

# FIREWORK INJURIES IN NEW SOUTH WALES, 1992–93 TO 2001–02

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Fireworks have a long tradition of use in Australia, in association with festivities such as New Year's Eve celebrations, Australia Day, and sporting events. However, recognition of the risk of injury posed by fireworks has led to increasing regulation of their sale and use. In order to identify the size and nature of fireworks-related injuries and the characteristics of people who incur these injuries in NSW, this article presents an analysis of firework injuries over the 10-year period 1992–93 to 2001–02. Statewide emergency department data for NSW do not include information on external causes of injury. Accordingly, this analysis was restricted to data describing hospital separations and deaths.

## BACKGROUND

In NSW, current restrictions to the use of fireworks are made under the *Dangerous Goods (General) Regulation 1999*. Toy fireworks (such as sparklers, party poppers, Christmas crackers, and gun caps) are freely available, but display fireworks may only be bought or used by holders of a One Day Display Fireworks Permit or General Permit to Use Display Fireworks (pyrotechnics licence). Permit holders must: be 18 years of age or over; demonstrate a good or sufficient reason for the display;

and have adequate training and experience in the use of fireworks. In 2002, the Regulation was amended to allow WorkCover inspectors and police officers to issue a penalty notice for using or receiving display fireworks without a permit, with penalties set at up to \$550.<sup>1</sup>

## METHODS

Hospital separations due to firework injuries were identified using the NSW Inpatients Statistics Collection (ISC) for the financial years 1992–93 to 2001–02, using the ICD-9-CM external cause code E923.0 (Accident caused by explosive material—Fireworks) for the years up to 1997–98, and the WHO ICD-10-AM external cause code W39 (Discharge of firework) for the later years. Records relating to acute hospital transfer or statistical discharge (change in service category) and records with non-injury principal diagnoses were excluded. To allow aggregation of diagnosis data over the entire 10-year period, principal diagnosis codes for the years up to 1997–98, which were recorded using ICD-9-CM, were mapped to ICD-10-AM codes. Rates were age-standardised using the Australian population at 30 June 1991.

Deaths due to firework injuries were sought using Australian Bureau of Statistics mortality data for the calendar years 1990 to 2000, using the ICD-9 external cause code E923.0 (Accident caused by explosive material—Fireworks) for the years up to 1998 and the

**TABLE 1**

**HOSPITAL SEPARATIONS FOR FIREWORK INJURIES BY YEAR, NSW, 1992–93 TO 2001–02**

Financial year	Hospital separations		
	Number	Crude rate per 100,000 person years	Age-standardised rate per 100,000 person years
1992–93	5	0.08	0.08
1993–94	2	0.03	0.04
1994–95	6	0.10	0.10
1995–96	7	0.11	0.12
1996–97	10	0.16	0.17
1997–98	10	0.16	0.17
1998–99	18	0.28	0.29
1999–00	18	0.28	0.30
2000–01	17	0.26	0.28
2001–02	21	0.32	0.33
<b>Total</b>	<b>114</b>	<b>0.18</b>	<b>0.19</b>

Note: Records were identified using the ICD-9-CM external cause code E923.0 for the years up to 1997–98 and the ICD-10-AM external cause code W39 for the later years. Records relating to acute hospital transfer or statistical discharge and records with non-injury principal diagnoses were excluded. Data for the 2001–02 financial year do not include all private hospital or interstate records. Rates were age-standardised using the Australian population as at 30 June 1991.

Source: NSW Inpatients Statistics Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Department of Health.

WHO ICD-10 external cause code W39 (Discharge of firework) for the later years.

## RESULTS

A total of 114 hospital separations for firework injuries were identified for the 10-year period, giving a crude separation rate of 0.18 per 100,000 population per year and age-standardised separation rate of 0.19 per 100,000 population per year. The number and rate of separations per year is shown in Table 1, and a breakdown by age and sex is given in Table 2.

The number and rate of hospital separations for firework injuries increased over the 10-year period, with 21 separations recorded in 2001–02 (corresponding to an age-standardised rate of 0.33 per 100,000 population), compared with only five in 1992–93 (0.08 per 100,000). Most of those hospitalised (84.2 per cent) were males. More than one-quarter (27.2 per cent) were children aged less than 15 years, and almost two-thirds (64 per cent) were people aged less than 30 years. The majority of people hospitalised for firework injuries (86.8 per cent) were Australian-born.

People hospitalised for firework injuries included residents from every NSW area health service. Age-standardised separation rates per 100,000 population per year were similar in urban (0.18) and rural (0.21) health areas.

Hospital admissions for firework injuries occurred in every month of the year, although December and January combined accounted for around 30 per cent of all admissions. Close to half of admissions (45.6 per cent)

**TABLE 2**

**HOSPITAL SEPARATIONS FOR FIREWORK INJURIES BY AGE GROUP AND GENDER, NSW, 1992–93 TO 2001–02**

Age (years)	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
0–4	2	(1.8)	1	(0.9)	3	(2.6)
5–9	8	(7)	3	(2.6)	11	(9.7)
10–14	17	(14.9)	0	(0)	17	(14.9)
15–19	17	(14.9)	1	(0.9)	18	(15.8)
20–24	13	(11.4)	1	(0.9)	14	(12.3)
25–29	9	(7.9)	1	(0.9)	10	(8.8)
30–34	11	(9.7)	1	(0.9)	12	(10.5)
35–39	6	(5.3)	1	(0.9)	7	(6.1)
40+	13	(11.4)	9	(7.9)	22	(19.3)
<b>Total</b>	<b>96</b>	<b>(84.2)</b>	<b>18</b>	<b>(15.8)</b>	<b>114</b>	<b>(100)</b>

Note: Records were identified using the ICD-9-CM external cause code E923.0 for the years up to 1997–98 and the ICD-10-AM external cause code W39 for the later years. Records relating to acute hospital transfer or statistical discharge and records with non-injury principal diagnoses were excluded. Data for the 2001–02 financial year do not include all private hospital or interstate records.

Source: NSW Inpatients Statistics Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Department of Health.

occurred on Saturdays or Sundays. Small clusters of admissions for firework injuries occurred around New Year's Eve in 1998–1999 (three separations), 1999–2000 (three separations) and 2000–2001 (six separations).

**TABLE 3**

**HOSPITAL SEPARATIONS FOR FIREWORK INJURIES BY BODY SITE AND TYPE OF INJURY, NSW, 1992–93 TO 2001–02**

Body site	Injury type						Total	
	Burn injury		Traumatic amputation		Other injury type		n	(%)
	n	(%)	n	(%)	n	(%)		
Head (not eye)	6	(5.3)	0	(0)	13	(11.4)	19	(16.7)
Eye	2	(1.8)	0	(0)	10	(8.8)	12	(10.5)
Neck and trunk	2	(1.8)	0	(0)	6	(5.3)	8	(7)
Upper extremity (not hand)	2	(1.8)	2	(1.8)	6	(5.3)	10	(8.8)
Hand	17	(14.9)	18	(15.8)	22	(19.3)	57	(50)
Lower extremity	2	(1.8)	0	(0)	5	(4.4)	7	(6.1)
Multiple sites	1	(0.9)	0	(0)	0	(0)	1	(0.9)
<b>Total</b>	<b>32</b>	<b>(28.1)</b>	<b>20</b>	<b>(17.5)</b>	<b>62</b>	<b>(54.4)</b>	<b>114</b>	<b>(100)</b>

Note: Records were identified using the ICD-9-CM external cause code E923.0 for the years up to 1997–98 and the ICD-10-AM external cause code W39 for the later years. Records relating to acute hospital transfer or statistical discharge and records with non-injury principal diagnoses were excluded. Data for the 2001–02 financial year do not include all private hospital or interstate records.

Source: NSW Inpatients Statistics Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Department of Health.

The bodily locations of injuries and type of injury are shown in Table 3. The most common site of injuries was the upper extremity (58.8 per cent) and most of these (50 per cent of all injuries) were to the hand. The head was the site of more than one-quarter (27.2 per cent) of injuries, with close to half of these (10.5 per cent of all injuries) being eye injuries. The eye injuries included two instances each of: ocular lacerations and rupture with prolapse or loss of intraocular tissue; and penetrating wounds of the eyeball.

Just over one-quarter of separations (32; 28.1 per cent) were for burn injuries, including six full-thickness burns and 19 partial thickness burns with blistering and epidermal loss.

Almost one in five separations (20; 17.5 per cent) were for traumatic amputation of part of the upper extremity. These included four complete or partial amputations of thumbs, 14 complete or partial amputations of other single fingers, one traumatic amputation at a level between the elbow and wrist and one amputation of the upper limb at an unspecified level. Other injuries included a variety of open wounds; fractures of nasal bones, mandible, ribs and bones of the arm, wrist and hand; traumatic pneumothorax; and traumatic haemothorax.

For separations recorded in the period 1999–00 to 2001–02, the ICD-10-AM external cause code could include digits to specify the place of occurrence of the injury and the activity in which the victim was engaged at the time of injury. However, of these 56 separations, only nine (16.1 per cent) specified a place of occurrence, and only 20 (35.7 per cent) specified an activity, with half of the latter specifying the activity as 'other'.

No deaths due to firework injury were recorded in the Australian Bureau of Statistics mortality data for the calendar years 1990 to 2000.

## DISCUSSION

This analysis shows that firework injury is relatively uncommon in NSW, and that no deaths from this cause have been recorded in the most recent 10 years. However, important features of firework injuries include the high proportion of serious and disabling injuries, and the higher risk of injury among children and young people, especially males.

Unfortunately, few recent data for firework injuries from other Australian states are available for comparison. A Victorian study of hospital data for the period 1987–88 to 1995–96 found only 16 separations for firework injury over the 10-year period (giving a rate of approximately 0.04 per 100,000 population).<sup>2</sup> However, a more recent Victorian study reported 20 admissions for these injuries, and 122 emergency department presentations, to 28 major

hospitals over the five-year period October 1995 to December 2000.<sup>3</sup>

The rate of hospital separations for firework injuries in NSW increased fourfold over the 10-year period examined, from an age-standardised rate of 0.08 per 100,000 population in 1992–93 to 0.33 per 100,000 in 2001–02. This increase may well reflect improvements in recording of these injuries in hospital data—the introduction of ICD-10-AM in 1998–99 coincided with a big jump in separations—rather than increasing incidence. Nonetheless, it indicates that there is still substantial scope for preventing these injuries, despite the introduction of more stringent regulation in NSW in 1999 and 2002.

The scope for prevention extends also to less serious firework injuries, which were not identified in this analysis. Only about one in five presentations to emergency departments for firework injuries results in admission to hospital.<sup>3</sup> Therefore, the number of presentations to emergency departments in NSW for these injuries is likely to be in the order of 100 per year, with a further (unknown) number of injuries treated in general practice.

The data used here contained no information about the type of fireworks that caused injury. The recent Victorian study of firework injuries concluded that around one-third were associated with legal fireworks (sparklers, party poppers, and public firework displays), while the remaining two-thirds were associated with fireworks that are not on general sale in that state.<sup>3</sup> The variation among Australian states and territories in regulations restricting sale and use of fireworks acts to limit the effectiveness of regulation. Indeed, serious hand injuries have been reported in association with the explosion of hand-held crackers that were purchased in the ACT and brought into NSW for use.<sup>4</sup>

Disappointingly, the data used here also contained only very limited information on the place that injuries occurred, and the activity that victims were engaged in at the time of injury. Although the ICD-10-AM coding system theoretically enables capture of this information in the external cause code for injuries, it is only rarely recorded. This presumably relates to lack of detail in the clinical record from which the external cause is coded.

Important strategies for reduction of firework injuries include national harmonisation of regulations regarding sale and use of fireworks, active enforcement of these regulations, and increasing community awareness of the degree of risk associated with illegal fireworks.<sup>3,4</sup> Improved recording of firework injuries in hospital data, including information regarding the type of firework involved, and the circumstances of the injury, could provide a stronger information base on which to build and monitor prevention strategies in NSW.

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## AN INNOVATIVE SEXUAL HEALTH MEDICATION ORDER SYSTEM FOR THE FAR WEST AREA HEALTH SERVICE

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This article describes the development of sexual health services in the Far West Area Health Service, and the contribution of a medication order system that has been established between the Sydney Sexual Health Centre (SSHC) and the Far West Area Sexual Health Service (FWASHS).

The management of sexually transmissible infections (STIs) in rural and remote areas is difficult because of issues of access to health care and treatment,<sup>1,2,3</sup> confidentiality,<sup>4,5</sup> community attitudes,<sup>6,7</sup> and the transient nature of some sectors of the population. Many models of care—such as syndromic management (treatment based on patterns of symptoms and signs rather than on specific aetiologic diagnoses)—have met with limited success due to inaccurate diagnosis and treatment and poor patient follow-up.<sup>8,9</sup> The prevalence of STIs in rural and remote populations of Australia is not completely understood; however, evidence exists demonstrating higher rates of STIs among the indigenous population.<sup>2,10,11</sup>

The Far West Area Health Service (FWAHS) provides health care in rural and remote NSW across an area equivalent to one-third of the landmass of NSW, and has a population of 47,563.<sup>12</sup> Thirty-three per cent of these residents are aged 15–40 years, and 13 per cent identify as indigenous Australians. The FWAHS has the largest percentage indigenous population, compared with the other area health services in NSW, which reflects its remoteness.

### SEXUAL HEALTH SERVICES IN FAR WESTERN NSW

#### Pre-1998

Prior to the creation of two area health services for western NSW in 1998, the Far West Area Health Service and the

Macquarie Area Health Service, sexual health services to far western and north western NSW were provided by a centralised model based in Dubbo. Outreach services to several sites, including Broken Hill, were provided by medical and nursing staff. Visits varied in frequency from monthly to three-monthly, resulting in a restricted service. Between visits, communication between local primary care providers and the service was limited. In addition, there was also a full-time Aboriginal sexual health worker based at Walgett, and an Aboriginal health worker based at Dubbo who had a part-time role in sexual health. Both these workers were employed by the community-controlled health services.

#### A new sexual health service for the Far West Area Health Service

Since 1999, four sexual health nurse specialists (SHNs) located at four sites in the FWAHS (Broken Hill, Bourke, Lightning Ridge, and Dareton) have provided the new foundations of a regionalised sexual health service. This service is supported by medical staff from the Sydney Sexual Health Centre (SSHC), a large urban sexual health centre. Specialist medical officers visit each site on a monthly basis and provide telephone support to the nurses between visits. The SHNs work in collaboration with four Aboriginal sexual health workers, who are employed by the community-controlled health services at the same sites.<sup>13</sup> The SHNs link closely with the general practitioners in the towns, in managing sexual health clients. Some of the SHNs fulfil roles other than sexual health care, assisting with other primary health care roles and covering staff absences.

It was anticipated that the four SHNs would make most of the diagnoses of STIs in the FWAHS through their STI screening activities; however, as nurses in NSW cannot prescribe medication, immediate treatment of STIs was hindered by the infrequent visits of the medical staff.