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Raymond A Cripps

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Author
Raymond A. Cripps

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Any enquiries about or comments on this publication should be directed to:

Raymond Cripps
Research Centre for Injury Studies
Flinders University of South Australia
GPO Box 2100,
Adelaide 5001, South Australia

Phone: (08) 8201 7602
email: Raymond.Cripps@flinders.edu.au

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Contents

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The Australian Spinal Cord Injury Register (ASCIR) is a cooperative arrangement of the six Australian spinal units and the AIHW National Injury Surveillance Unit in the Flinders University Research Centre for Injury Studies (RCIS).

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Introduction

Spinal cord injury (SCI) is a sudden and unexpected injury that can be devastating physiologically and its consequences are costly in human and social terms. Scientific and technological improvements in medicine, especially in initial resuscitation and long-term care, have improved survival rates and increased longevity (Tyroch, Davis et al. 1997).

The level of acute care and rehabilitation of persons with SCI during the 1940s to 1960s was poor with few tetraplegic cases or high level paraplegics surviving (Stover 1995). Changes in acute care and rehabilitation, particularly in the development of a team approach to patient case management in the 70s brought about a significant reduction in premature mortality, especially from respiratory and renal diseases (Geisler, Jousse et al. 1983; Nakajima 1989; DeVivo 1993).

Each year in Australia about 300–400 newly incident cases of SCI are added to an estimated prevalent SCI population of about 12,000 cases. In 1988, the ongoing costs associated with long-term care of a prevalent population of 6,000 was estimated to be about A$200 million per year (Walsh 1988; Walsh 1995).

The prevention and control of injury is one of seven National Health Priority Areas for Australia (DHFS & AIHW 1998) and one of the performance indicators for this area is the annual incidence rate of persistent SCI from traumatic causes.

To facilitate national and international comparisons, the US Centers for Disease Control (CDC) case definition of SCI was adopted in Australia for registration of cases of SCI. The CDC case definition of SCI is as follows:

> … a case of spinal cord injury is defined as the occurrence of an acute, traumatic lesion of neural elements in the spinal canal (spinal cord and cauda equina) resulting in temporary or permanent sensory deficit, motor deficit, or bladder/bowel dysfunction. (Thurman DJ 1995a).

This report presents statistical information on new cases of SCI that occurred during the financial year 2001–02 in Australia to Australian residents. Cases that had neurological loss from traumatic causes at admission or later were selected to enable data in this report to be compared with earlier reports.

This report is the seventh statistical report based on case registration data holdings of the Australian Spinal Cord Injury Register (ASCIR). Previous reports, based on data from the period 1995–96 to 1998–99, were published in the *Australian Injury Prevention Bulletin* (O'Connor 1997; Cripps 1998; O'Connor 1998; O'Connor 2000). More recent publications, based on ASCIR data from the period 1999–00 to 2000–01, were reported in the AIHW's *Injury Research and Statistics Series* (O'Connor 2001; O'Connor 2003). Terms used in the report are defined in the Glossary.

The ASCIR, in 2001–02, was in its eighth year of operation and had about 10,100 new cases of persisting SCI registered.

Overview of spinal cord injury

Six spinal units (SUs) located in five States and specialising in acute management and rehabilitation of SCI patients nationally reported 398 case registrations during the financial year 2001–02. These spinal units treat SCI patients Australia-wide and patients from States and Territories that have no spinal units (e.g. Tasmania, Northern Territory and the Australian Capital Territory) are sent to the nearest available spinal unit in other States for treatment. Complete enumeration of cases was confirmed by Directors or Staff at each SU and a quality assurance audit of ASCIR data was completed prior to data analysis.

Two hundred and thirty-nine of the 398 newly incident SCI cases (60%) had their SCI from traumatic causes (Table 1). The remaining cases were non-traumatic SCI cases, cases who were admitted with suspected SCI or transient cord concussion but had no lasting neurological deficit and cases who were reported to have died on ward. The last group of cases were Australian residents who had their SCI overseas (3 cases) and non-Australian residents who had their SCI in Australia or overseas (Table 1). The number of tourists who suffered an injury to the spine (n=7 cases) was similar to the number reported in previous years.

Table 1: Case registrations reported to ASCIR by spinal units; Australia 2001–02 (counts and column percentages)

Case characteristics	Counts	Per cent
SCI from traumatic causes*	239	60
SCI from non-traumatic causes	102	26
Cases with no neurological deficit	34	9
SCI cases who died on ward**	13	3
SCI cases who were Australian residents who had SCI overseas and non-residents of Australia	10	2
Total	**398**	**100**

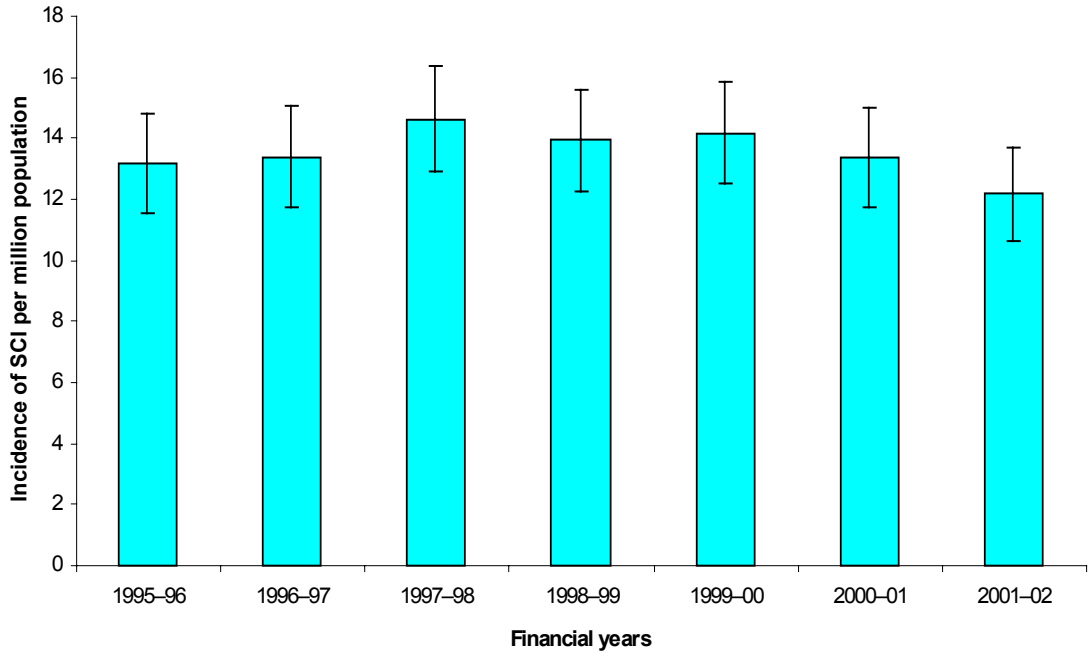
* These cases are the focus of this report.
** All cases who died had a SCI from traumatic causes; 10 cases were aged 65 years and above, with a mean age of 77 years.

Given the rarity, at present, of neurological recovery from SCI, cases discharged with a neurological deficit can be regarded as *persisting* cases of SCI. These cases are an important group to monitor because they contribute to the prevalent SCI population whose health and welfare needs require ongoing management and financial support. The size of the group reflects the cumulative effects of the rate of incidence of SCI, the patient response to retrieval and treatment, and the rate of survival to discharge.

Trends in SCI

The age-adjusted incidence rate of SCI in financial year 2001–02 was estimated to be 12.2 new cases per million population, lower than the rate in 2000–01 (13.6 new cases per million population), but not significantly different (95% CI=10.6–13.7). Rates reported here for other financial years also differ slightly from rates reported in previous reports in this statistical series due to quality assurance audit of case registration data that identified 24 additional cases of SCI from traumatic causes admitted during 1995–96, 1996–97 and 1999–2000 and seven fewer cases admitted during 1997–98, 1998–99 and 2000–01 reporting periods. Paediatric cases (cases under the age of 15 years) were excluded as in previous years due to the poor coverage of this group which are usually treated in paediatric hospitals rather than SUs.

Incidence rates prior to the commencement of prospective data collection by the ASCIR in 1995 are not included in this report. These rates were reported in a recent trend analysis report published by AIHW (O'Connor 2002).



Note: Error bars indicate 95% confidence intervals for rates.
Rates are based on persisting cases of SCI for Australian residents who had their SCI in Australia (238 cases). One case with no date of birth reported was excluded.

Figure 1: Incidence of SCI from traumatic causes by year; Australia (age-adjusted rates)

State or Territory of usual residence

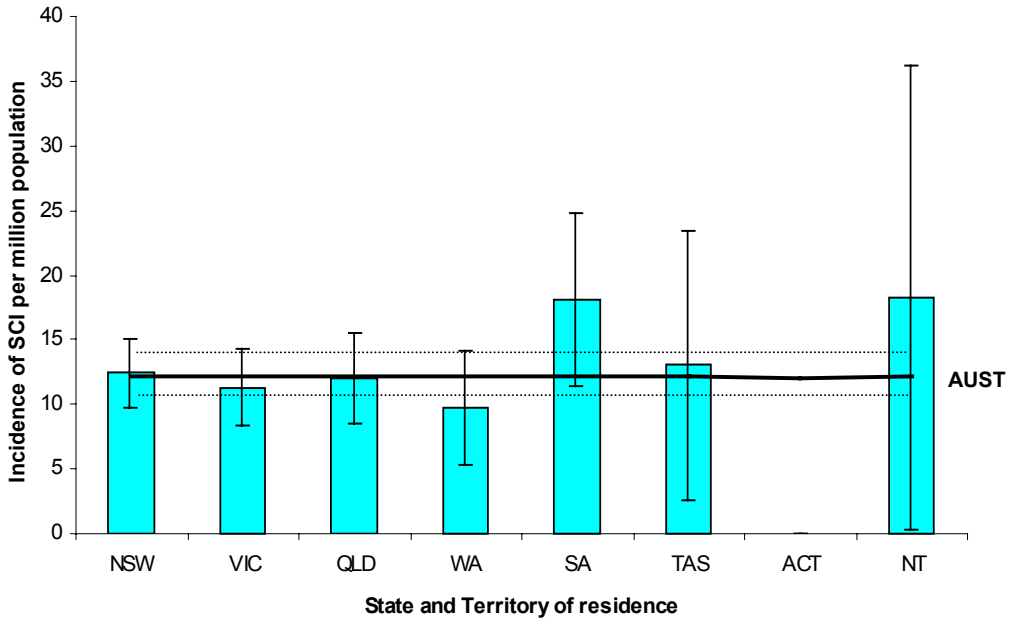
The age adjusted rate of incidence of SCI from traumatic causes by state and territory of usual residence is presented in Figure 2. No case registrations were reported for Australian Capital Territory residents. Case counts for Tasmania and the Northern

Territory were low (10 cases) which was reflected in the large confidence intervals for these two jurisdictions.

It was evident from the 95% confidence intervals on the rates, based on the Poisson distribution, that in 2001–02 no jurisdiction had a rate that was significantly different from the national incidence rate (12.2 cases per million population) or from any other jurisdiction rate. This result was similar to the rates reported in 2000–01.

The incidence rates range from a high of 18.3 SCI cases per million of population in Northern Territory to a low of 9.8 SCI cases per million of population in Western Australia.

All jurisdictions, except Victoria, Tasmania and the Northern Territory had a reduction in the incidence rate from 2000–01 to 2001–02.



Note: Error bars and dashes indicate 95% confidence intervals for rates.
One case from SA with no date of birth reported was excluded.

Figure 2: Incidence of SCI from traumatic causes by State or Territory of usual residence; Australia 2001–02 (age-adjusted rates)

Age and sex distribution

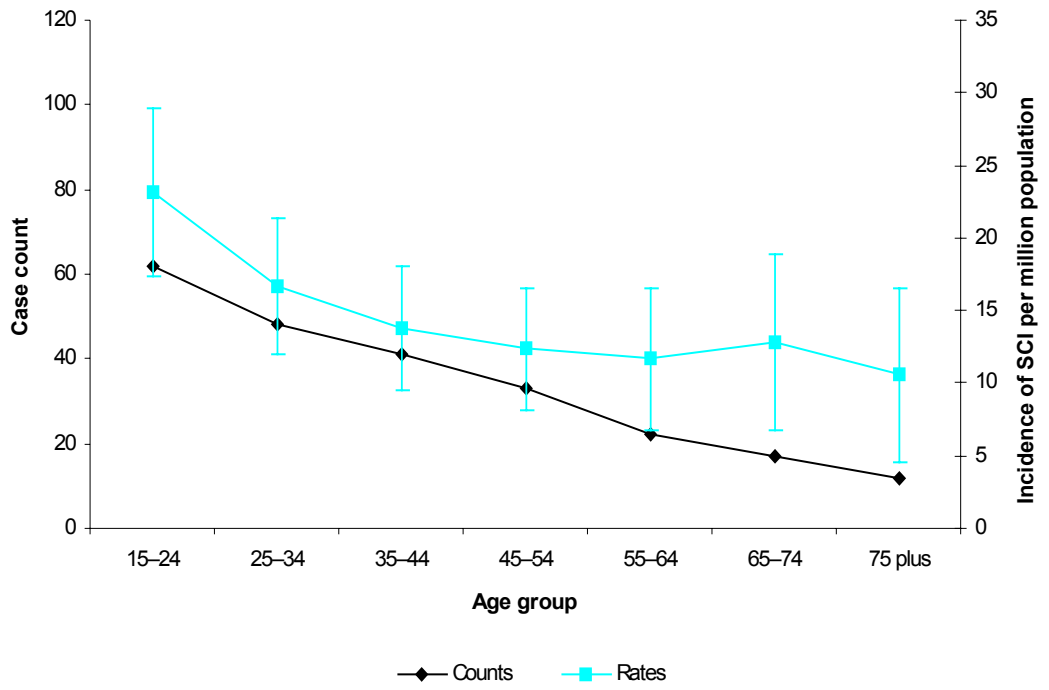
The age distribution of cases of SCI from traumatic causes is presented in Figure 3. The age group of 0–14 years was excluded from this figure because paediatric cases are not routinely reported to the ASCIR by paediatric hospitals at this time. Plans are under way to broaden the scope of the ASCIR to include the reporting of paediatric cases. These cases are expected to be low in number. Currently, three paediatric cases were reported to NISU from SUs.

From Figure 3, it is evident that the highest case count and age specific rate occurred in the age group 15–24 years. This group accounted for 27% (n=63) of the cases of SCI from traumatic causes. With increasing age, the age specific rate declined with age until age group 55–64 years. This pattern of counts and rates was similar to those reported in 2000–01, although rates for the youngest and oldest age groups were slightly lower in this report than reported in 2000–01.

The 95% confidence intervals on the rates, based on the Poisson distribution, indicated that the rate for the 15–24 year age group was statistically, significantly different from rates in the 45–64 year age group (95% CI=17–29 versus 8–17) and the elderly aged 75 years and above (95% CI=18–29 versus 5–17).

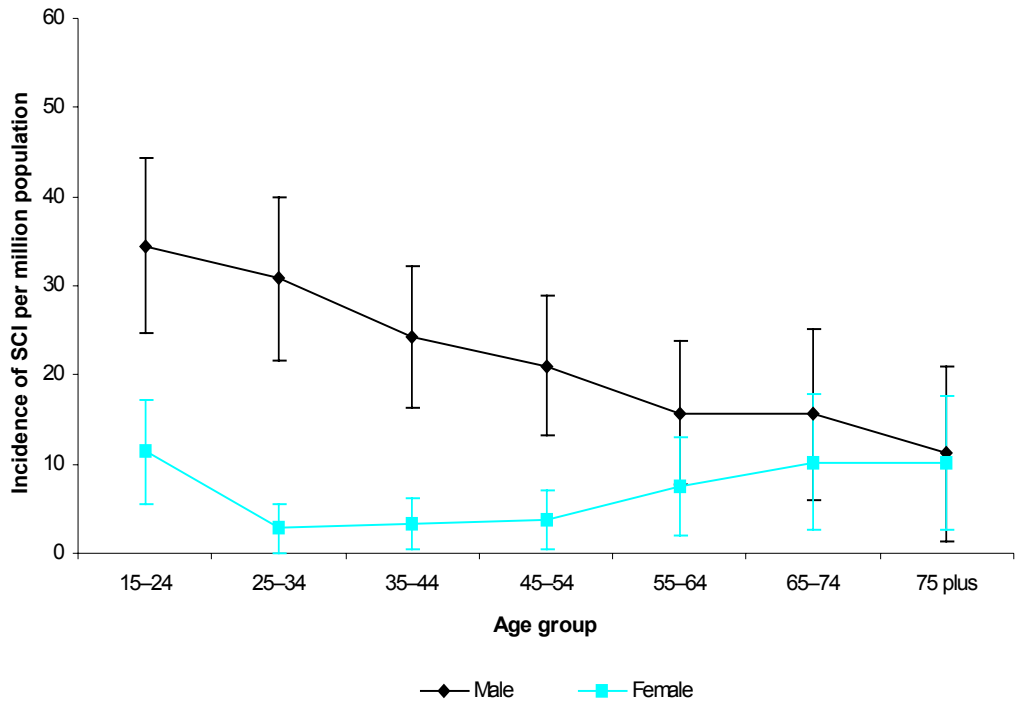
Of the cases of SCI from traumatic causes, 79% were male and 21% were female. The incidence of SCI by age group and sex, presented in Figure 4, shows that males have a rate that was higher, to a statistically significant extent than rates for females at all age except age groups 55–64 years and higher.

A substantial sex difference in rates exist in a number of age groups. The male to female rate ratio ranged from a low of 1.1:1 in the age group 75 years and above to a high of 11.4:1 in the age group 25–34 years. The rate ratios for the elderly aged 65 years and above were about 33% lower than the rate ratios reported for this age group in 2000–1. Case counts for those aged 75 years and above were low and accounted for about 12% of the SCI cases and were almost equally distributed between both sexes.



Note: Error bars indicate 95% confidence intervals for rates.
Age and sex for one case and three cases aged less than 15 years were excluded.

Figure 3: Incidence of SCI from traumatic causes by age group; Australia 2001–02 (counts and age-specific rates)



Note: Error bars indicate 95% confidence intervals for rates.
Three cases aged less than 15 years were excluded, as was one case for which age and sex were missing.

Figure 4: Incidence of SCI from traumatic causes by age group and sex; Australia 2001–02 (age-specific rates)

Clinical information

The monitoring of clinical information on SCI enables the patients' outcomes in response to treatment to be studied and provides, indirectly, an indication of the degree of support required by this population at discharge from hospital. Information on the neurological level of SCI, extent of injury to the cord, and degree of impairment is routinely reported by SUs during the acute admission and at discharge.

The following discussion of the clinical features of SCI is based on 235 cases for whom neurological category was reported at the acute admission. Clinical information at admission rather than discharge was used in this section to allow data reported during 2001–02 to be compared with the SCI statistical report for financial year 2000–01.

Neurological level of injury

The neurological level of SCI at admission is presented in Figure 6. The most commonly reported neurological injury was to the cervical segments (54%, n=128) and to the spinal segments at the thoraco-lumbar junction (T12 and L1, 14%, n=32).

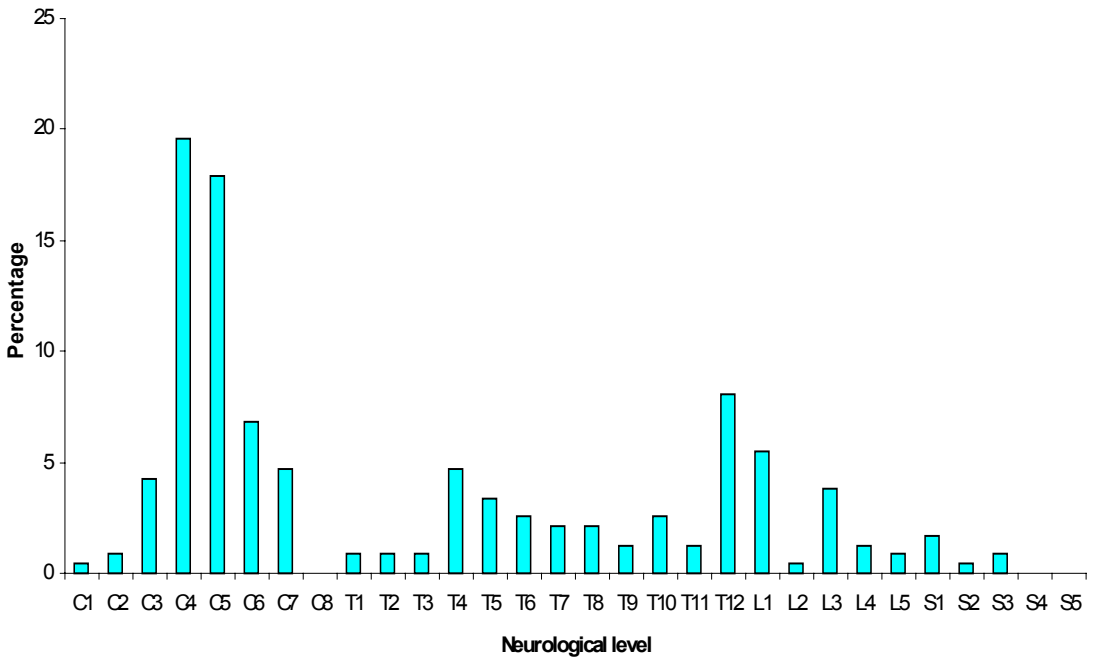
Sixty-nine per cent of the 128 cases with injury to cervical segments had neurological loss (sensory and/or motor function) below the C4 and C5 neurological levels (n=88). This proportion was similar to the equivalent value for financial year 2000–01 (64%, n=92). However, during the 2001–02 reporting period, proportionally more cases had neurological loss below the C4 cervical level and less cases had neurological loss below the C5 cervical level than reported during 2000–01.

Injury to the cord at the cervical level results in impairment or loss of motor and/or sensory function in the arms as well as in the trunk, legs, and pelvic organs. This type of impairment is referred to as *tetraplegia*.

Forty-six per cent (n=107) had an injury at the thoracic, lumbar, or sacral (but not cervical) levels, with an impairment or loss of motor and/or sensory function in these segments of the spinal cord. This type of impairment is referred to as *paraplegia*. With paraplegia, upper limb function is spared, but depending on the level of injury, the trunk, pelvic organs, and lower limbs may be functionally impaired.

Injury to these spinal segments was proportionally similar to the injury reported in 2000–01 (45%, n=115).

The most commonly injured spinal cord segments were the cervical segments, resulting in neurological loss in sensory or motor function below C4 (20%, n=46), C5 (18%, n=42), and C6 (7%, n=16), the thoracic segment with loss below T12 (8%, n=19), and the lumbar segment with loss below L1 (6%, n=13).



Note: Neurological level was not reported for four cases

Figure 5: Incidence of SCI from traumatic causes by neurological level at admission; Australia 2001–02 (percentages)

Neurologic category

The overall severity of SCI is usually measured by a combination of the neurological level and extent of injury and is divided into five neurologic categories (complete tetraplegia, incomplete tetraplegia, complete paraplegia, incomplete paraplegia, and complete recovery). Table 2 presents the counts and column percentages for the four neurological categories relevant to a discussion of persisting cases of SCI, as well as a finer breakdown of the paraplegia category.

Table 2: Incidence of SCI from traumatic causes by neurological level (major grouping) and extent of injury at admission; Australia 2001–02 (counts and column percentages)

Extent of injury	Tetraplegia		Paraplegia											
	Cervical		Thoracic		Lumbar		Sacral		All paraplegia		Not specified		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Complete	44	34	43	60	4	14	1	14	48	45	1	25	93	39
Incomplete	82	64	29	40	24	86	6	86	59	55	2	50	143	60
Not specified	2	2	0	0	0	0	0	0	0	0	1	25	3	1
Total	**128**	**100**	**72**	**100**	**28**	**100**	**7**	**100**	**107**	**100**	**4**	**100**	**239**	**100**

The most common neurologic category was incomplete tetraplegia (n=82), 35% of all cases with neurological category reported, followed by incomplete paraplegia (n=59, 25% of total), complete paraplegia (n=48, 20% of total) and complete tetraplegia (n=44, 19% of total).

Complete injury was most common in the thoracic spinal segments, due to the small diameter of the spinal canal in this region in relation to the size of the cord (White A & Panjabi M 1990)

Duration of initial care

During financial year 2001–02, 188 cases with persisting SCI from traumatic causes were discharged from SUs with 44% of the cases (n=82) admitted prior to the above reporting period. For this report, *duration of initial care* is the period of time from the date of injury to the date of discharge from the SU to their previous home, or to a new home, nursing home or other accommodation. This period of care includes retrieval of the patient from the scene of the accident, stabilisation in a hospital or intensive care unit, acute care in a SU and other wards, and rehabilitation. Information on the duration of initial care (DIC) in hospital from the date of injury to the date of discharge from the SU, by neurologic category, is presented in Table 3.

The average duration of initial care (ADIC) for all cases of SCI was 148 days (about five months), ranging from a high of 254 days (about eight and a half months) for cases of complete tetraplegia to 45 days for a case of complete paraplegia involving injury to a sacral spinal segment.

In general, cases with tetraplegia had an ADIC 33% greater than cases with paraplegia (168 days, S.D.=149 versus 127 days, S.D.=97). For cases with paraplegia, the longest ADIC was reported for cases with injury to the thoracic spinal segments (extent of injury cases combined). Although the ADIC for cases with complete injury to the lumbar spinal segments was greater than the ADIC for complete injury to the thoracic spinal segments (210 days, S.D.=99 versus 179 days, S.D.=91), there were more cases with complete injury at the thoracic level than the lumbar (39 cases versus 2 cases).

For incomplete injury, the ADIC decreased with a decrease in the neurological level of injury, from the cervical to the sacral segments of the spinal cord.

Table 3: Neurological status of injury to the spinal cord of persisting cases of SCI from traumatic causes discharged during 2001–02 in Australia (counts and average duration of initial care (ADIC))

	Tetraplegia		Paraplegia											
	Cervical		Thoracic		Lumbar		Sacral		All paraplegia		Not specified		Total	
Extent of injury	Count	ADIC (days)	Count	ADIC (days)	Count	ADIC (days)	Count	ADIC (days)	Count	ADIC (days)	Count	ADIC (days)	Count	ADIC (days)
Complete	30	254	26	179	2	210	1	45	29	176	5	174	64	212
Incomplete	56	123	20	141	32	87	7	64	59	103	7	164	122	115
Not specified	0	..	0	..	0	..	0	..	0	..	2	92	2	92
Total	**86**	**168**	**46**	**162**	**34**	**94**	**8**	**62**	**88**	**127**	**14**	**157**	**188**	**148**

Factors associated with the SCI event

In addition to collecting information on the demographic and clinical features of cases of SCI, the ASCIR also collects information associated with the injury event, such as mechanism of injury, role of human intent, type of place of injury, and type of activity at the time of injury. Such factors are often referred to as *External Causes of Injury*. This information, coded according to the NISU's National Data Standards for Injury Surveillance (NDS-IS), provides useful information for understanding the underlying events that led to the injury. Such information will assist the development and implementation of injury prevention interventions to decrease the incidence of SCI in Australia.

External cause of injury

The external cause and neurological level of injury for cases of SCI from traumatic causes is tabulated in Tables 4 and 5 and external cause of injury by age group is presented in Figure 6.

Motor vehicle occupants

Motor vehicle occupants accounted for the highest proportion of all cases of SCI during 2001–02 (25%, n=59). Sixty-eight per cent (n=40) of these cases were in the age group 15–44 years (Figure 6). These results are similar to those reported during financial year 2000–01.

Motor vehicle accident related SCI was highest in the 15–24 year age group and proportionally similar in age groups 25–34 and 45–54 years. The case numbers then declined with age (Figure 6). A proportionally lower number of SCI cases in the 25–34 year age group is difficult to account for. Most of the motor vehicle accidents occurred during leisure activities (n=37, 63%) or travelling to or from work, or from other work related activities (n=7, 12%).

Table 4: Incidence of SCI from traumatic causes by external cause of injury (major groupings); Australia 2001–02 (counts and column percentages)

External cause	Counts	Per cent
Motor vehicle occupants	59	25
Unprotected road users (motor cyclists, pedal cyclists, pedestrians)	51	21
High falls	43	18
Low falls	30	13
Water related (diving in pools or ocean, surfing)	16	7
Sports related	13	5
Other and unspecified causes	27	11
All external causes	**239**	**100**

Additional details important for the development of strategies for reducing SCI for motor vehicle occupants was obtained from the structured injury narrative. Impact with another vehicle or roadside hazard (such as trees) was reported in about 39% (n=23) of the motor vehicle accidents. Ejection from the vehicle was reported for 7% (n=4) of these accidents and vehicle rollover was also quite common, with about 30% (n=17) of the motor vehicles reported as having rolled over.

In motor vehicle accidents high energy transfer to occupants is common and can result in high severity injury to many body regions, including the spinal column. For example, 63% (n=37) of the cases in the Motor Vehicle Occupants group sustained injuries to the cervical spinal segments resulting in tetraplegia (Table 5). Forty-seven per cent of these cases (n=17) had complete injury to the cord. Head injuries were also reported in 20% (n=12) of motor vehicle accidents and most cases had multiple fractures and internal damage particularly to the thoracic cavity.

In cases involving rollover, 76% (n=13) of the occupants had complete lesion of the cord, resulting in tetraplegia in 54% (n=7) of these cases and paraplegia in the remaining cases (n=6) due to injury to the thoracic spinal segments. The remaining rollover cases (n=4) had incomplete tetraplegia due to injury to the cervical spinal segments.

Table 5: Incidence of SCI from traumatic causes by external cause (major groupings), and neurological level of injury at admission; Australia, 2001–02 (counts and row percentages)

	Tetraplegia		Paraplegia											
	Cervical		Thoracic		Lumbar		Sacral		All paraplegia		Not reported		Total	
External cause	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Motor vehicle occupants	37	63	12	20	9	15	1	2	22	37	0	0	59	100
Unprotected road users (motor cyclists, pedal cyclists, pedestrians)	20	39	23	45	4	8	2	4	29	57	2	4	51	100
High falls (1m +)	14	33	17	40	9	21	2	5	28	65	1	2	43	100
Low falls (<1m)	21	70	4	13	2	7	2	7	8	27	1	3	30	100
Water related (diving in pools or ocean, surfing)	16	100	0	0	0	0	0	0	0	0	0	0	16	100
Sports related	11	85	0	0	2	15	0	0	2	15	0	0	13	100
Other and unspecified causes	9	33	16	59	2	7	0	0	18	67	0	0	27	100
All causes	**128**	**54**	**72**	**30**	**28**	**12**	**7**	**3**	**107**	**37**	**4**	**9**	**239**	**100**

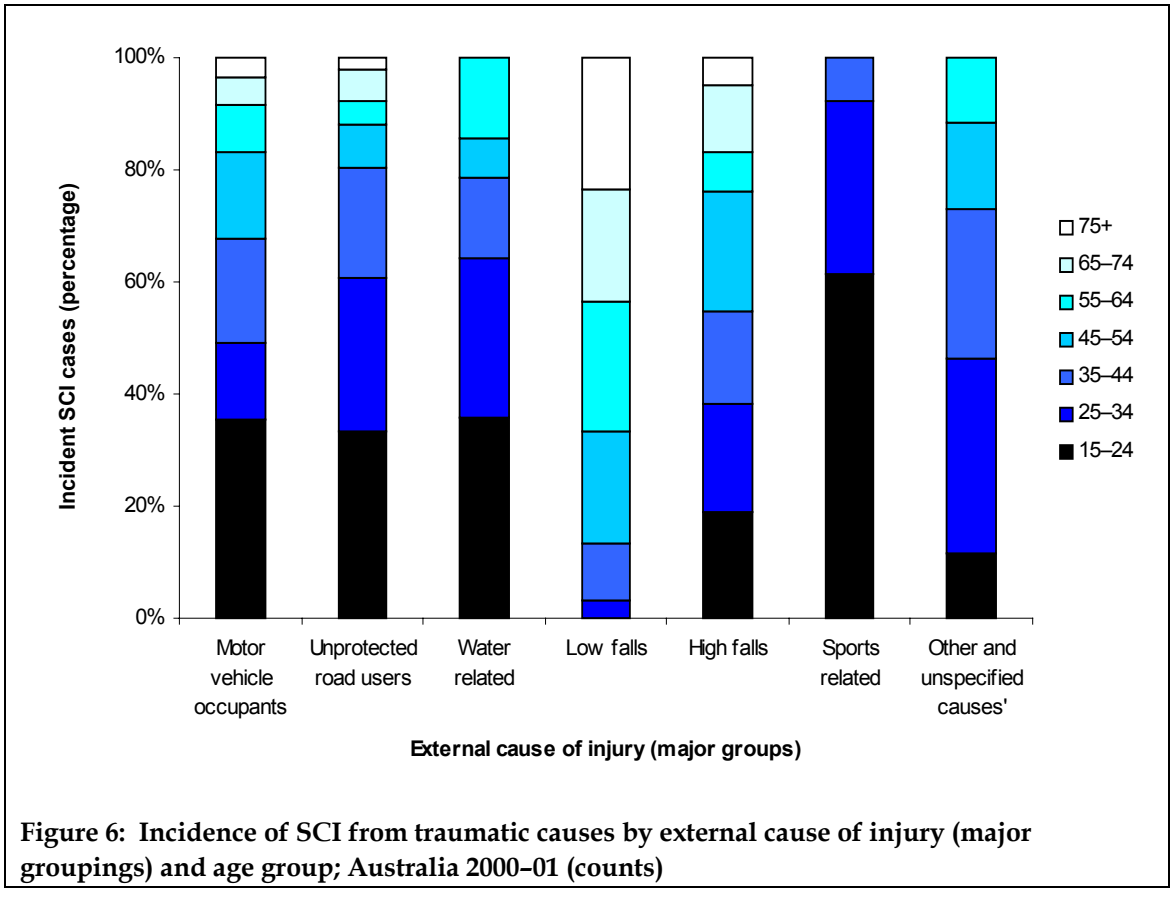


Figure 6: Incidence of SCI from traumatic causes by external cause of injury (major groupings) and age group; Australia 2000–01 (counts)

Unprotected road users

Twenty-one per cent (n=51) of SCI cases were unprotected road users (Table 4). Sixty-five per cent (n=33) of these cases were motor cyclists, 16% (n=8) pedal cyclists and the remaining 20% (n=10) were pedestrians. Eighty per cent (n=41) of unprotected road users were in the 15–44 year age group (Figure 6) and 71% of this age group were motor cyclists (drivers or pillion passengers). Sixty-three per cent of the unprotected road users (n=32) were injured during leisure activities and 14% while working for income.

Fifty-seven per cent of unprotected road users (n=29) were paraplegic due to injury primarily to the thoracic spinal segments (Table 5). Forty-five per cent of unprotected road users had complete injury to the spinal cord.

Falls

Falls, both high (greater than 1 metre) and low (less than 1 metre or on the same level) accounted for 31% (n=73) of SCI cases (Table 4). Fifty-nine per cent of the falls (n=43) were due to high falls. Seventy-six per cent (n=32) of SCI from high falls occurred in age groups 15–54 years. Nine per cent of the falls occurred while at work (construction site or factory) and 28% working, but not for income, doing handy man jobs around the home (while using a ladder, on a roof, or cutting tree branches) or on a farm.

Falling from a height resulted in paraplegia in 65% of the cases (n=28) and in tetraplegia in the remaining cases (Table 5). In the paraplegic cases, injury to the thoracic spinal segments was more common than in lower spinal segments. Seventy-four per cent of the cases from high falls had an incomplete lesion of the cord.

Low falls, although less frequent than high falls (30 cases versus 42 cases), were proportionally higher in the elderly (ages greater than 64 years) than in younger age groups (Figure 6). As an ageing demographic cohort, the elderly population are increasingly at risk of fall-related injuries particularly fractures of the upper and lower limbs and the neck and trunk (Cripps R & Carman J 2001). Most of the falls occurred at home during housework and other personal activities.

Low falls resulted in tetraplegia in 70% of the cases (n=21) due to injury to the cervical spinal segments (Table 5). Paraplegia, although less common was primarly due to injury to the thoracic spinal segments at the T12 neurological level. In the elderly, injury to the cervical segments was four times more likely to occur than in lower spinal segments. Incomplete tetraplegia occurred in 60% of the elderly cases (n=10) reporting neurological level and extent of injury to the cord.

Water related

Water related SCI accounted for 7% of the cases reported (Table 4) and 64% (n=9) were under the age of 35 years (Figure 6).

All water related SCI reported had injury to the cervical spinal segments (Table 5), with 44% sustaining complete injury to the cord after diving into pools or the surf.

Twenty-five per cent of the injuries (n=4) were related to surfing, 56% occurred when diving into a pool, dam, or the surf, and the remaining cases were injured in other surf or water related activities.

Sports related

Sports related SCI occurred in 5% of the cases reported during 2001–02 (Table 4) and 85% of the cases (n=11) had injury to the cervical spinal segments (Table 5). Sports injuries occurred primarily in age groups 15–24 and 25–34 years (93%, n=12).

All cases occurring during contact sports (e.g. rugby and football) resulted in injury to the cervical segments (8 cases). Half of these players had complete tetraplegia. Only one player was under the age of 19 years and the SCI occurred during a group tackle. All other rugby players injured were adult players and twice as many were injured during tackles than were injured during scrums.

The remaining sports related cases reported (n=5) occurred during snow sports (skiing and snowboarding), trampolining and parachuting. Injuries sustained during these activities were to the cervical and lumbar spinal segments (Table 5).

Other or unspecified causes

Eleven per cent of the SCI cases reported during 2001–02 had an external cause of injury that was either not reported in the injury event narrative or had an external cause that could not be included in the other major groups of external causes in Table 4. Most of these injuries occurred in the 25–44 year age group (Figure 6).

Cases that had an external cause of injury reported, sustained injury to their spinal cord from crushing or being hit by an object (10 cases), animal related (3 cases), assault (gunshot and stabbing/cutting (8 cases)) and medical complication (2 cases). All 10 cases of injury by crushing or being hit, and two of the animal related cases, occurred while working for income.

Sixty-seven per cent of SCI cases in the *Other and unspecified causes* major groupings had injury to the thoracic and lumbar spinal segments resulting in paraplegia (Table 5). The remaining cases had tetraplegia. Fifty-two per cent of the cases had complete lesion of the cord, with almost three-quarters of these cases injured at the thoracic spinal segment.

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Glossary

Duration of initial care: is the period of time from the date of injury to the date of discharge from the SU to a patient's previous home, or to a new home, nursing home or other accommodation. This period of care includes retrieval of the patient from the scene of the accident, stabilisation in a hospital or intensive care unit, acute care in a SU and other wards, and rehabilitation.

Extent of SCI: refers to the extent of neurological damage, which is either 'complete' or 'incomplete'. If partial preservation of sensory and/or motor functions is found below the neurological level and includes the lowest sacral segment, the injury is defined as incomplete. The term 'complete injury' is used when there is an absence of sensory and motor function in the lowest sacral segment.

Neurological level of SCI: refers to the most caudal segment of the spinal cord with normal sensory and motor function on both sides of the body (i.e. the lowest level that has full function) .

Incident case of SCI: a person who suffers an SCI, as defined by the CDC clinical definition, during this reporting period (i.e. in 2001–02).

Paraplegia: refers to impairment or loss of motor and/or sensory function in the thoracic, lumbar or sacral (but not cervical) segments of the spinal cord, secondary to damage of neural elements within the spinal canal.

Tetraplegia: refers to impairment or loss of motor and/or sensory function in the cervical segments of the spinal cord due to damage of neural elements within the spinal canal. This term is etymologically more accurate than 'Quadriplegia', combining tetra + plegia, both from Greek, rather than quadri + plegia, a Latin/Greek amalgam. It is generally preferred outside the US.

Unprotected road users: refers to pedestrians, pedal cyclists and motor cycle riders.

Data issues

Rates

Incidence rates have been calculated as cases per million of the usually resident population of Australia. Population data were obtained from the Australian Institute of Health and Welfare and are similar to data presented in the Demographic Statistics Catalogue No. 3101.0 (Australian Bureau of Statistics). Annual rates were calculated using finalised population estimates as at 31 December for each year except 2001–02 which were preliminary estimates.

All-ages rates have been adjusted to overcome the effects of differences in the proportions of people at different ages (and different injury risks) in the populations that are compared. Direct standardisation was employed, taking the Australian population in 2001 as the standard.

Confidence intervals

All (or nearly all) cases of SCI are registered, so sampling errors do not apply to these data. However, the time periods used to group the cases (i.e. financial years) are arbitrary. Use of another period (e.g. January to December) would result in different rates.

Where case numbers are small, the effect of chance variation on rates can be large. Confidence intervals (95%, based on a Poisson assumption about the number of cases in a time period) have been placed around rates as a guide to the size of this variation. Chance variation alone would be expected to lead to a rate outside the interval only once out of 20 occasions. An extreme rate in a single period of enumeration should not be ignored simply because of a wide confidence interval—a time series may show such a rate to be part of a trend.

INJURY RESEARCH & STATISTICS

Severe spinal cord injury (SCI) is a very debilitating injury. Australia was the first country to implement a national population-based register to enable surveillance of SCI cases to help prevent and control this problem. This report provides information on case registrations for the year 2001–02.

During the year, 239 new cases of SCI from traumatic causes were registered in Australia, an age-adjusted incidence rate of 12.2 cases per million population.

Approximately 25% of the cases were motor vehicle occupants. Water related SCI accounted for 7% of the cases, all of which had injury to the cervical spinal segments. Thirty-one cases were work related. Thirteen cases occurred during sporting activities, eight of which were during contact sports. Falling was the most common type of event leading to traumatic SCI at older ages.

The most common clinical outcome of SCI was incomplete tetraplegia (82 cases).