal cord injury events in Wisconsin with the predominant causes of hospitalizations being motor vehicle crashes, falls, and other injury events. Males disproportionately represented 75% of spinal cord injuries. In Wisconsin, the average age at time of injury was 42.8 (males 40.6 and females 49.5), with the most frequent age at 16 (males 16 and 21 and females 16 and 79). Males aged 16-30 represented the overall largest group of injury with 82, followed by men in the 31-45 age group with 69. Females aged 16-30 represented the largest group for women with 21injuries, followed by women aged 31-45 with 17 injuries. Overall, 31% of all injuries (both men and women) occurred between the ages of 16-30.

The majority of individuals admitted for spinal cord injuries during 1995-1996 were white (262 or 80%), followed by 29 (or 9%) 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 (July through November) 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 1995-1996 ranged from 28.9 days in 1995 to 28.7 days in 1996. During the five years, over 9,433 days – the equivalent of 26 years – were spent in acute care hospitals by Wisconsin's 327 spinal cord injury survivors. From 1995-1996, acute care hospital charges for treatment for spinal cord injuries totaled more than $9 million per year. The average charge for a non-fatal spinal cord injury was $62,518 per year.

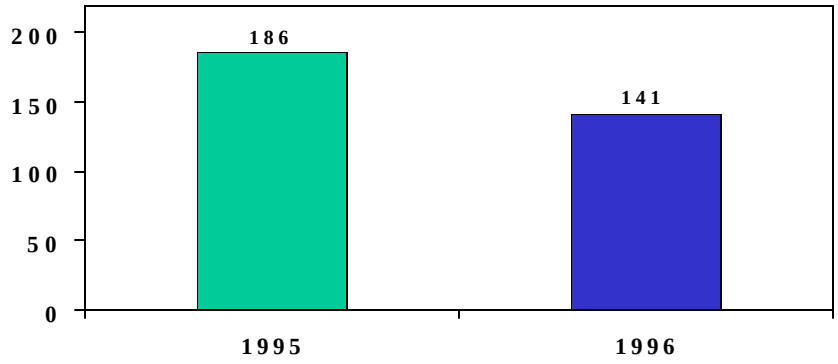
Spinal cord injuries have profound effects on the public health system because of the young age of those injured, the high cost of acute and rehabilitative care, and the long-term disability. Thus, the findings of this and future registries will identify the cost and cause of spinal cord injury, leading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

Spinal Cord Injury Events: 1995—1996

The Incidence of Spinal Cord Injury

From January 1, 1995 to December 31, 1996, a total of 327 Wisconsin residents were hospitalized for a spinal cord injury. In 1995, the first year of data for this report, there was a total of 186 injuries, and in 1996, a total of 141 injuries. There was an average of 163 injuries per year. Over the two-year period, there was a decrease of 45 spinal cord injuries **(Graph 1.1)**.

Graph 1.1
Incidence of Spinal Cord Injuries
1995-1996

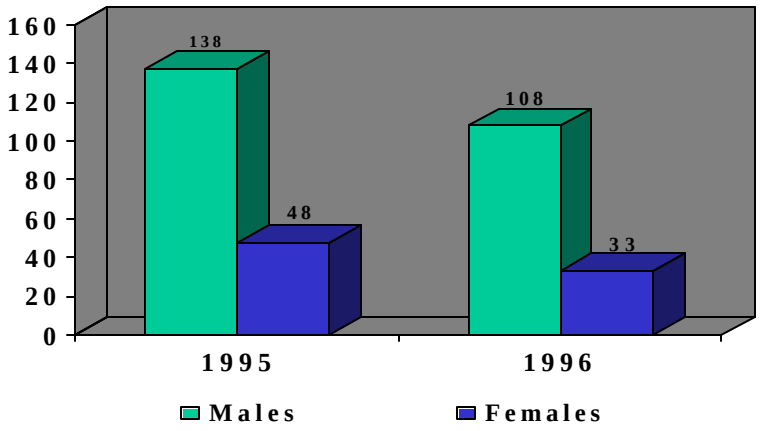


Demographics

Sex—From 1995-1996, males sustained 246 injuries (75%) and females sustained 81 injuries (25%) **(Graph 2.1)**.

Graph 1.2

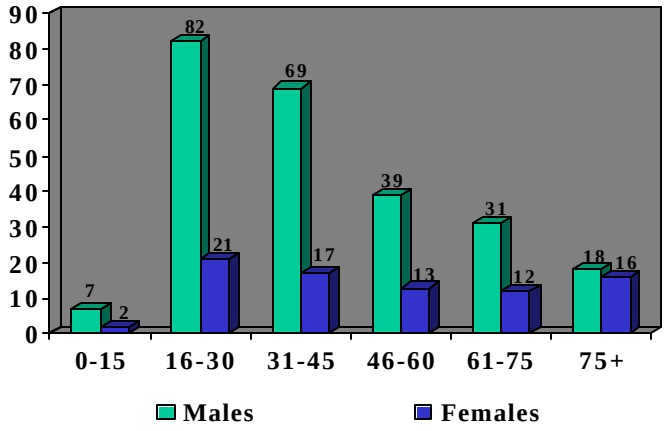
Injuries by Gender and Year 1995-1996



Age—In the Wisconsin 1995-1996 data, the average age at time of injury was 42.8. The most frequent age of injury was 16 overall, with 16 and 21 for males and 16 and 79 for females. The mean age at injury was slightly higher for females (49.5) than for males (40.6). Ages ranged from 4 to 96. Males aged 16-30 represented the overall largest group of injury (82), followed by men in the 31-45 age group (69). Females aged 16-30 represented the largest group of women with 21 injuries, followed by women aged 31-45 with 17 injuries **(Graph 1.3)**.

Graph 1.3

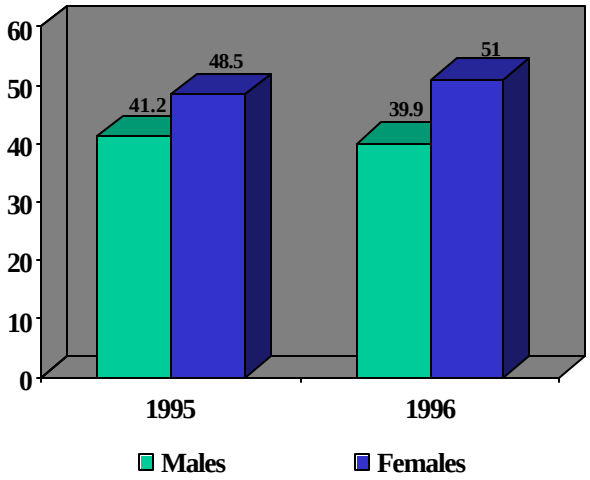
Injuries by Age and Gender 1995-1996



There was a slight increase in the mean age of injury for both males and females through the five year period **(Graph 1.4)**. In 1995, the average age of injury was 41.2 for males

and 48.5 for females, and in 1996, the average age of injury was 39.9 for males and 51.0 for females.

Graph 1.4
Average Age by Year and Gender
1995-1996

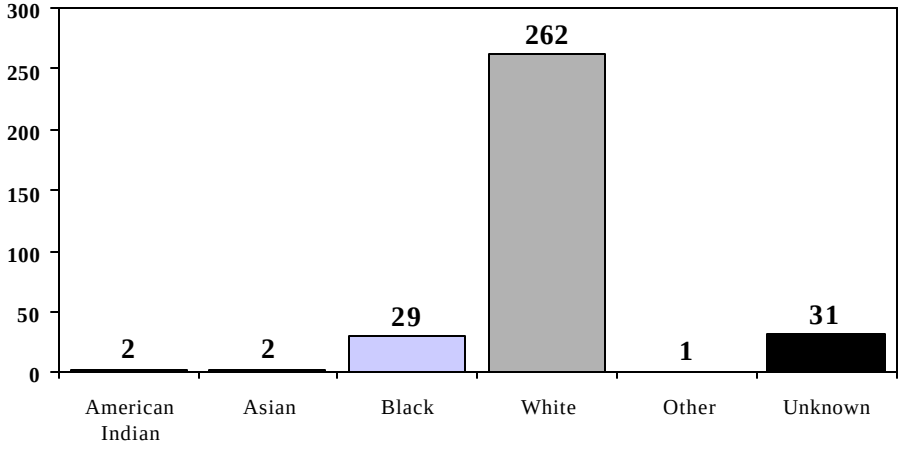


Overall, 31% of all injuries occurred between the ages of 16-30. The next highest age group was 31-45, with 26% of all injuries. Sixteen percent occurred between the ages of 61-75, 10% between the ages of 46-60, and 10% of persons aged 75 and older. Finally, 4% of all injuries occurred between the ages of 0-15. The total number of spinal cord injuries for each age group and gender is listed in **Table 1.4**.

Among racial/ethnic groups, Native Americans had the highest mean age at injury (48 years), while Asians had the lowest mean age at injury (31 years). The mean age at injury for whites was 43.4 years, while for blacks it was 36.1 years.

Ethnicity—In the early years of hospital data collection, documentation and collection of race was not mandatory, therefore the race of some patients from 1995-1996 is unknown or documented as "other" (32 or 10%). The majority of individuals admitted for spinal cord injuries during 1995-1996 were white (262 or 80%), followed by 29 or 9% 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 9% of all spinal cord injuries in Wisconsin.

Graph 1.5
Injuries by Race
1995-1996

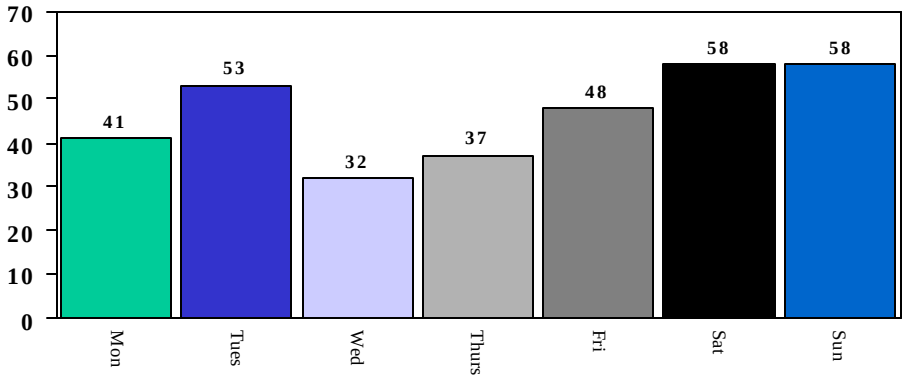


Among blacks, men were five times as likely to acquire spinal cord injuries than females, while among whites, males were three times as likely to acquire spinal cord injuries than females.

Hospitalization and Cost Information

Admission Day, Month, Type and Source—In 1995-1996, the majority of spinal cord injury events occurred during the weekend. Saturdays and Sundays had the highest number of events. Wednesdays had the lowest number of injury events **(Graph 1.6)**.

Graph 1.6
Admission by Day of the Week
1995-1996

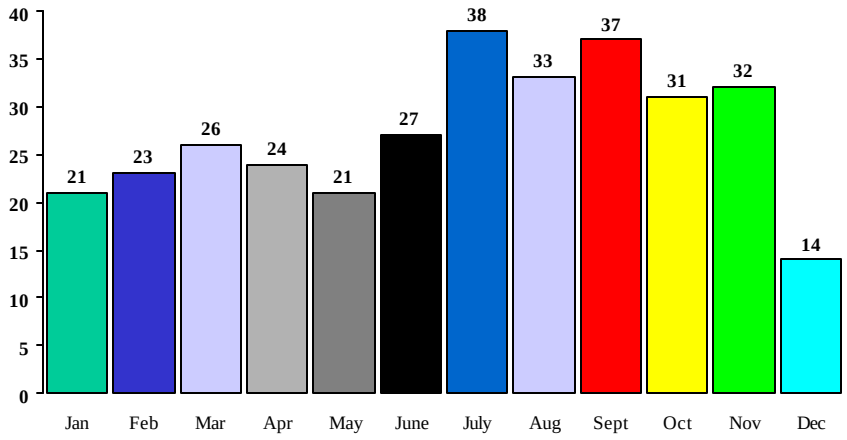


In terms of the month in which individuals were admitted to hospitals in Wisconsin for spinal cord injuries, the months of July through November had the highest number of

injuries. Overall, July had the highest number of admissions with 38, followed by September with 37. December had the lowest amount with 14 **(Graph 1.7)**. If race becomes a variable, blacks had the highest incidence of injury in January, April and July.

Graph 1.7

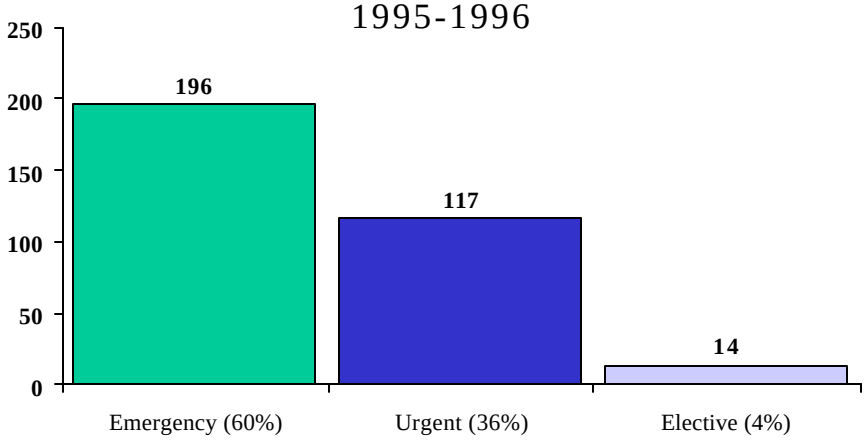
Admission by Month
1995-1996



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
1995-1996

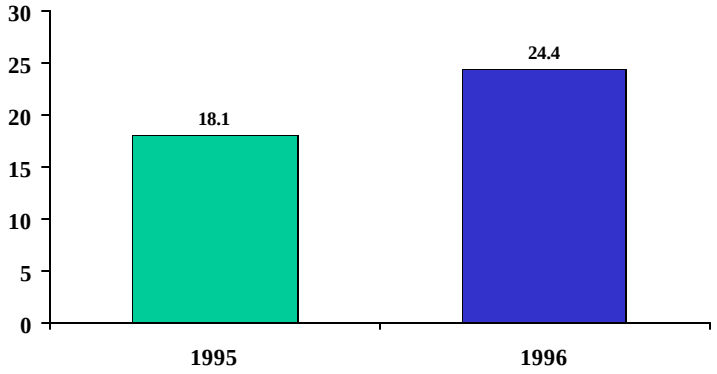


Length of Inpatient Stay—The average length of hospital stay from 1995-1996 ranged from 28.9 days in 1995, to 28.7 days in 1996 **(Graph 1.9)**. During the two years, over 9,433 days—the equivalent of 26 years—were spent in acute care hospitals by

Wisconsin's 327 spinal cord injury survivors. During the time period, acute initial hospital stays ranged from 1 to 149 days. The average length of stay for men was 29.3 days, for women 27.4 days. The level and severity of the injury, as well as other injuries, complications and surgical interventions contributed to this variation. For instance, the average length of stay for a tetraplegia injury was 21.1 days and for a paraplegia injury, 20.4 days. Above all factors, respiratory complications, including ventilator dependency, were responsible for lengthy hospital stays.

Graph 1.9

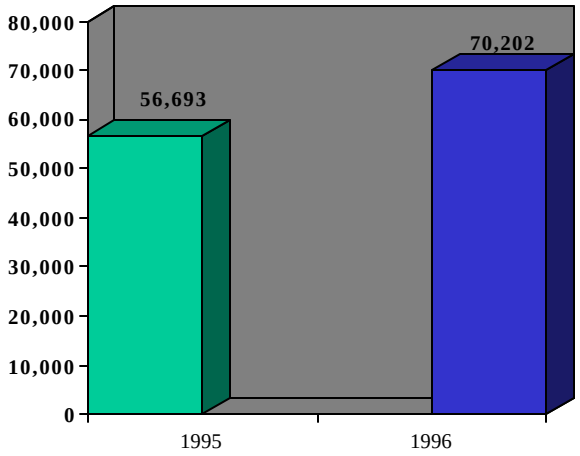
Average Length of Inpatient Stay 1995-1996



Cost of Inpatient Hospital Care—From 1995-1996, acute care hospital charges for treatment of spinal cord injury totaled more than $9 million a year. In relation to the time spent in the hospital, the total costs for those stays fluctuated between 1995 and 1996. In 1995, the average cost for a hospital stay was $56,693. In 1996 the average was $70,202 **(Graph 1.10)**. This was an increase of 24%. In terms of gender differences, the cost of hospitalization was greater for females than males during the two years. Females averaged $67,155 per year, males averaged $60,992 per year. In the two-year period, females tended to sustain more severe injuries. Sixty-eight percent of all injuries to females resulted in tetraplegia, while just 57% of injuries to males 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

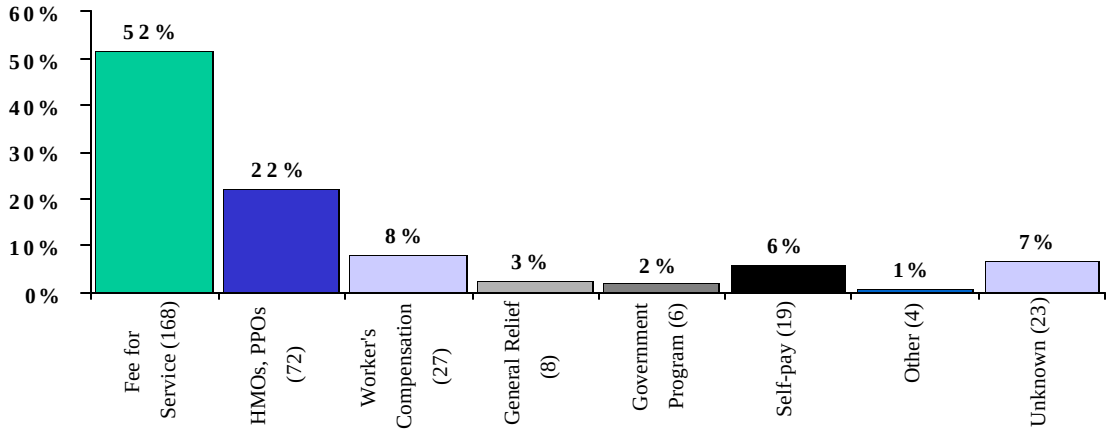
Average Cost of Inpatient Hospital Care 1995-1996



Payer Type—From 1995-1996, the majority of initial inpatient stays (168 or 51.5%) were paid for by fee-for service insurance. Seventy-two (22%) initial inpatient stays were paid for by an Alternative Health Care Insurance Plan (HMO, PPO, PPA, etc.). Other payment types included worker's compensation (27 or 8%), general relief (8 or 2.5%), other government agency or program (6 or 2%), self-pay (19 or 6%), and other (4 or 1%). For twenty-three (7%) inpatient stays, the exact type of payment, either fee-for-service or HMO was unable to be determined **(Graph 1.11)**.

Graph 1.11

Payer Type 1995-1996



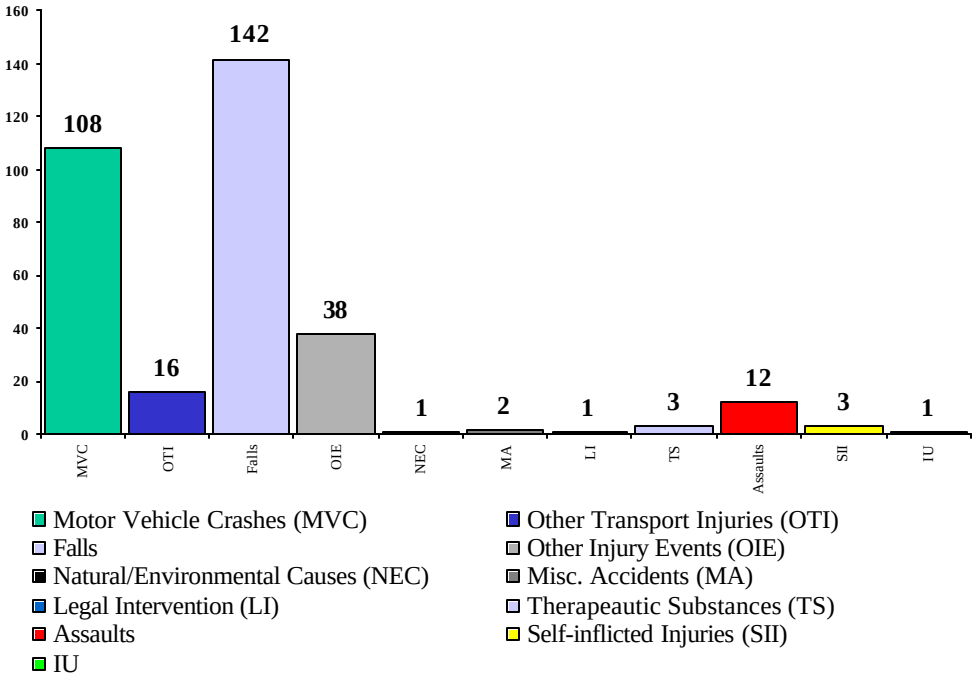
Primary and Secondary Payer— Medicare was the primary payer for 63 initial inpatient stays; Medicaid for 25 stays. Medicare was the secondary payer for 9 initial hospital stays; Medicaid for 14.

Circumstances of Spinal Cord Injury

Causes of Injury—The leading cause of spinal cord injury during 1995-1996 was accidental falls (142), followed by motor vehicle crashes (108), and then other injury events (38) **(Graph 1.12)**. Causes of spinal cord injury can vary by race. Falls were the leading cause among whites (119), followed by motor vehicle crashes (89). Falls were the leading cause of spinal cord injury among blacks (11), followed by intentional injuries (assault and self-inflicted) with (10).

Graph 1.12

Causes of Injury 1995-1996



The leading causes of injuries of spinal cord injuries for 1995 and 1996 are listed in **Table 1.3**.

Table 1.3
Causes of SCI, by Gender: 1995-1996

Cause (with E-code)	***Male* #**	*Male %*	***Female* #**	*Female %*	***Total* #**	*Total %*
Unintentional						
Motor Vehicle Crashes *(810-819, 929.0)*	**76**	31	**32**	40	**108**	33
Other Transport Injuries *(820-848, 929.1)*	**11**	4.5	**5**	6	**16**	4.5
Falls *(880-888, 929.3)*	**111**	45	**31**	38.5	**142**	43
Other Injury Events *(870-879, 916-928)*	**33**	13	**5**	6	**38**	11.5
Natural/Environmental Factors *(900-909)*	**1**	.5	**0**	0	**1**	.5
Misc. Accidents *(910-915)*	**0**	0	**2**	2.5	**2**	1
Legal Intervention *(970-978)*	**0**	0	**1**	1	**1**	.5
Therapeutic Substances *(930-949)*	**2**	1	**1**	1	**3**	1
Intentional						
Assault *(960-969)*	**10**	4	**2**	2.5	**12**	3.5
Self-inflicted Injuries *(950-959)*	**1**	.5	**2**	2.5	**3**	1
Unclear						
Intention Unclear *(980-989)*	**1**	.5	**0**	0	**1**	.5
Total SCI	**246**	100	**81**	100	**327**	100

Table 1.4
Causes of SCI by Selected Age Groups: 1995-1996

Age Groups & Causes	*Male*		*Female*		*Total*	
	Number of SCI Events	*%*	***Number of SCI Events***	*%*	***Number of SCI Events***	*%*
0-15						
Total All Causes	**7**	100	**2**	100	**9**	100
Motor Vehicle Crashes	**2**	29	**0**	0	**2**	22.5
Other Transport Injuries	**0**	0	**0**	0	**0**	0
Falls	**1**	14	**1**	50	**2**	22.5
Other Injury Events	**3**	43	**1**	50	**4**	44
Natural/Environmental Factors	**0**	0	**0**	0	**0**	0
Misc. Accidents	**0**	0	**0**	0	**0**	0
Legal Intervention	**0**	0	**0**	0	**0**	0
Therapeutic Substances	**0**	0	**0**	0	**0**	0
Assaults	**1**	14	**0**	0	**1**	11
Self-inflicted Injuries	**0**	0	**0**	0	**0**	0
Intention Unclear	**0**	0	**0**	0	**0**	0
16-30						
Total All Causes	**82**	100	**21**	100	**103**	100
Motor Vehicle Crashes	**34**	41.5	**14**	67	**48**	47
Other Transport Injuries	**3**	4	**0**	0	**3**	3
Falls	**25**	30.5	**2**	9.5	**27**	26
Other Injury Events	**12**	15	**2**	9.5	**14**	13
Natural /Environmental Factors	**1**	1	**0**	0	**1**	0
Misc. Accidents	**0**	0	**0**	0	**0**	0
Legal Intervention	**0**	0	**0**	0	**0**	0
Therapeutic Substances	**0**	0	**0**	0	**0**	0
Assaults	**5**	6	**2**	9.5	**7**	7
Self-inflicted Injuries	**1**	1	**1**	4.5	**2**	2
Intention Unclear	**1**	1	**0**	0	**1**	1
31-45						
Total All Causes	**69**	100	**17**	100	**86**	100
Motor Vehicle Crashes	**21**	30	**8**	47	**29**	34
Other Transport Injuries	**3**	4	**4**	23	**7**	8
Falls	**31**	45	**3**	18	**34**	40
Other Injury Events	**8**	12	**0**	0	**8**	9
Natural/Environmental Factors	**0**	0	**0**	0	**0**	0
Misc. Accidents	**0**	0	**0**	0	**0**	0
Legal Intervention	**0**	0	**1**	6	**1**	1
Therapeutic Substances	**2**	3	**0**	0	**2**	2
Assaults	**4**	6	**0**	0	**4**	5
Self-inflicted Injuries	**0**	0	**1**	6	**1**	1
Intention Unclear	**0**	0	**0**	0	**0**	0

(Table 1.4, Continued)

46-60						
Total All Causes	**39**	100	**13**	100	**52**	100
Motor Vehicle Crashes	**8**	21	**6**	46	**14**	27
Other Transport Injuries	**4**	10	**0**	0	**4**	8
Falls	**21**	54	**6**	46	**27**	52
Other Injury Events	**6**	15	**1**	8	**7**	13
Natural/Environmental Factors	**0**	0	**0**	0	**0**	0
Misc. Accidents	**0**	0	**0**	0	**0**	0
Legal Intervention	**0**	0	**0**	0	**0**	0
Therapeutic Substances	**0**	0	**0**	0	**0**	0
Assaults	**0**	0	**0**	0	**0**	0
Self-inflicted Injuries	**0**	0	**0**	0	**0**	0
Intention Unclear	**0**	0	**0**	0	**0**	0
61-75						
Total All Causes	**31**	100	**12**	100	**43**	100
Motor Vehicle Crashes	**8**	26	**1**	8	**9**	21
Other Transport Injuries	**0**	0	**1**	8	**1**	2
Falls	**20**	64	**8**	67	**28**	65
Other Injury Events	**3**	10	**0**	0	**3**	7
Natural/Environmental Factors	**0**	0	**0**	0	**0**	0
Misc. Accidents	**0**	0	**2**	17	**2**	5
Legal Intervention	**0**	0	**0**	0	**0**	0
Therapeutic Substances	**0**	0	**0**	0	**0**	0
Assaults	**0**	0	**0**	0	**0**	0
Self-inflicted Injuries	**0**	0	**0**	0	**0**	0
Intention Unclear	**0**	0	**0**	0	**0**	0
75+						
Total All Causes	**18**	100	**16**	100	**34**	100
Motor Vehicle Crashes	**3**	17	**3**	19	**6**	18
Other Transport Injuries	**1**	5.5	**0**	0	**1**	3
Falls	**13**	72	**11**	69	**24**	70
Other Injury Events	**1**	5.5	**1**	6	**2**	6
Natural/Environmental Factors	**0**	0	**1**	6	**1**	3
Misc. Accidents	**0**	0	**0**	0	**0**	0
Legal Intervention	**0**	0	**0**	0	**0**	0
Therapeutic Substances	**0**	0	**0**	0	**0**	0
Assaults	**0**	0	**0**	0	**0**	0
Self-inflicted Injuries	**0**	0	**0**	0	**0**	0
Intention Unclear	**0**	0	**0**	0	**0**	0

Falls—Accidental falls were by far the leading cause of spinal cord injury among Wisconsin residents. There were 142 fall events recorded in Wisconsin from 1995-1996, with seventy-eight percent of those events occurring to men. Men sustained 111 (45% of all injuries to males) spinal cord injuries due to falls, while females sustained 31 (38.5% of all injuries to females) injuries. Falls were the leading cause of spinal cord injury for both genders aged 46 and older.

The majority of identified falls (45%) occurred when the individual fell from one level to another (falling down stairs, off ladders and chairs, etc.). Twenty-three (16%) of injuries were sustained from shallow water dives.

Motor Vehicle Crashes—Motor vehicle crashes were the second leading cause of spinal cord injury in Wisconsin. From 1995-1996, 108 spinal cord injuries (76 or 31% of

injuries to males and 31 or 40% 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 males age 16-45 and females age 0-30, and the second leading cause of injury for persons aged 46 and older.

In the majority of motor vehicle crashes (62%), the driver was the individual to sustain the spinal cord injury. Six percent of motor vehicle injuries occurred to individuals while operating a motorcycle.

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 38 injuries sustained in 1995-1996 due to these events. Males sustained 33 (87%) of these injuries.

***Other Transport Injuries*—**From 1995-1996, other transport injuries were the fourth leading cause of spinal cord injury, with 16 injuries reported. Other transport injuries include injuries from snowmobiles, watercraft, and aircraft, among others. Males sustained 11 (69%) of these other transport-related events.

Intentional Injuries—Intentional injuries were the fifth leading cause of spinal cord injury. From 1995-1996, there were 15 intentional events resulting in spinal cord injury. Men sustained 11 (73%) of these intentional events. This total includes self-inflicted injury as well as those inflicted by other persons.

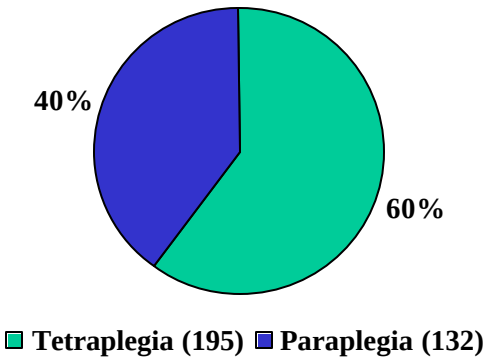
The question of intention is often considered relevant to causation. An injury is categorized as "intention unknown" when it is unspecified or it cannot be determined whether the injuries are accidental (unintentional), suicide (attempted), or assault.

Whether ruled accidental, intentional, or intention unknown, firearms were a recurring cause of spinal cord injury, especially among males. Sixteen firearm injury events were reported, fourteen (87.5%) of these to males.

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 1995 through 1996 data, 60% of the individuals sustained spinal cord injuries resulting in tetraplegia, and 40% in paraplegia **(Graph 1.13)**. Men sustained 140 injuries (57%) resulting in tetraplegia and 106 injuries (43%) resulting in paraplegia. Women sustained 55 injuries (68%) resulting in tetraplegia and 26 injuries (32%) resulting in paraplegia.

Graph 1.13

Severity of Injury
1995-1996



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. Levels of injuries for 1995-1996 are listed in **Table 1.5**.

Table 1.5

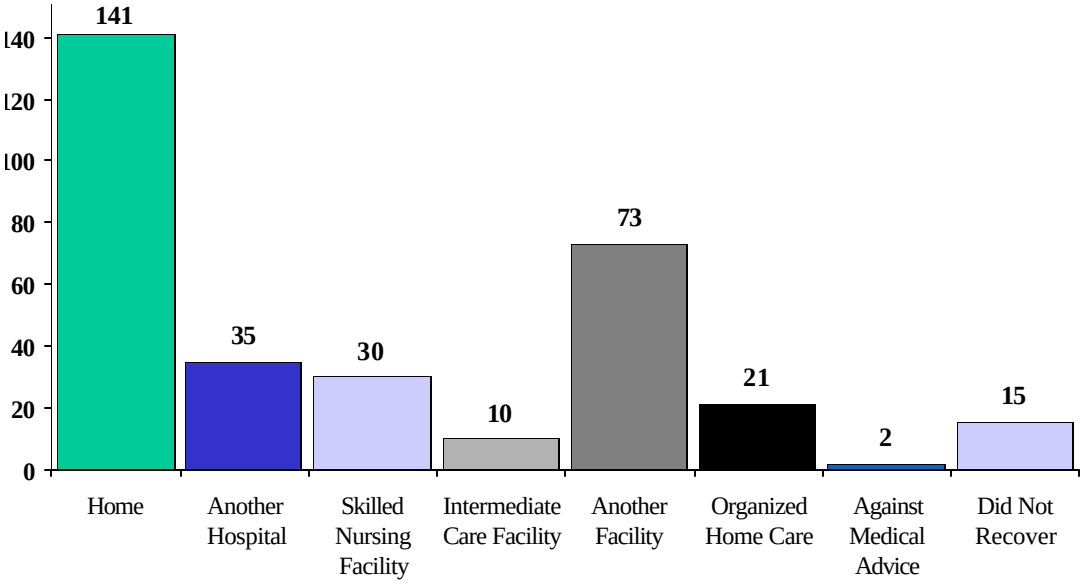
Principal Diagnosis

Diagnosis Code	Principal Diagnosis	Male	Female	Total
806	**Fracture of vertebral column with spinal cord injury**			
806.0	***Cervical, closed***			
806.00	C1-C4 level with unspecified spinal cord injury	**10**	**6**	**16**
806.01	C1-C4 level with complete lesion of cord	**3**	**4**	**7**
806.03	C1-C4 level with central cord syndrome	**5**	**8**	**13**
806.04	C1-C4 level with other specified spinal cord injury	**7**	**2**	**9**
806.05	C5-C7 level with unspecified spinal cord injury	**18**	**6**	**24**
806.06	C5-C7 level with complete lesion of cord	**8**	**1**	**9**
806.08	C5-C7 level with central cord syndrome	**8**	**3**	**11**
806.09	C5-C7 level with other specified spinal cord injury	**14**	**3**	**17**
806.2	***Dorsal (thoracic), closed***			
806.20	T1-T6 level with unspecified spinal cord injury	**5**	**2**	**7**
806.21	T1-T6 level with complete lesion of cord	**9**	**1**	**10**
806.24	T1-T6 level with other specified spinal cord injury	**5**	**0**	**5**
806.25	T7-T12 level with unspecified spinal cord injury	**4**	**2**	**6**
806.26	T7-T12 level with complete lesion of cord	**11**	**3**	**14**
806.28	T7-T12 level with central cord syndrome	**1**	**0**	**1**
806.29	T7-T12 level with other specified spinal cord injury	**13**	**3**	**16**
806.3	***Dorsal (thoracic), open***			
806.35	T7-T12 level with unspecified spinal cord injury	**2**	**0**	**2**
806.36	T7-T12 level with complete lesion of cord	**1**	**0**	**1**
806.4	***Lumbar, closed***	**27**	**5**	**32**
806.5	***Lumbar, open***	**4**	**1**	**5**
806.8	***Unspecified, closed***	**1**	**1**	**2**
952	**Spinal cord injury without evidence of spinal bone injury**			
952.0	***Cervical***			
952.00	C1-C4 level with unspecified spinal cord injury	**20**	**6**	**26**
952.03	C1-C4 level with central cord syndrome	**14**	**4**	**18**
952.04	C1-C4 level with other specified spinal cord injury	**6**	**0**	**6**
952.05	C1-C4 level with unspecified spinal cord injury	**13**	**4**	**17**
952.06	C1-C4 level with complete lesion of spinal cord	**1**	**1**	**2**
952.07	C5-C7 level with anterior cord syndrome	**2**	**1**	**3**
952.08	C5-C7 level with central cord syndrome	**10**	**2**	**12**
952.09	C5-C7 level with other specified spinal cord injury	**1**	**4**	**5**
952.1	***Dorsal (thoracic)***			
952.10	T1-T6 level with unspecified spinal cord injury	**2**	**0**	**2**
952.14	T1-T6 level with other specified spinal cord injury	**2**	**1**	**3**
952.18	T7-T12 level with central cord syndrome	**1**	**1**	**2**
952.2	***Lumbar***	**8**	**1**	**9**
952.4	***Cauda Equina***	**2**	**1**	**3**
952.9	***Unspecified site of spinal cord***	**8**	**4**	**12**

Discharge Location

In terms of patient discharge, the most common discharge location was to the home or to self-care with 141 (43%) of patients returning to their home or the home of another. Discharges to an institution were the second most common with 73 (22%) discharges **(Graph 1.14)**.

Graph 1.14
Patient Discharge Location
1995-1996



Spinal Cord Injuries Rates by County of Residence

Map 1.1 shows the spinal cord injury events by county of residence from 1995-1996. 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, 1995-1996
Douglas 1
Bayfield 1
Ashland 0
Iron 0
Vilas 0
Washburn 3
Sawyer 0
Burnett 0
Price 1
Oneida 2
Forest 3
Florence 0
Marinette 6
Polk 0
Barron 5
Rusk 3
Lincoln 3
Langlade 2
Oconto 2
Taylor 3
St. Croix 0
Dunn 1
Chippewa 3
Marathon 6
Menominee 2
Clark 2
Shawano 0
Pierce 0
Eau Claire 9
Door 4
Pepin 1
Wood 6
Portage 4
Waupaca 2
Outagamie 9
Brown 11
Kewaunee 2
Buffalo 0
Tremp-ealeau 2
Jackson 1
Juneau 0
Waushara 0
Winnebago 8
Calu-met 1
Manitowoc 0
Monroe 1
Adams 3
La Crosse 7
Green-Lake 4
Sheboygan 7
Marquette 0
Fond du Lac
Vernon 2
Sauk 5
Columbia 9
Dodge 9
Washington 6
Ozaukee 5
Richland 2
Crawford 2
Dane 21
Jefferson 5
Waukesha 18
Milwaukee 62
Iowa 2
Grant 1
Green 3
Rock 10
Walworth 6
Racine 20
Lafayette 1
Kenosha 7

Table 1.6

Injuries by Year and County of Residence for 1995-1996

	County	1995	1996	Totals
01	Adams		3	**3**
02	Ashland			**0**
03	Barron	**3**	2	**5**
04	Bayfield		1	**1**
05	Brown	**4**	7	**11**
06	Buffalo			**0**
07	Burnett			**0**
08	Calumet	**1**	0	**1**
09	Chippewa	**2**	1	**3**
10	Clark	**1**	1	**2**
11	Columbia	**6**	3	**9**
12	Crawford	**1**	1	**2**
13	Dane	**11**	10	**21**
14	Dodge	**7**	2	**9**
15	Door	**2**	2	**4**
16	Douglas	**1**		**1**
17	Dunn	**1**		**1**
18	Eau Claire	**5**	4	**9**
19	Florence			**0**
20	Fond Du Lac	**3**	1	**4**
21	Forest		3	**3**
22	Grant	**1**		**1**
23	Green	**1**	2	**3**
24	Green Lake			**0**
25	Iowa	**1**	1	**2**
26	Iron			**0**
27	Jackson	**1**		**1**
28	Jefferson	**1**	4	**5**
29	Juneau			**0**
30	Kenosha	**4**	3	**7**
31	Kewaunee	**1**	1	**2**
32	LaCrosse	**5**	2	**7**
33	Lafayette	**1**		**1**
34	Langlade		2	**2**
35	Lincoln	**2**	1	**3**
36	Manitowoc			**0**
37	Marathon	**4**	2	**6**
38	Marinette	**3**	3	**6**
39	Marquette			**0**
40	Menominee	**1**	1	**2**
41	Milwaukee	**39**	23	**62**
42	Monroe	**1**		**1**

	County	1995	1996	Totals
43	Oconto	**2**		**2**
44	Oneida	**2**		**2**
45	Outagamie	**4**	5	**9**
46	Ozaukee	**2**	3	**5**
47	Pepin	**1**		**1**
48	Pierce			**0**
49	Polk			**0**
50	Portage	**2**	2	**4**
51	Price		1	**1**
52	Racine	**11**	9	**20**
53	Richland	**1**	1	**2**
54	Rock	**7**	3	**10**
55	Rusk	**1**	2	**3**
56	St. Croix			**0**
57	Sauk	**4**	1	**5**
58	Sawyer			**0**
59	Shawano			**0**
60	Sheboygan	**3**	4	**7**
61	Taylor	**3**		**3**
62	Trempealeau	**1**	1	**2**
63	Vernon	**1**	1	**2**
64	Vilas			**0**
65	Walworth	**5**	1	**6**
66	Washburn		3	**3**
67	Washington	**4**	2	**6**
68	Waukesha	**11**	7	**18**
69	Waupaca	**1**	1	**2**
70	Waushara			**0**
71	Winnebago	**4**	4	**8**
72	Wood	**2**	4	**6**

State Totals	**186**	141	**327**

Appendix 1.1:
Hospitals and E-Codes,
1995—1996

Table 1.7
Hospitals Reporting SCI

HOSPITAL	CITY	COUNTY
Langlade Memorial Hospital	Antigo	Langlade
Appleton Medical Center	Appleton	Outagamie
St. Elizabeth Hospital	Appleton	Outagamie
Memorial Medical Center	Ashland	Ashland
Beaver Dam Community Hospitals, Inc.	Beaver Dam	Dodge
St. Joseph's Hospital	Chippewa Falls	Chippewa
Luther Hospital	Eau Claire	Eau Claire
Sacred Heart Hospital	Eau Claire	Eau Claire
St. Agnes Hospital	Fond Du Lac	Fond Du Lac
Bellin Memorial Hospital	Green Bay	Brown
St. Vincent Hospital	Green Bay	Brown
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
Meriter Hospital, Inc.	Madison	Dane
St. Mary's Hospital Medical Center	Madison	Dane
University of Wisconsin Hospital and Clinics	Madison	Dane
Saint Joseph's Hospital	Marshfield	Wood
Community Memorial Hospital	Menomonee Falls	Waukesha
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 . Michael Hospital	Milwaukee	Milwaukee
Theda Clark Medical Center	Neenah	Winnebago
Mercy Medical Center	Oshkosh	Winnebago
Saint Mary's Medical Center	Racine	Racine
Spooner Community Memorial Hospital, Inc	Spooner	Washburn
St. Mary's Hospital of Superior	Superior	Douglas
Waukesha Memorial Hospital, Inc.	Waukesha	Waukesha
Wausau Hospital	Wausau	Marathon
John L. Doyle Hospital	Wauwatosa	Milwaukee
West Allis Memorial Hospital	West Allis	Milwaukee
St. Joseph's Community Hospital	West Bend	Washington
Sinai Samaritan Medical Center	Milwaukee	Milwaukee
Midwest Rehabilitation Hospital	Waterford	Racine

Table 1.8

E-Codes

E-code	*Description*	*Male*	*Female*	*Total*
8120	Traffic accidents with motor vehicle, driver	**19**	7	**26**
8121	Traffic accidents with motor vehicle, passenger	**5**	3	**8**
8122	Traffic accidents with motor vehicle, motorcyclist	**1**	0	**1**
8129	Traffic accidents with motor vehicle, unspecified person	**1**	0	**1**
8130	Motor vehicle with other vehicle, driver	**0**	1	**1**
8136	Motor vehicle with other vehicle, pedal cyclist	**1**	0	**1**
8147	Motor vehicle collision with pedestrian, pedestrian	**1**	1	**2**
8150	Collision on highway accident, driver	**2**	0	**2**
8151	Collision on highway accident, passenger	**2**	1	**3**
8160	Motor vehicle-loss of control, driver	**18**	10	**28**
8161	Motor vehicle-loss of control, passenger	**9**	5	**14**
8162	Motor vehicle-loss of control, motorcyclist	**3**	0	**3**
8163	Motor vehicle-loss of control, passenger on motorcycle	**1**	0	**1**
8169	Motor vehicle-loss of control, unspecified person	**1**	0	**1**
8170	Non-collision motor vehicle, while boarding	**1**	0	**1**
8180	Non-collision motor vehicle, driver	**1**	1	**2**
8181	Non-collision motor vehicle, passenger	**3**	0	**3**
8190	Unspecified motor vehicle accident, driver	**2**	0	**2**
8191	Unspecified motor vehicle accident, passenger	**3**	1	**4**
8192	Unspecified motor vehicle accident, motorcyclist	**1**	0	**1**
8197	Unspecified motor vehicle accident, pedestrian	**0**	1	**1**
8199	Unspecified motor vehicle accident, unspecified person	**1**	1	**2**
8200	Non-traffic accident (snow vehicle), driver	**2**	0	**2**
8210	Off-road motor vehicle, driver	**1**	0	**1**
8211	Off-road motor vehicle, passenger	**1**	0	**1**
8212	Off-road motor vehicle, motorcyclist	**1**	0	**1**
8232	Collision with stationary object, passenger	**1**	0	**1**
8259	Unspecified motor vehicle, unspecified person	**3**	0	**3**
8273	Animal-drawn vehicle accident, passenger	**0**	1	**1**
8282	Animal being driven, rider of animal	**1**	2	**3**
8321	Submersion or drowning in water transport, occupant of small boat	**1**	0	**1**
8354	Unspecified fall in water transport, water skier	**0**	1	**1**
8449	Other air transport accidents, other person	**0**	1	**1**
8784	Surgical Ops & Procedures, restorative surgery	**1**	0	**1**
8788	Surgical Ops & Procedures, other specified	**1**	1	**2**
8809	Fall from stairs or steps, other stairs or steps	**9**	5	**14**
8810	Fall from ladder	**13**	0	**13**
8811	Fall from scaffolding	**3**	0	**3**
882	Fall from or out of building	**8**	1	**9**
8830	Accident from diving or jumping into water	**19**	4	**23**
8839	Fall into other hole or other opening in surface	**1**	0	**1**

8841	Fall from cliff	**1**	0	**1**
8842	Fall from chair	**6**	0	**6**
8844	Fall from bed	**2**	0	**2**
8849	Fall from one level to another	**18**	0	**18**
885	Fall from same level, slip, trip, or stumble	**17**	10	**27**
8860	Fall on same level, collision, pushing, or shoving, in sports	**1**	1	**2**
888	Other & unspecified fall	**13**	10	**23**
9068	Other injury caused by animals	**1**	0	**1**
912	Inhalation and ingestion of other object	**0**	1	**1**
915	Foreign body accidentally entering other orifice	**0**	1	**1**
916	Struck by falling object	**7**	0	**7**
9170	Struck by objects or persons – in sports	**6**	0	**6**
9179	Struck by objects or persons – other	**5**	1	**6**
9190	Machinery accident, agricultural machine	**1**	0	**1**
9192	Machinery accident, lifting machine & appliances	**2**	0	**2**
9220	Accident caused by firearm, handgun	**1**	0	**1**
9229	Accident caused by firearm, unspecified firearm	**4**	0	**4**
927	Overexertion and strenuous movements	**2**	2	**4**
9289	Environmental & accident causes, unspecified accident	**3**	1	**4**
9342	Agents primarily affecting blood constituents, anticoagulants	**1**	0	**1**
9352	Analgesics, antipyretics, and antirheurmatics, other opiates and related narcotics	**0**	1	**1**
9379	Sedatives & hypnotics , unspecified	**1**	0	**1**
9571	Suicide/self-inflicted injury, jumping from high place, other man-made structure	**1**	1	**2**
9572	Suicide/self-inflicted injury, jumping from high place, natural site	**0**	1	**1**
9600	Fight/ brawl/ rape, unarmed fight or brawl	**2**	1	**3**
9650	Assault by firearms, handgun	**1**	1	**2**
9654	Assault by firearms, other & unspecified firearms	**7**	0	**7**
970	Injury due to legal intervention, by firearm	**0**	1	**1**
9850	Intention unknown accident, handgun	**1**	0	**1**

Appendix 1.2:
Spinal Cord Injuries by Year, 1995—1996

Table 1.9
1995 Data

Category of Data	*Male*	*Female*	*Total*
INCIDENCE			
Incidence (by gender)	138	48	186
AGE			
0-15	4	1	5
16-30	48	13	61
31-45	37	11	48
46-60	20	7	27
61-75	15	5	20
75+	14	11	25
RACE			
American Indian, Native Alaskan	0	0	0
Asian, Pacific Islander	2	0	2
Black	11	4	15
White	115	38	153
Other	1	0	1
Unknown	3	3	6
Not Reported	6	3	9
ADMISSION MONTH			
January	10	3	13
February	8	4	12
March	14	6	20
April	9	2	11
May	14	1	15
June	14	3	17
July	19	6	25
August	10	5	15
September	16	3	19
October	14	3	17
November	3	8	11
December	7	4	11
ADMISSION DAY			
Monday	12	7	19
Tuesday	22	10	32
Wednesday	18	2	20
Thursday	15	5	20
Friday	21	8	29
Saturday	22	8	30
Sunday	28	8	36
ADMISSION TYPE			
Emergency	86	25	111
Urgent	48	21	69
Elective	4	2	6

(1995 Data, Continued)

Category of Data	*Male*	*Female*	*Total*
ADMISSION SOURCE			
Physician referral	9	5	14
Clinic referral	1	1	2
HMO referral	1	0	1
Transfer from hospital	19	6	25
Transfer from skilled nursing facility	0	0	0
Transfer from another health care facility	1	1	2
Emergency room	107	35	142
LENGTH OF INPATIENT STAY			
Total number of days	4,170	1,212	5.382
Average number of days	30.2	25.3	28.9
COST OF INPATIENT HOSPITAL CARE			
Total	$7,581,280	$2,963,721	$10,545,001
Average	$54,937	$61,744	$56,693
MOST FREQUENT CAUSES OF INJURY			
1. Falls	59	20	79
2. Motor vehicle crashes	49	19	68
3. Other injury events	14	3	17
4. Other transportation injuries	8	3	11
5. Assault	5	1	6
6. Self-inflicted injuries	1	1	2
7. Therapeutic substances	1	0	1
8. Misc. Accidents	0	1	1
9. Natural/environmental factors	1	0	1
LEVEL OF SEVERITY			
Tetraplegia	78	29	107
Paraplegia	60	19	79
PATIENT DISCHARGE LOCATION			
Discharged to home or self-care	63	17	80
Discharged or transferred to another short-term general hospital	14	6	20
Discharged or transferred to a skilled nursing facility	12	8	20
Discharged or transferred to an intermediate care facility	1	3	4
Discharged or transferred to another type of institution	33	7	40
Discharged or transferred to home under care of organized health service	9	2	11
Left against medical advice	1	0	1
Expired or did not recover	5	5	10

Table 1.10
1996 Data

Category of Data	*Male*	*Female*	*Total*
INCIDENCE			
Incidence (by gender)	108	33	141
AGE			
0-15	3	1	4
16-30	34	8	42
31-45	32	6	38
46-60	19	6	25
61-75	16	7	23
75+	4	5	9
RACE			
American Indian, Native Alaskan	1	1	2
Asian, Pacific Islander	0	0	0
Black	13	1	14
White	83	26	109
Other	0	0	0
Unknown	4	1	5
Not Reported	7	4	11
ADMISSION MONTH			
January	6	2	8
February	8	3	11
March	3	3	6
April	10	3	13
May	3	3	6
June	8	2	10
July	9	4	13
August	16	2	18
September	13	5	18
October	11	3	14
November	18	3	21
December	3	0	3
ADMISSION DAY			
Monday	18	4	22
Tuesday	15	6	21
Wednesday	10	2	12
Thursday	10	7	17
Friday	15	4	19
Saturday	24	4	28
Sunday	16	6	22
ADMISSION TYPE			
Emergency	65	20	85
Urgent	37	11	48
Elective	6	2	8

(1996 Data, Continued)

Category of Data	*Male*	*Female*	*Total*
ADMISSION SOURCE			
Physician referral	14	3	17
Clinic referral	3	0	3
HMO referral	0	0	0
Transfer from hospital	10	4	14
Transfer from skilled nursing facility	0	0	0
Transfer from another health care facility	0	0	0
Emergency room	81	26	107
Court, law enforcement	0	0	0
Information not available	0	0	0
LENGTH OF INPATIENT STAY			
Total number of days	3,045	1,006	4,051
Average number of days	28.2	30.5	28.7
COST OF INPATIENT HOSPTIAL CARE			
Total	$7,422,752	$2,475,804	$9,898,556
Average	$68,729	$75,024	$70,202
MOST FREQUENT CAUSES OF INJURY			
1. Falls	52	11	63
2. Motor vehicle crashes	27	13	40
3. Other injury events	19	2	21
4. Other transportation injuries	3	2	5
5. Assault	5	1	6
6. Therapeutic substances	1	1	2
7. Self-inflicted injuries	0	1	1
8. Intention unclear	1	0	1
9. Misc. Accidents	0	1	1
10. Legal intervention injuries	0	1	1
LEVEL OF SEVERITY			
Tetraplegia	62	26	88
Paraplegia	46	7	53
PATIENT DISCHARGE LOCATION			
Discharged to home or self-care	45	16	61
Discharged or transferred to another short-term general hospital	9	6	15
Discharged or transferred to a skilled nursing facility	5	5	10
Discharged or transferred to an intermediate care facility	5	1	6
Discharged or transferred to another type of institution	30	3	33
Discharged or transferred to home under care of organized health service	8	2	10
Left against medical advice	1	0	1
Expired or did not recover	5	0	5

Table 1.11
1995-1996 Data

Category of Data	*Male*	*Female*	*Total*
INCIDENCE			
Incidence (by gender)	246	81	327
AGE			
0-15	7	2	9
16-30	82	21	103
31-45	69	17	86
46-60	39	13	52
61-75	31	12	43
75+	18	16	34
RACE			
American Indian, Native Alaskan	1	1	2
Asian, Pacific Islander	2	0	2
Black	24	5	29
White	198	64	262
Other	1	0	1
Unknown	7	4	11
Not Reported	13	7	20
ADMISSION MONTH			
January	16	5	21
February	16	7	23
March	17	9	26
April	19	5	24
May	17	4	21
June	22	5	27
July	28	10	38
August	26	7	33
September	29	8	37
October	25	6	31
November	21	11	32
December	10	4	14
ADMISSION DAY			
Monday	30	11	41
Tuesday	37	16	53
Wednesday	28	4	32
Thursday	25	12	37
Friday	36	12	48
Saturday	46	12	58
Sunday	44	14	58
ADMISSION TYPE			
Emergency	151	45	196
Urgent	85	32	117
Elective	10	4	14

(1995-1996 Data, Continued)

Category of Data	*Male*	*Female*	*Total*
ADMISSION SOURCE			
Physician referral	23	8	31
Clinic referral	4	1	5
HMO referral	1	0	1
Transfer from hospital	29	10	39
Transfer from skilled nursing facility	0	0	0
Transfer from another health care facility	1	1	2
Emergency room	188	61	249
LENGTH OF INPATIENT STAY			
Total number of days	7,215	2,218	9,433
Average number of days	29.3	27.4	28.8
COST OF INPATIENT HOSPITAL CARE			
Total	$15,004,032	$5,439,525	$20,443,557
Average	$60,992	$67,155	$62,518
MOST FREQUENT CAUSES OF INJURY			
1. Falls	111	31	142
2. Motor vehicle crashes	76	32	108
3. Other injury events	33	5	38
4. Other transportation injuries	11	5	16
5. Assaults	10	2	12
6. Self-inflicted injuries	1	2	3
7. Therapeutic substances	2	1	3
8. Misc. Accidents	0	2	2
9. Intention unclear	1	0	1
10. Natural/environmental causes	1	0	1
11. Legal intervention	0	1	1
LEVEL OF SEVERITY			
Tetraplegia	140	55	195
Paraplegia	106	26	132
PATIENT DISCHARGE LOCATION			
Discharged to home or self-care	108	33	141
Discharged or transferred to another short-term general hospital	23	12	35
Discharged or transferred to a skilled nursing facility	17	13	30
Discharged or transferred to an intermediate care facility	6	4	10
Discharged or transferred to another type of institution	63	10	73
Discharged or transferred to home under care of organized health service	17	4	21
Left against medical advice	2	0	2
Expired or did not recover	10	5	15

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 second 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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