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Spinal cord injury, Australia 2002–03

Raymond A Cripps

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Introduction

Spinal cord injury (SCI) is sudden and unexpected. It can be devastating and costly in human and social terms. Medical improvements, especially in initial resuscitation and long-term care, have improved survival rates and increased longevity (Tyroch, Davis et al. 1997).

During the 1940s to 1960s, the level of acute care and rehabilitation of persons with SCI 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 1970s, 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 10,000 cases. In 1988, the ongoing costs associated with the 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's 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 2002–03 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 eighth 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; Cripps 2003; O'Connor 2003). Terms used in the report are defined in the Glossary.

The ASCIR, 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), has enhanced its collaborative relationship with spinal units by the establishment of an ASCIR Operation and Management Board in late 2003.

The ASCIR, in 2002–03, was in its ninth year of operation and has about 10,800 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 394 case registrations during the financial year 2002–03. 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 forty-five of the 394 new SCI cases (62%) 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 non-residents of Australia who had their SCI in Australia (6 cases). The number of tourists who suffered an injury to the spine (n=6 cases) was similar to the number reported in previous years.

Table 1: Case registrations reported to ASCIR by spinal units; Australia 2002–03 (counts and column percentages)

Case characteristics	Counts	Per cent
SCI from traumatic causes*	245*	62
SCI from non-traumatic causes	97	25
Cases with no neurological deficit	31	8
SCI cases who died on ward**	15	4
SCI cases who were non-residents of Australia who had their SCI in Australia	6	2
Total	**394**	**100**

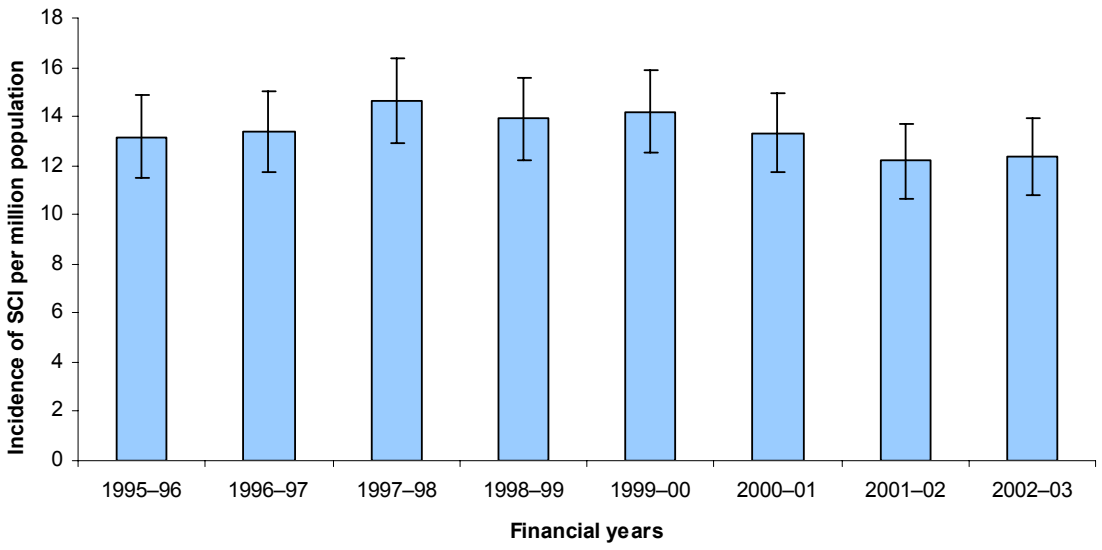
* These cases are the focus of this report.
** Twelve cases who died had an SCI from traumatic causes; 11 of these traumatic cases were aged 65 years and above, with a mean age of 81 years.

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. Since national case registration of spinal cord injury began in 1986, about 2,000 people of the prevalent SCI population have died. An investigation of factors affecting survival in this deceased population and their cause of death will be published at a later date.

Trends in SCI

The age-adjusted incidence rate of SCI in the financial year 2002–03 was estimated to be 12.4 new cases per million population and is presented in Figure 1. The rate was higher than the rate in 2001–02 (12.2 new cases per million population), but not significantly different (95% CI=10.8–13.9). Rates reported here for other financial years differ slightly from rates reported in previous reports in this statistical series due to a quality assurance audit of case registration data. This audit identified 24 additional cases of SCI from traumatic causes admitted during 1995–96, 1996–97 and 1999–00 and seven fewer cases admitted during 1997–98, 1998–99 and 2000–01 reporting periods. No additional cases were identified for the 2001–02 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 who are usually treated in paediatric hospitals rather than SUs.



Note: Error bars indicate 95% confidence intervals for rates. Direct age standardisation was employed, taking the Australian population in 2001 as the standard.
Rates are based on persisting cases of SCI for Australian residents who had their SCI in Australia (244 cases). One paediatric case was excluded.

Figure 1: Incidence of SCI from traumatic causes by year; Australia (age 15 years and over)

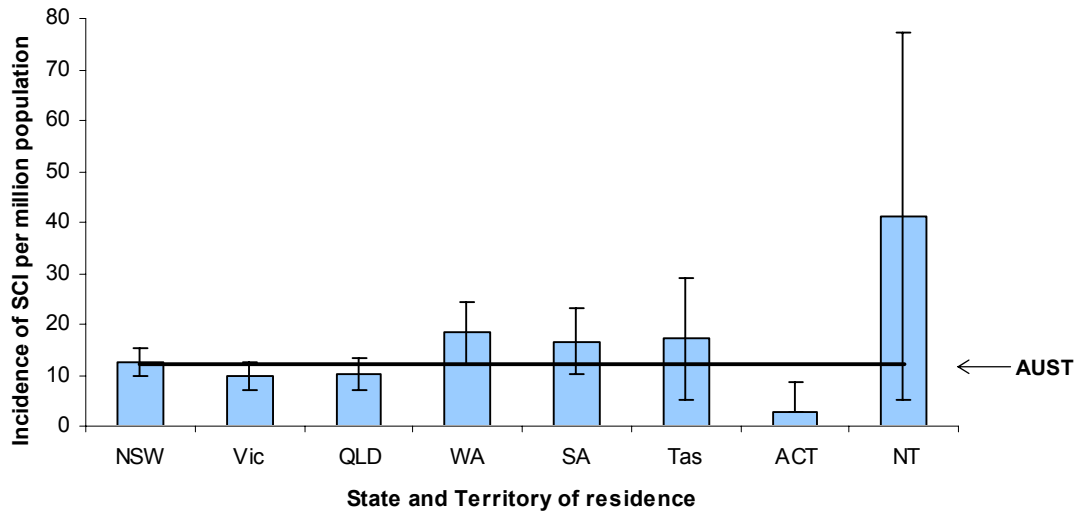
State or territory of usual residence

The age adjusted rate of incidence of SCI from traumatic causes by state and territory of usual residence is presented in Figure 2. Case counts for Tasmania, the Australian Capital Territory and the Northern Territory were low (14 cases) which was reflected in the large confidence intervals for these three jurisdictions. The age-adjusted rate for the Northern Territory was larger than expected due to the occurrence of elderly cases of SCI which had low age-specific reference populations. When comparing rates in the FY2001–02 statistical report's Figure 2 (Cripps 2003) with rates from 2002–03 in Figure 2, please note the different axis scales used in presenting these data.

The incidence rates range from a high of 41.3 SCI cases per million of population in Northern Territory to a low of 2.9 SCI cases per million of population in the Australian Capital Territory

It was evident from the 95% confidence intervals on the rates, based on the Poisson distribution, that in 2002–03 only the Australian Capital Territory had a rate that was significantly different from the national incidence rate (2.9 cases per million population versus 12.4 cases per million population). No other jurisdiction rate was significantly different from any other jurisdiction rate.

Victoria, South Australia and Queensland experienced a reduction in SCI incidence from 2001–02 to 2002–03.



Note: Error bars and dashes indicate 95% confidence intervals for rates. Direct age standardisation was employed, taking the Australian population in 2001 as the standard.

Figure 2: Incidence of SCI from traumatic causes by State or Territory of usual residence; Australia 2002–03 (age 15 years and over)

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 all paediatric hospitals at this time. No paediatric SCI cases were reported from one paediatric hospital that has agreed to routinely report consenting SCI case registrations to the ASCIR. Plans are under way to broaden the scope of the ASCIR to include more of the paediatric hospitals. These cases are expected to be low in number. In 2002–03, one paediatric case was reported to NISU from SUs.

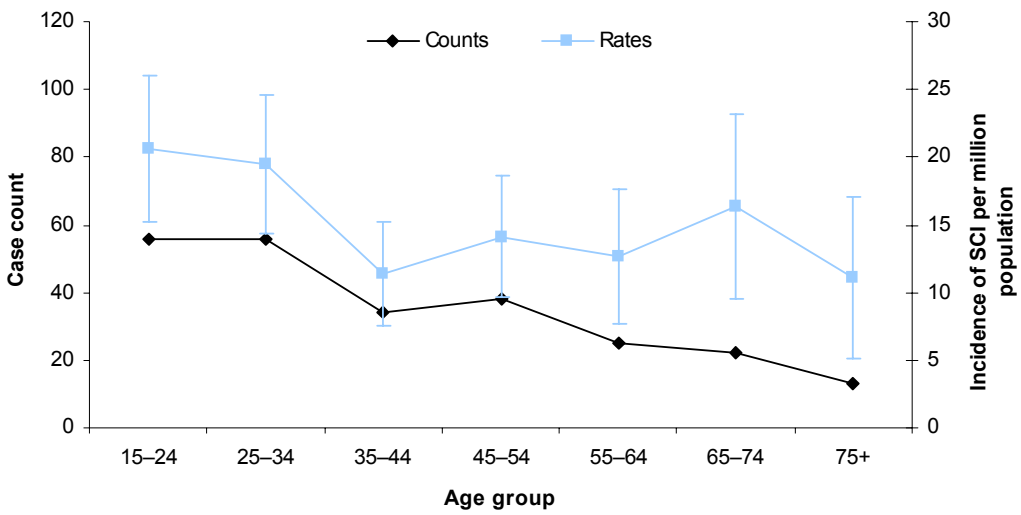
From Figure 3, it is evident that the highest case count occurred in the age group 15–34 years and the highest age specific rate occurred in the age group 15–24 years. The 15–34 year age group accounted for 46% (n=112) of the cases of SCI from traumatic

causes. With increasing age, the age specific rate declined with age until age group 35–44 years, then increased to age group 65–74 years and declined thereafter. This pattern of counts and rates was different to those reported in 2001–02. Rates for the youngest age group were slightly lower in this report than reported in 2001–02, but rates for the 75 years and above age group were similar in both reporting periods.

The 95% confidence intervals on the rates, based on the Poisson distribution, indicated that there was no significant difference in rate between any age group.

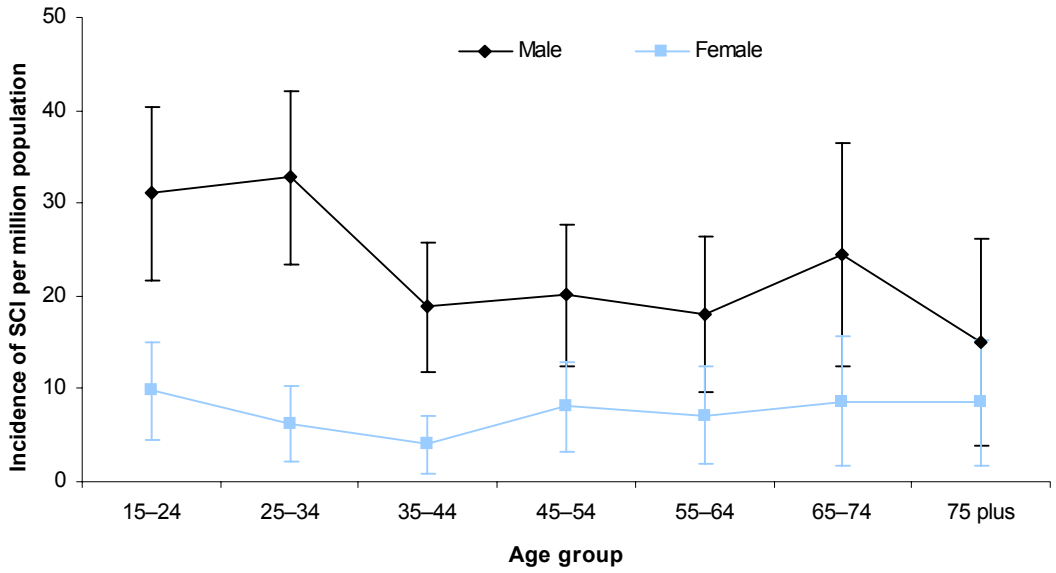
Of the cases of SCI from traumatic causes, 79% were male and 21% were female. The incidence of SCI by age group and sex, presented in Figure 4, shows that males have a rate that was significantly higher statistically than rates for females at all ages less than 45 years.

A substantial sex difference in rates exists in a number of age groups. The male to female rate ratio ranged from a low of 1.8:1 in the age group 75 years and above to a high of 5.3:1 in the age group 25–34 years. The rate ratios for the elderly aged 65 years and above were about 44% higher than the rate ratios reported for this age group in 2001–2. Case counts for those aged 75 years and above were low and accounted for about 5% of the SCI cases and were almost equally distributed between both sexes.



Note: Error bars indicate 95% confidence intervals for rates. One case under the age of 15 years was excluded.

Figure 3: Incidence of SCI from traumatic causes by age group, Australia 2002–03 (counts and age-specific rates)



Note: Error bars indicate 95% confidence intervals for rates. One case aged less than 15 years was excluded.

Figure 4: Incidence of SCI from traumatic causes by age group and sex, Australia 2002–03 (age-specific rates)

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 2 and 3 and external cause of injury by age group is presented in Figure 5.

Motor vehicle occupants

Motor vehicle occupants accounted for 22% (n=53) of all cases of SCI during 2002–03. Sixty-three per cent (n=35) of these cases were in the age group 15–44 years (Figure 5). These results are similar to those reported during financial year 2001–02.

Motor vehicle accident-related SCI was highest in the 15–24 year age group and declined in age groups 25–34 and 35–44 years. Case numbers then declined with age after age 44 years (Figure 5). Most of the motor vehicle accidents occurred during leisure activities (n=23, 43%) or travelling to or from work, or from other work related activities (n=12, 23%).

Table 2: Incidence of SCI from traumatic causes by external cause of injury (major groupings); Australia 2002–03 (counts and column percentages)

External cause	Counts	Per cent
Motor vehicle occupants	53	22
Unprotected road users (motor cyclists, pedal cyclists, pedestrians)	56	23
Low falls (< 1m)	43	18
High falls (1m +)	39	16
Water related (diving in pools or ocean, surfing)	18	7
Sports related	15	6
Other and unspecified causes	20	8
All external causes	**244**	**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 40% (n=21) of the motor vehicle accidents. Ejection from the vehicle was reported for 11% (n=6) of these accidents and vehicle rollover was also quite common, with about 45% (n=24) 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, 57% (n=30) of the cases in the *Motor vehicle occupants* group sustained injuries to the cervical spinal segments resulting in tetraplegia (Table 3). Nine per cent of these cases (n=5) had complete injury at the cervical level. Head injuries were also reported in 15% (n=8) of motor vehicle accidents and most cases had multiple fractures and internal damage particularly to the thoracic cavity.

In cases involving rollover (n=24), 63% (n=15) of the occupants had injury to the cervical segments of the cord resulting in tetraplegia. Thirteen per cent (n=3) of these cases had complete tetraplegia. The remaining rollover cases (n=9) had injury to the thoracic and lumbar spinal segments resulting in paraplegia and 25% of these cases (n=6) had complete injury to the cord resulting in complete paraplegia.

Table 3: Incidence of SCI from traumatic causes by external cause (major groupings), and neurological level of injury at admission; Australia, 2002–03 (counts and row percentages)

	Tetraplegia		Paraplegia									
	Cervical		Thoracic		Lumbar		Sacral		All paraplegia		Total	
External cause	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Motor vehicle occupants	30	57	16	30	7	13	0	0	23	43	53	100
Unprotected road users (motor cyclists, pedal cyclists, pedestrians)	21	38	28	50	7	13	0	0	35	63	56	100
Low falls (<1m)	38	88	4	9	1	2	0	0	5	12	43	100
High falls (1m +)	15	38	17	44	7	18	0	0	24	62	39	100
Water related (diving in pools or ocean, surfing)	16	89	1	6	1	6	0	0	2	11	18	100
Sports related	13	87	0	0	2	13	0	0	2	13	15	100
Other and unspecified causes	10	50	7	35	3	15	0	0	10	50	20	100
All causes	**143**	**59**	**73**	**30**	**28**	**11**	**0**	**0**	**101**	**41**	**244**	**100**

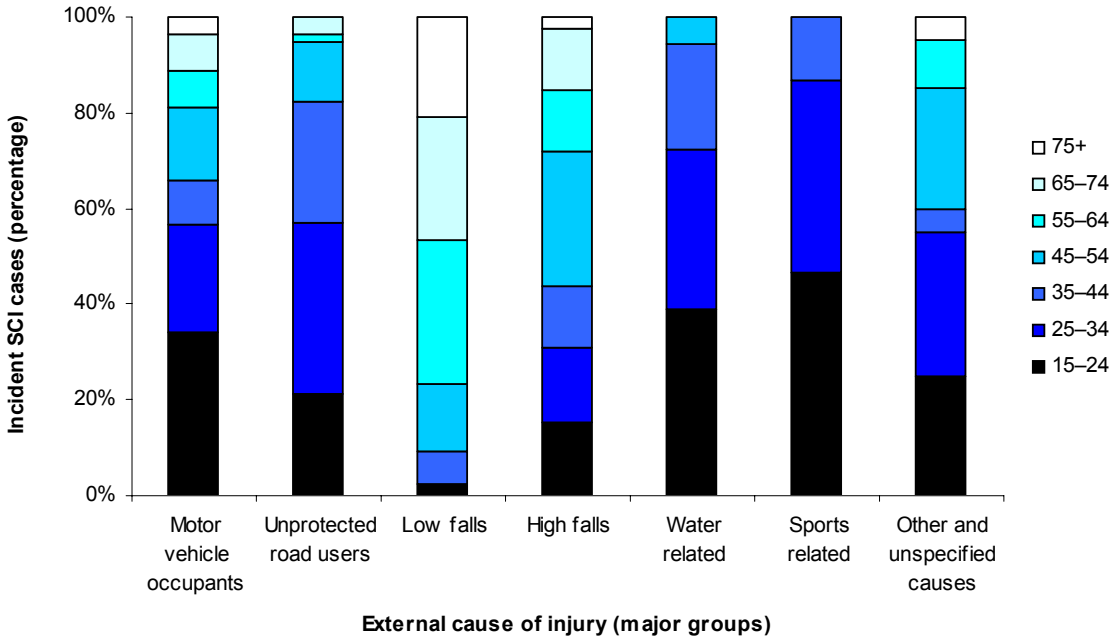


Figure 5: Incidence of SCI from traumatic causes by external cause of injury (major groupings) and age group, Australia 2002–03 (counts)

Unprotected road users

Unprotected road users accounted for the highest proportion of all cases of SCI during 2002–03 (23%, n=56) (Table 2). Eighty-two per cent (n=46) of these cases were in the age group 15–44 years (Figure 5). These results are different from those reported during financial year 2001–02. During the 2001–02 reporting period, SCI from motor vehicle accidents was the most common cause, accounting for 59 cases of SCI and was highest in age group 15–44 years.

Unprotected road users accident-related SCI was highest in the 25–34 year age group and less, but proportionally similar in age groups 15–24 and 34–44 years. After age 44 years, unprotected road users case numbers declined rapidly with age (Figure 5).

Seventy-eight per cent of the unprotected road users (n=46) were motor cyclists (drivers or pillion passengers), 15% (n=9) pedal cyclists and the remaining 7% (n=4) were pedestrians. Motorcyclists in the 25–34 year age group represented 77% (n=17) of the cases.

Fifty-seven per cent of the unprotected road users (n=32) were injured during leisure activities, 7% during sports (n=4) or 11% while riding to or from work (n=6). The remaining unprotected road users were injured during unpaid work or no specific activity was reported (n=14).

Sixty-three per cent of unprotected road users (n=35) were paraplegic due to injury primarily to the thoracic spinal segments (Table 3). Fifty-four per cent of unprotected road users (n=30) had complete injury to the spinal cord and sixty per cent (n=26) of these were motor cyclists.

Falls

Falls, both low (less than 1 metre or on the same level) and high (greater than 1 metre) accounted for 34% (n=82) of SCI cases during the 2002–03 reporting period (Table 2).

Low falls, unlike in the 2001–02 reporting period, were more frequent than high falls (43 cases versus 39 cases). They were also proportionally higher at ages greater than 55 years than in younger age groups (Figure 5). Proportionally, when compared to the 2001–02 reporting period, SCI cases from low falls in the elderly during the 2002–03 reporting period increased by 35% (13 cases versus 20 cases). 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 88% of the cases (n=38) due to injury to the cervical spinal segments (Table 3). Paraplegia, although less common, was primarily 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 and incomplete tetraplegia occurred in 70% of the elderly cases (n=14).

Forty-eight per cent of the falls (n=39) were due to high falls. SCI cases from high falls were similar in number across age groups 15–44 and 55–74 years and accounted for 69% (n=27) of the cases. The highest number of cases occurred at age group 45–54 years (68%, n=11).

Thirty-eight per cent (n=15) of high falls occurred while at work (construction site or factory) and working, but not for income, doing handyman jobs around the home (while using a ladder, on a roof, or cutting tree branches).

Falling from a height resulted in paraplegia in 62% of the cases (n=24) and in tetraplegia in the remaining cases (Table 3). In the paraplegic cases, injury to the thoracic spinal segments was more common than in lower spinal segments. Sixty-two per cent of the cases from high falls had an incomplete lesion of the cord.

Water related

Water related SCI accounted for 7% of the cases reported during 2002–03 (Table 2) and 72% (n=13) were under the age of 35 years (Figure 5).

Eighty-nine per cent (n=16) of water related SCI reported had injury to the cervical spinal segments (Table 3), with 56% sustaining complete injury to the cord after diving into pools or the surf.

Twenty-eight per cent of the injuries (n=5) were related to surfing or water skiing and 72% occurred when diving into a pool, river, or the surf.

Sports related

Sports related SCI occurred in 6% of the cases reported during 2002–03 (Table 2) and 87% of the cases (n=13) had injury to the cervical spinal segments (Table 3). Sports injuries occurred primarily in age groups 15–24 and 25–34 years (87%, n=13).

All cases occurring during contact sports (e.g. rugby and other football, n=10) resulted in injury to the cervical spinal segments. Forty percent of these cases resulted in

complete lesion of the cervical spinal cord. Two players were under the age of 19 years and the SCI occurred during a group tackle. All other rugby players injured were adult players and three were injured during a scrum.

The remaining sports related cases reported (n=5) occurred during motor cross racing, skiing or hang gliding. Injuries sustained during these activities were to the cervical and lumbar spinal segments (Table 3).

Other or unspecified causes

Eight per cent of the SCI cases reported during 2002–03 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 2. Most of these injuries occurred in the 25–34 and 45–54 year age group (Figure 5).

Cases that had an external cause of injury reported, sustained injury to their spinal cord from crushing or being hit by an object (9 cases), animal related (1 case) and assault (gunshot and stabbing/cutting (4 cases). All nine cases of injury by crushing or being hit, and the animal related case, occurred while working for income.

Fifty 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 3). The remaining cases had tetraplegia. Thirty-five per cent of the cases had complete lesion of the cord, with half of these cases injured at the cervical spinal segment.

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 244 cases for whom neurological category was reported at acute admission. Clinical information at admission rather than discharge was used in this section to allow data reported during 2002–03 to be compared with the SCI statistical report for financial year 2001–02.

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 (59%, n=143) and to the spinal segments at the thoraco-lumbar junction (T12 and L1, 11%, n=28).

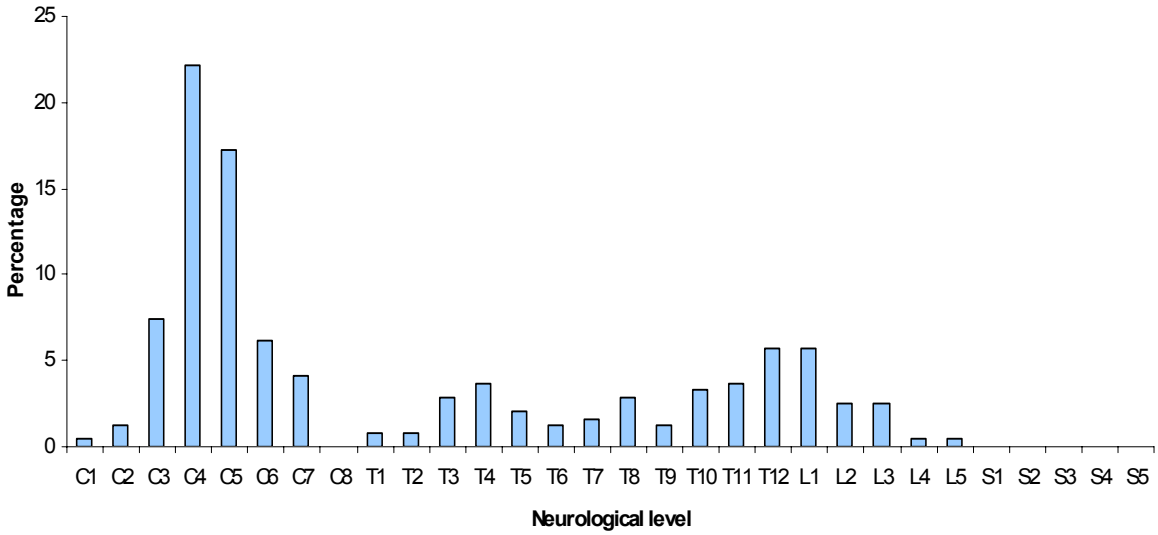
Sixty-seven per cent of the 143 cases with injury to cervical segments had neurological loss (sensory and/or motor function) below the C4 and C5 neurological levels (n=96). This proportion was similar to the equivalent value for financial year 2001–02 (69%, n=88). However, during the 2002–03 reporting 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 2001–02.

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. Fifty-nine per cent (n=143) had an injury at the cervical level. This type of impairment is referred to as *tetraplegia*.

Forty-one per cent (n=101) had an injury at the thoracic or lumbar level (no injury to the sacral levels was reported), 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 lower than the injury reported in 2001–02 (46%, n=107).

The most commonly injured spinal cord segments were the cervical segments, resulting in neurological loss in sensory or motor function below C4 (22%, n=54), C5 (17%, n=42), and C6 (6%, n=15), the thoracic segment with loss below T12 (6%, n=14), and the lumbar segment with loss below L1 (6%, n=14).



Note: One case aged less than 15 years was excluded.

Figure 6: Incidence of SCI from traumatic causes by neurological level at admission, Australia 2002–03 (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 4 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 4: Incidence of SCI from traumatic causes by neurological level (major grouping) and extent of injury at admission; Australia 2002–03 (counts and column percentages)

Extent of injury	Tetraplegia		Paraplegia								Total	
	Cervical		Thoracic		Lumbar		Sacral		All paraplegia			
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Complete	41	29	50	68	6	21	0	0	56	55	97	40
Incomplete	102	71	23	32	22	79	0	0	45	45	147	60
Total	**143**	**100**	**73**	**100**	**28**	**100**	**0**	**0**	**101**	**100**	**244**	**100**

Based on all cases reported (244 cases), the most common neurologic category was incomplete tetraplegia (n=102, 42%), followed by complete paraplegia (n=56, 23%), incomplete paraplegia (n=45, 18%) and complete tetraplegia (n=41, 17%).

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 2002–03, 218 cases with persisting SCI from traumatic causes were discharged from SUs with 37% of the cases (n=80) 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 5.

The average duration of initial care (ADIC) for all cases of SCI was 148 days (about five months), ranging from a high of 265 days (about nine months) for cases of complete tetraplegia to 65 days for a case of incomplete paraplegia involving injury to sacral spinal segments.

In general, cases with tetraplegia had an ADIC 20% greater than cases with paraplegia (159 days, S.D.=133, versus 133 days, S.D.=104). For cases with paraplegia, the longest ADIC was reported for cases with injury to the thoracic spinal segments (extent of injury cases combined). The ADIC for cases with complete injury to the lumbar spinal segments was also high, but cases were fewer in number than cases with complete injury at the thoracic level (44 cases versus 6 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 5: Neurological status of injury to the spinal cord of persisting cases of SCI from traumatic causes discharged during 2002–03 in Australia (counts and average duration of initial care (ADIC))

	Tetraplegia				Paraplegia							
	Cervical		Thoracic		Lumbar		Sacral		All paraplegia		Total	
Extent of injury	Count	ADIC (days)	Count	ADIC (days)	Count	ADIC (days)	Count	ADIC (days)	Count	ADIC (days)	Count	ADIC (days)
Complete	31	265	44	164	6	136	0	.	50	161	81	201
Incomplete	100	126	14	123	22	77	1	65	37	94	137	117
Total	**131**	**159**	**58**	**154**	**28**	**90**	**1**	**65**	**87**	**133**	**218**	**148**

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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 2002–03).

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 2002–03 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.

This report presents information from the Australian Spinal Cord Injury Register (ASCIR) on cases in the year 2002–03. During the year, 245 new cases of SCI from traumatic causes were registered in Australia, an age-adjusted incidence rate of 12.4 cases per million population. The most common clinical outcome of SCI was incomplete tetraplegia (102 cases).

Over 45% of cases were related to road transport, and 7% to water-related activities. Cases also occurred during sport and work. Falling was the most common type of event leading to traumatic SCI at older ages.

The ASCIR is a collaborative activity of the AIHW National Injury Surveillance Unit and all of the specialist spinal units in Australia.