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National Trauma Registry Analytic Bulletin

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Pedestrian Injury Hospitalizations in Canada, 2001-2002

This report provides a descriptive analysis of pedestrian injury hospitalizations in Canada during fiscal year 2001-2002. The source of data used is the Hospital Morbidity Database (HMDB), which is managed by the Canadian Institute for Health Information (CIHI). The National Trauma Registry Minimal Data Set is a subset of HMDB.

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1. Introduction

Traumatic injuries are a substantial health problem that may cause long-term disability and death. According to the National Trauma Registry, motor vehicle collisions are the second leading cause of injury hospitalization in Canada. Further, the proportion of pedestrian injuries has remained stable at approximately 2% of all injury hospitalizations over the past five years. To better understand pedestrian injuries in Canada, this paper provides a descriptive analysis of pedestrian injury hospitalizations in Canada during 2001-2002.

2. Methods

People hospitalized with the relevant injuries during fiscal year 2001-2002 (April 1, 2001 to March 31, 2002) were identified in the National Trauma Registry Minimal Data Set (NTR MDS) and linked to the Hospital Morbidity Database (HMDB), the NTR MDS parent database. This linkage was performed to permit a more detailed analysis of trauma cases. HMDB captures information on patients who were discharged or died in all acute care facilities in Canada.

In the first phase of analysis, data originally submitted to CIHI using the ICD-10-CA (International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Canada) classification system were converted to ICD-9 codes. This conversion permitted national comparisons at the lowest common denominator since several provinces were still coding in the ICD-9 coding system. Pedestrian injuries were identified using ICD-9 External Cause of Injury Codes (E Codes) with the appropriate fourth digit identifying the pedestrian (Table 1). Specific E code definitions are listed in Appendix A.

Table 1: ICD-9 E Codes Included in the Current Study

E Code Category	E Code Range	4th Digit Identifying Pedestrian
Railway	E800-E807	.2
Motor Vehicle Traffic	E810-E819	.7
Motor Vehicle Non-Traffic	E820-E825	.7
Pedal Cycle and Other Road Incidents	E826-E829	.0

In the second phase of analysis, data from the five provinces (Newfoundland and Labrador, Prince Edward Island, Nova Scotia, part of Saskatchewan and British Columbia) and one Territory (Yukon) that submitted data to CIHI in ICD-10-CA were analyzed to provide additional detail using this comprehensive classification system. In this phase of analysis, pedestrian injuries were identified by External Cause of Injury codes in the range of V01-V06 and V09 (Appendix B).

3. Results

3.1 Overview

In fiscal year 2001-2002 there were 3,574 hospitalizations due to pedestrian injuries. As shown in Table 2, this represents 2% of all hospitalized injuries in Canada. The crude pedestrian hospitalization rate was 1.1 per 10,000 population. Males had a slightly higher proportion of hospitalizations than females (56% vs. 44%, respectively). The average age for pedestrian injuries was 41.5 years and the average length of hospital stay was 13.5 days. There was a substantial difference between the mean and median length of hospital stay (13.5 days vs. 5.0 days), meaning that there were more cases with longer length of hospital stays, as compared to the median of 5 days. Table 2 also shows there were 146 deaths in hospital, representing 4% of pedestrian-related hospitalizations.

Table 2. Summary of Pedestrian Injury Hospitalizations*, 2001-2002

Characteristics	All Cases
Total Cases	3,574
Crude Rate per 10,000	1.1
No. Male (%)	1,997 (56)
Age (years)	
Mean (Std. Dev)	41.5 (25.0)
Median	40.0
Range	1 to 100
Length of Hospital Stay (days)	
Mean (Std. Dev)	13.5 (24.7)
Median	5.0
Range	1 to 415
In-hospital deaths (%)	146 (4)

* Note: Hospitalizations in the HMDB database do not necessarily represent unique persons since a person can be admitted to hospital more than once within a fiscal year.

3.2 Analysis by Sex

As shown in Table 3, there was a higher proportion of male pedestrian injury hospitalizations (56%, n = 1,997) as compared to female (44%, n = 1,577). Similarly, the crude hospitalization rate for males (1.3 per 10,000 population) was greater than the rate for females (1.0 per 10,000 population). Males sustained these injuries at a lower average age than females (38 years vs. 45 years, respectively), and experienced a slightly lower average length of hospital stay. Males had a substantially greater proportion of in-hospital deaths than females (5% n = 93 vs. 3%, n = 53 respectively). Finally, a higher proportion of males (77%) were discharged home (including with home support) as compared to females (74%) who were more likely to be discharged to another institution or care setting.

Table 3. Characteristics of Pedestrian Injury Hospitalizations by Sex, 2001-2002**

	Male	Female	Total
No. Cases (%)	1,997(56)	1,577(44)	3,574
Crude Rate per 10,000 population	1.3	1.0	1.1
Age (years)			
Mean (Std.Dev)	38.4 (24.1)	45.3 (25.5)	41.5(25.0)
Median	37.0	45.0	40.0
LOS (days)			
Mean (Std.Dev)	12.6 (24.8)	14.6 (24.5)	13.5(24.7)
Median	5.0	6.0	5.0
In-hospital deaths (%)	93 (5)	53 (3)	146(4)
Discharge disposition (% of total discharged alive)*			
Discharged home	1,336(70)	998(65)	2,334(68)
Transferred to another acute care facility	352(18)	332(22)	684(20)
Discharged home with support services	132(7)	123(8)	255(7)
Transferred to a long term care facility	31(2)	29(2)	60(2)
All other	53(3)	42(3)	95(3)

*Note that the denominator is the total number of hospitalizations within each gender discharged alive.

**Note: Hospitalizations in the HMDB database do not necessarily represent unique persons since a person can be admitted to hospital more than once within a fiscal year.

3.3 Analysis by Age

The five-year age group distribution of pedestrian injury hospitalizations is shown in Figure 1. Though the average age of pedestrian injuries was 41.5 years, when examined by age group most injuries occurred among children and young adults. Injured pedestrians aged 10-14 years showed the highest proportion of hospitalizations (8.6%). However prominent peaks in the proportion of hospitalizations were observed among those 10-19 years of age, 35-49 years of age and 65-79 years of age.

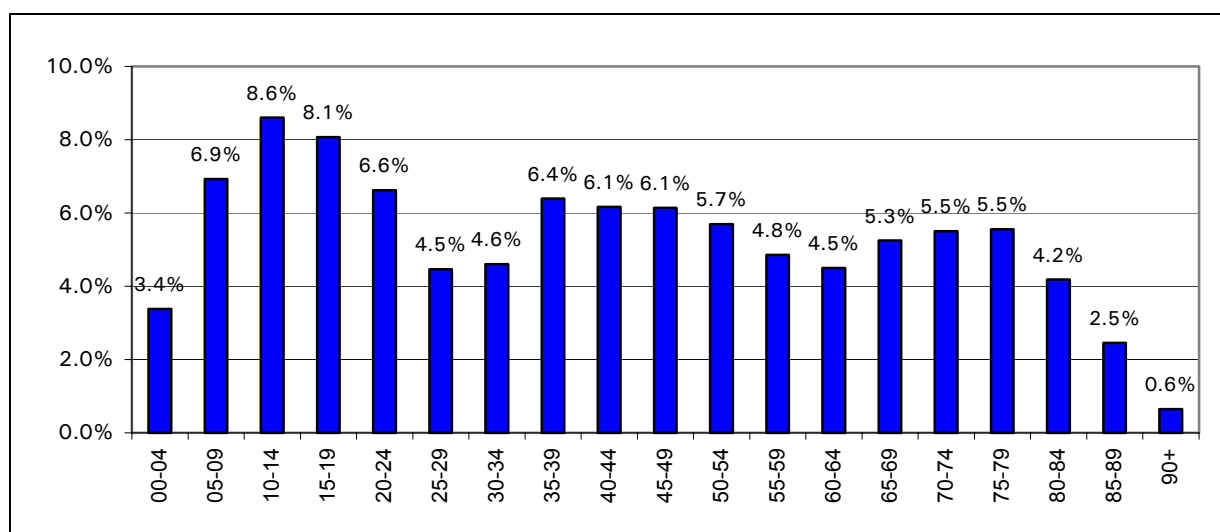


Figure 1. Pedestrian Injury Hospitalizations by Age Group, 2001-2002

As shown in Table 4, injured pedestrians 65 years of age and over had the highest average length of hospital stay (23 days) followed by those in the 35-64 years of age group (14 days). The shortest length of stay was observed in the injured pedestrians less than 20 years of age (6 days).

Injured patients who were less than 20 years and those 20-34 years of age were predominantly male (62%, n=600 and 61%, n=341, respectively) while those who were 65 years and over were predominantly female (56%, n=468). Injured patients who were 65 years of age and over had the highest proportion of in-hospital deaths (8%, n=65) compared to 3% for the other age groups.

Table 4. Characteristics of Pedestrian Injury Hospitalizations* by Age Group, 2001-2002

	<20 yrs	20-34 yrs	35-64 yrs	65+ yrs	Total (%)
Total Cases (% Total)	966(27)	561(16)	1,204(34)	843(24)	3,574
No.Male (%)	600 (62)	341 (61)	681 (57)	375 (44)	1,997(56)
Length of Stay (days)					
Mean (Std.Dev)	6.4(12.0)	9.8(21.1)	14.4(25.5)	22.6(32.4)	13.5 (24.7)
Median	3.0	4.0	6.0	12.0	5.0
In-hospital deaths (%)	32(3)	17 (3)	32(3)	65(8)	146 (4)

*Note: Hospitalizations in the HMDB database do not necessarily represent unique persons since a person can be admitted to hospital more than once within a fiscal year.

3.4. Leading Causes of Injury Hospitalizations

As shown in Figure 2, the leading cause of pedestrian injury hospitalizations was motor vehicle traffic collisions, which accounted for 85% (n = 3,026) of all pedestrian injury hospitalizations. Motor vehicle traffic collisions (E810-E819) are those that occur on a public highway. Motor vehicle non-traffic collisions (E820-E825) were the second most common cause of pedestrian injury hospitalizations (10%, n = 361) and include collisions that occur entirely in any place other than a public highway. Three percent (n = 117) of hospitalizations were due to collision with a pedal cycle. All other causes of pedestrian injury hospitalizations (2%, n = 70) were due to railway and other road vehicle incidents.

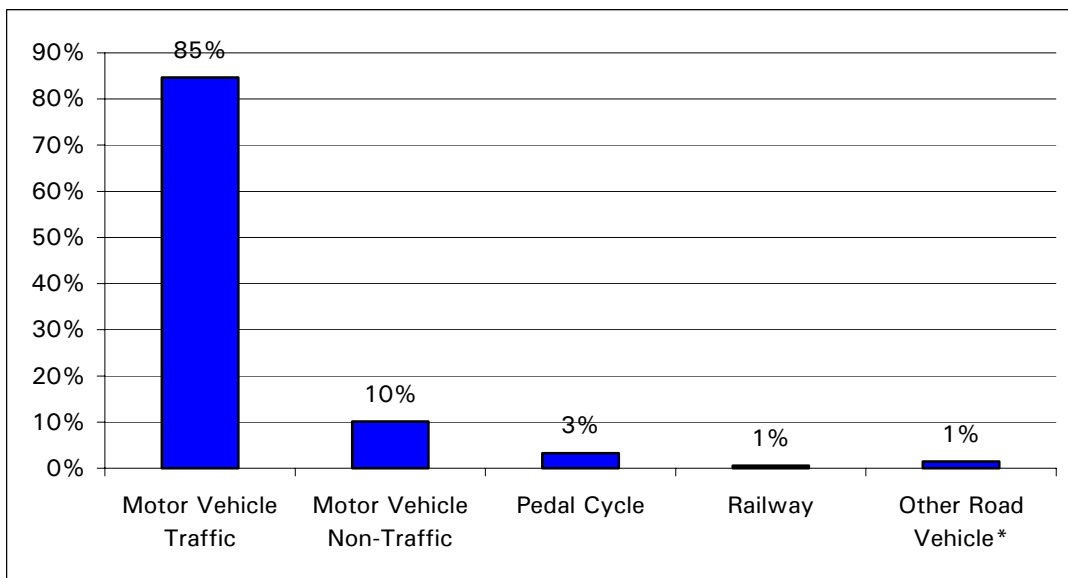


Figure 2. Causes of Pedestrian Injury Hospitalizations in Canada, 2001-2001

* Note: Other road vehicle collisions include incidents involving an animal-drawn vehicle, streetcar or non-motor road vehicle

National Trauma Registry Analytic Bulletin
Pedestrian Injury Hospitalizations in Canada, 2001-2002

In 2001-2002, several provinces (including Newfoundland & Labrador, Prince Edward Island, Nova Scotia, part of Saskatchewan, British Columbia and Yukon) coded cases using the ICD-10-CA classification. Because of the additional detail available in this classification system, supplementary analyses for causes of injury are provided in Table 5. Of the 3,574 pedestrian injury hospitalizations in 2001-2002, 877 (25%) of these were coded using ICD-10-CA. Of those coded using ICD-10-CA, the leading specific cause of injury was due to collision with a car, pick-up truck or van (77%, n=677) (Table 5). This was followed by a collision with a heavy transport vehicle or bus (4%, n=33), then by a collision with a pedal cycle (3%, n=22).

Table 5. External Causes of Pedestrian Injury Hospitalization Using ICD-10-CA Classification, Canada, 2001-2002**

External Causes of Injury	Volume	Percent
Collision with car, pick-up truck or van	677	77%
Collision with heavy transport vehicle or bus	33	4%
Collision with pedal cycle	22	3%
Collision with two- or three-wheeled motor vehicle	9	1%
Collision with railway train or railway vehicle	*	*
All Other ⁺	133	15%
Total Cases Codes as ICD-10-CA	877	100%

* Data suppressed due to small cell sizes (<5).

⁺ Includes other non-motor vehicle and other and unspecified transport incidents.

** Note: Hospitalizations in the HMDB database do not necessarily represent unique persons since a person can be admitted to hospital more than once within a fiscal year.

3.5 Provincial Comparisons

In order to compare provinces and territories in a meaningful way, pedestrian hospitalization rates were age-standardized to adjust for differences in population structures. The 1991 Canadian population was used as the standard population. In 2001-2002, the national age-standardized pedestrian injury hospitalization rate was 11.2 per 100,000 population (Figure 3). The Territories had the highest injury hospitalization rate (15.6 per 100,000 population) followed by British Columbia (15.5 per 100,000 population) and Saskatchewan (14.9 per 100,000). Nova Scotia had the lowest injury hospitalization rate (5.8 per 100,000) followed by Newfoundland (6.7 per 100,000).

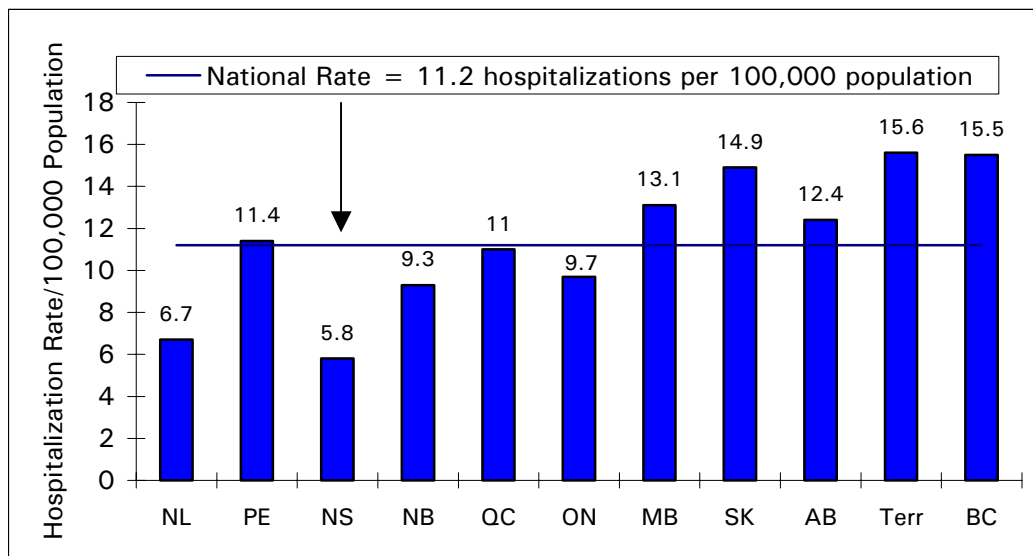


Figure 3. Age Standardized Pedestrian Injury Hospitalization Rates by Province, 2001-2002

3.6 Month of Hospitalization

Seasonal differences in pedestrian injury hospitalizations were examined. Figure 4 shows that the largest proportion of pedestrian injury hospitalizations in Canada occurred in December (10.7%, n = 381) followed by November (9.6%, n = 343), July (9.2%, n = 327) and October (9.1%, n = 324). The lowest proportion of injuries occurred in March (6.7%, n = 238) and April (6.7%, n = 241).

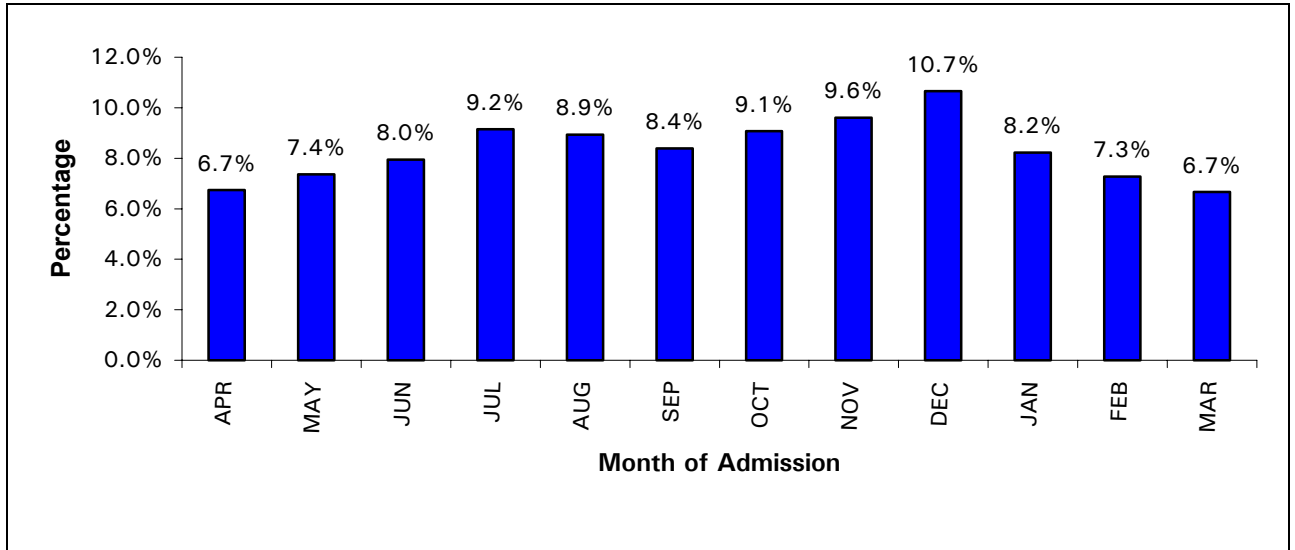


Figure 4. Pedestrian Injury Hospitalizations by Month of Admission, Canada, 2001-2002

3.7 Injury Types

Table 6 shows that the leading type of injury was orthopedic (77.3%, n = 2,761). This was followed by superficial (36.5%, n = 1304), head (28.4%, n = 1,015) and internal injuries (14.2%, n = 509). This trend was observed across all age groups.

Table 6. Injury Types by Age Group^{a + **}, 2001-2002

	< 20 Yrs	20-34 Yrs	35-64 Yrs	65+ Yrs	Total (% ^b)
Orthopedic	625	460	984	692	2,761 (77.3)
Superficial	436	197	381	290	1,304(36.5)
Head	360	127	292	236	1,015(28.4)
Internal	146	73	168	122	509(14.2)
Blood vessels	13	8	33	15	69(1.9)
Nerves	11	15	26	14	66(1.8)
Spinal cord	5	*	13	8	29(0.8)
Burns	5	*	*	0	7(0.2)
All Other	101	30	68	48	247(6.9)

^a Note: If a hospitalization has an injury N code that falls into several injury codes (N codes), each is counted once. However, if a hospitalization has several N codes that fall into one injury type, the type is counted only once.

^b The denominator for percentages is the total number pedestrian hospitalizations (3,574).

⁺ Note: Information regarding ICD-9 Injury Type Groupings may be found in Appendix C.

* Counts suppressed due to small cell size (<5).

** Hospitalizations in the HMDB database do not necessarily represent unique persons since a person can be admitted to hospital more than once within a fiscal year.

4. Summary

In 2001-2002, there were 3,574 hospitalizations due to pedestrian injuries, representing 2% of all hospitalizations and 4% of pedestrian-related in-hospital deaths in Canada. The Canadian age-standardized pedestrian injury hospitalization rate was 11.2 per 100,000 population. The Territories had the highest age-standardized injury hospitalization rate and Nova Scotia had the lowest. Males had a slightly higher proportion of pedestrian hospitalizations, but had a substantially higher proportion of in-hospital deaths than females. The average length of in-hospital stay increased with increasing age. The leading cause of injury for pedestrian hospitalizations was, by far, motor vehicle traffic collisions. Moreover, pedestrians injured in collisions with a car, pick-up truck or van accounted for the majority of pedestrian cases, based on data coded using ICD-10-CA.

The most commonly observed injuries were orthopedic in nature, followed by superficial and head injuries. This trend was observed among all age groups. The peak month of injury occurrence for pedestrians was in December followed by November.

Appendix A: ICD-9 External Cause of Injury (E Code) Categories

The following provides detail on the specific ICD-9 E Codes and E Code categories used in this bulletin.

ICD-9 E Code Categories		
E Code Category	E Code Range	Specific Codes
Railway	E800–E807	E800 Involving collision with rolling stock E801 Involving collision with other object E802 Involving derailment without antecedent collision E803 Involving explosion, fire, or burning E804 Fall in, on, or from railway train E805 Hit by rolling stock E806 Other specified E807 Unspecified nature
Motor vehicle traffic	E810–E819	E810 Involving collision with train E811 Involving re-entrant collision with another motor vehicle E812 Involving collision with motor vehicle E813 Involving collision with other vehicle E814 Involving collision with pedestrian E815 Involving collision on the highway E816 Due to loss of control, without collision on the highway E817 Noncollision while boarding or alighting E818 Other noncollision E819 Unspecified nature
Motor vehicle non-traffic	E820–E825	E820 Involving motor vehicle driven snow vehicle E821 Involving other off-road motor vehicle E822 Involving collision with moving object E823 Involving collision with stationary object E824 While boarding and alighting E825 Other and unspecified nature
Pedal cycle	E826	E826 Pedal cycle incident
Other road vehicle	E827–E829	E827 Animal drawn vehicle incident E828 Incident involving animal being ridden E829 Other road vehicle incidents

Appendix B: ICD-10-CA External Cause of Injury Categories

The following provides detail on the ICD-10-CA codes used to identify injured pedestrians.

ICD-10-CA External Cause of Injury Code Categories	
Pedestrian Injury Code Range	Specific Codes
V01-V06	V01 Involving collision with pedal cycle V02 Involving collision with two- or three-wheeled motor vehicle V03 Involving collision with car, pick-up truck or van V04 Involving collision with heavy transport vehicle or bus V05 Involving collision with railway train or railway vehicle V06 Involving collision with other non-motor vehicle
V09	V09 Involving in other and unspecified transport incidents

Appendix C
Injury Types

The following provides information on the specific diagnosis codes for the injury types described in this paper. Note that these are based on ICD-9 N codes.

Injury Types		
Injury Type	ICD-9 N Code Range	ICD-9 N Code Description
Superficial	N910–N919 N920–N924 N870–N879 N880–N884 N890–N894	Superficial injuries Contusion with intact skin surfaces Open wound of head, neck and trunk Open wound of upper limb Open wound of lower limb
Orthopedic	N802 N805 and N807–N829 N830–N839 N925–N929 N885–N887 N895–N897 N840–N848	Fractures of facial bones Fractures (excluding fractured skull and fractures of vertebral column with spinal cord injury) Dislocations Crushing injury Amputations of upper limb Amputations of lower limb Sprains and strains of joints and adjacent muscles
Burns	N940–N949	Burns
Head injury	N800–N801 and N803–N804 N850–N854	Fractured skull Intracranial injury excluding those with skull fracture
Spinal cord injury	N806 N952	Fractures of vertebral column with spinal cord injury Spinal cord injury without spinal bone injury
Internal injury	N860–N869	Internal injury of chest, abdomen and pelvis
Blood Vessels	N900–N904	Injury to blood vessels
Nerves	N950 N951 N953–N957	Injury to optic nerve Injury to other cranial nerves Injury to other nerves
Other	N930–N939 (excluding N933.1) N990–N933 and N994 (excluding N994.2, .3, .6) N959	Foreign body (excluding choking - N933.1) Other and unspecified effects of external causes Injury, other and unspecified