HAZARD

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Victorian Injury Surveillance Unit (VISU)

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Monash University
Accident Research Centre

VISU
Victorian Injury Surveillance Unit

This, and the next, issue of Hazard is focused on major groups of consumer products that are related to injury. This edition highlights the frequency of hospital treated playground equipment injuries among children and includes recommendations for prevention.

Consumer product-related injury (1): Playground equipment and trampolines

Angela Clapperton and Erin Cassell

Summary

- Playground equipment (including trampolines) is linked to more injury hospital admissions than any other grouping of consumer products used by children (aged 0-14 years).
- There were at least 7,862 hospital-treated playground equipment injuries over the two-year period July 2002-June 2004 (3,260 hospital admissions and at least 4,602 Emergency Department presentations).
- Playground equipment injuries most commonly occur in children aged 0-14 years (predominantly 5-9 year olds).
- Reliable location data were only available for E.D. presentations. Analysis showed that the three major locations for injury were: schools, day care centres and public administration areas (37%), home (32%) and places for recreation – public and amusement parks (20%).
- Nearly 90% of playground equipment injuries were falls (n=6,910).
- Trend data indicate that the playground equipment fall injury admission rate for children increased by 20% over the decade to 2003/4.
- Most hospital-treated playground equipment fall injuries involved climbing apparatus/monkey bars (36%) and trampolines (23%). Fall injuries involving slides, swings and flying foxes are also common.
- Arm fractures from falls are the most common playground injury accounting for 51% of hospital-treated playground equipment injuries over the study period.

Announcement

Name change: from VISAR to VISU

In 2005 responsibility for funding VISAR shifted from VicHealth to the Department of Human Services. The DHS core grant does not include funding for an applied research function. To reflect this change and to simplify our acronym we decided to change our name to Victorian Injury Surveillance Unit (VISU pronounced "vissoo"). Apart from this change it is business as usual in 2006.

Erin Cassell
Director, VISU

Analytic studies conducted in Victoria and elsewhere have shown strong associations between playground fall injury (and arm fracture) and equipment-related risk factors (height of the equipment; the height of the fall; and inadequate hand/guardrails) and surface-related risk factors (surface impact attenuation; the use of inappropriate surface material; surfacing not meeting recommended standards; and inappropriate undersurfacing substrate material).

Australian playground safety standards are framed to minimise the risk of potentially fatal head (brain) injury and recommendations on maximum playground equipment height (2.5m) and surface depth (20cm) are based on critical head impact criteria (HIC) derived from laboratory studies. When framing the new (2004) playground equipment standard, the Standards Committee decided to maintain the focus on head injury prevention in determining the general maximum free height of fall requirement for playground equipment (which remained at 2.5m), but reduced the maximum equipment height requirement for supervised early childhood equipment to 1.5m and for 'upper body' equipment (e.g. monkey bars) to 2.2m.

The current standard for trampolines (AS 4983 - 2003 Trampolines) and the revised Standard that is scheduled to be released in March 2006 concentrate on safety aspects such as padding design, protection of sharp edges, safety marking and consumer education. To comply with the standards manufacturers and suppliers are required to pad the entire top surface of the frame and suspension system, provide instructional material for the assembly, maintenance and safe use of trampolines, and include suitable product markings.

The full impact of the revised voluntary standards for playground equipment and trampolines and related educational initiatives on child injury rates should become apparent over the next five years.

Recommendations:

- When planning playgrounds and purchasing playground equipment, especially climbing apparatus/ monkey bars, consumers (government and private) should consider research evidence that shows that the critical free fall height for arm fractures from playground equipment is 1.5m.

- Government authorities must find solutions that make the provision and maintenance of Standards-compliant surfacing under playground equipment affordable in all public, pre-school and school playgrounds. Parents must be educated, preferably at point-of-sale, about the relevance of all safety requirements in the Australian Standards to playground equipment and trampolines installed in private homes.

- Current injury surveillance systems inadequately identify and describe the contribution of consumer products to injury and consideration should be given to the establishment of a centralised consumer product injury surveillance system in Victoria and nationally to provide an early warning system for emerging hazards, to monitor the safety of existing products and ascertain the effectiveness of interventions.

Introduction

Consumer products are defined in accordance with the European Economic Community General Product Safety Directive (COM(90)259) as:

"any manufactured, processed or agricultural product supplied in the course of business and likely to be used by consumers. It applies irrespective of whether or not the product is new, used or reconditioned." (Page et al., 2003).

Because individuals in industrialised countries live in an essentially man-made environment, there is a significant relationship between consumer products and injury. Quantification is difficult because available hospital-based injury surveillance data do not consistently identify the mechanisms and circumstances of injury in sufficient detail to enable accurate estimation of product involvement and the level of involvement. An estimate made in 1995, based on Australian and overseas data, indicated that 70 percent of all unintentional hospital-treated injuries are associated with consumer products and at least 15 percent of these are directly related to a design failure or product malfunction (Watson & Ozanne-Smith, 1995). If these proportions are applied to current Victorian hospital-treated injury frequency data then there are over 180,000 hospital-treated consumer product-related injuries annually, with consumer products directly causing almost 40,000 of these injuries.

This edition of Hazard focuses on a group of consumer products that is significantly related to injury in children — playground equipment (including trampolines). Playground equipment is linked to more injury hospital admissions than any other grouping of consumer products used by children (aged 0-14 years). Falls and other injuries from playground equipment accounted for 12% of all child injury admissions and at least 4% of all child injury E.D. presentations (non-admissions) in Victoria over the two-year period 2002/4.

Products may be involved in injury causation at a number of levels: physical failure (design or manufacturing faults and lack of maintenance); inadequate design (for normal use, for use by target age or ability groups, for foreseeable mishandling or misuse and for protection of bystanders); inadequate instructions/ safety warnings; and in ways not influenced by any shortcomings of the product due to misuse beyond the influence of the supplier and unforseen human and environmental factors (ACA, 1989). It is not possible to identify the

level of causation of the product to the playground equipment injuries included in this study, as data recorded on current Victorian hospital-based injury surveillance systems is inadequate for this task. This highlights the need for special or enhanced injury data systems to service the area of consumer product safety.

Method

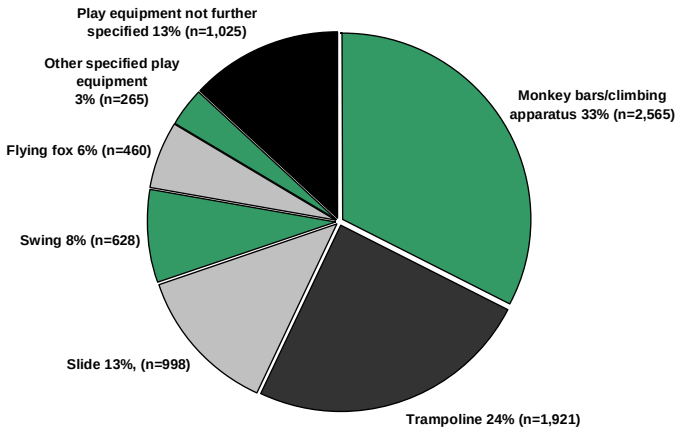
Playground equipment injury cases for the period 2002-4 were extracted from two datasets of hospital-treated injury held by VISU: the Victorian Admitted Episodes Dataset (VAED) which records all Victorian public and private hospital admissions; and the Victorian Emergency Minimum Dataset (VEMD) which included presentations data from 28 of the 35 Victorian public hospital emergency departments for 2002/3 and all 37 hospitals with 24 hour Emergency Departments from the beginning of 2004. Admissions were excluded from the VEMD to avoid double counting. Admissions data were also selected for the decade 1994/5 to 2003/4 for trend analysis. The method for extracting data is described in more detail in Box 1 and relevant data issues regarding completeness and quality are discussed within the report and in Box 2.

Inclusion/exclusion criteria: For the purposes of this study playground equipment includes any equipment and structures (including trampolines) on which children can play outdoors or indoors, excluding toys. Items of playground equipment located in backyards of private homes are included in analyses.

Results

There were at least 7,862 hospital-treated playground equipment injuries in Victoria over the two-year period July 2002 to June 2004 (3,260 hospital admissions and 4,602 Emergency Department presentations).

Hospital reated all-cause playground equipment injury: equipment items involved (July 2002-June 2004) **Figure 1**



Source: Fall injury cases - VAED (admissions) and VEMD (non-admissions). All other injury causes- VEMD only (admissions and non-admissions)

These numbers are underestimates because of a range of data quality and completeness issues pertaining to both the Victorian Admitted Episodes Dataset (VAED) and the Victorian Emergency Minimum Dataset (VEMD) (see Box 2). A very high proportion of these injuries occurred in children aged 0-14 years (96%, n=7,527). Figure 1 shows the breakdown of equipment items involved in all hospital-treated playground injuries.

Fall injury from playground equipment

Falls are the major cause of hospital-treated playground equipment injury. In total there were 6,910 playground equipment fall injuries recorded on hospital injury databases over the two-year period July 2002 to June 2004, 3,177 hospital admissions (recorded on the VAED) and 3,733 Emergency Department presentations (recorded on the VEMD). Available data indicate that falls account for 93% of admissions and 81% of E.D. presentations for playground equipment injury.

Yearly trend

Figure 2 shows the yearly trend in admission rates for playground equipment falls over the decade July 1994 to June 2004. The trend is shown separately for children aged 5-9 years, children aged 0-14 years and adults aged 15 and older. It is evident that children, particularly those aged 5-9 years, account for the majority of playground equipment fall admissions.

Analyses compared the 3-year average admission rate at the start of the decade to the 3-year average at the end:

- The all-ages admission rate increased by 12% from 28.6 admissions per 100,000 in the period 1994/7 to 32.2 admissions per 100,000 in the period 2001/4.
- The child (0-14 years) admission rate increased by 20% from 131.3/100,000 in the period 1994/7 to 158.1/100,000 in the period 2001/4.
- The child (5-9 years) admission rate increased by 19% from 262.4/100,000 in the period 1994/7 to 313.1/100,000 in the period 2001/4.

- The adult admission rate decreased by 10% from 1.6/100,000 in the period 1994/7 to 1.4/100,000 in the period 2001/4.

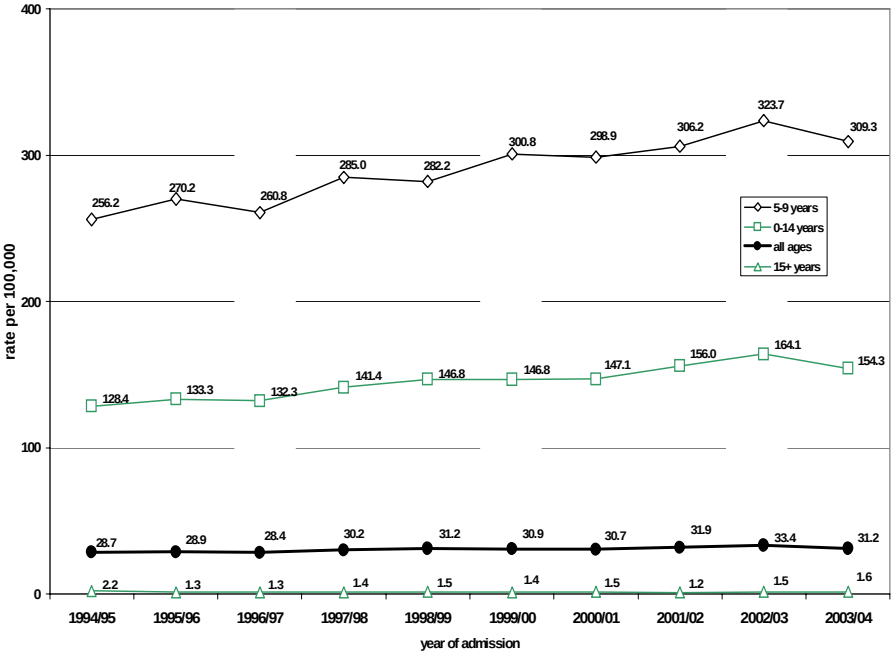
Figure 3 shows the yearly trend in child and all-ages playground equipment fall injury admission rates for arm fracture and head injury over the decade July 1994 to June 2004. Trend lines are shown for all ages and for children aged 0-14 years.

Analysis showed the following:

- The all-ages arm fracture admission rate increased by 13% from 21.8 admissions per 100,000 in the period 1994/7 to 24.5 admissions per 100,000 in the period 2001/4.
- The all-ages head injury admission rate decreased by 9% from 3.5 admissions per 100,000 in the period 1994/7 to 3.2 admissions per 100,000 in the period 2001/4.
- The child arm fracture admission rate increased by 20% from 103.0/100,000 in the period 1994/7 to 123.6/100,000 in the period 2001/4.
- The child head injury admission rate decreased by 4% from 15.9/100,000 in the period 1994/7 to 15.3/100,000 in the period 2001/4.

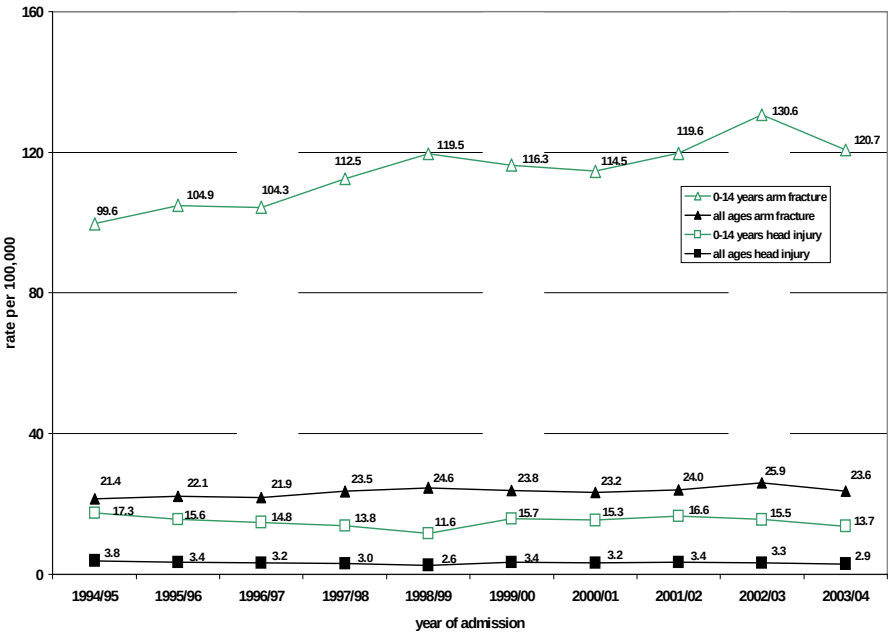
Reliable location of injury data were only available from the VEMD, due to the lack of a specific code for public parks in the VAED and generally poor reporting of location on that database. However, not all hospitals with 24-hour emergency services contributed data to the VEMD over the study period so population playground equipment injury rates cannot be calculated. Figure 4 shows the yearly trend in the frequency (number) of E.D. presentations (non-admissions) for play equipment injury between 1998/9 and 2003/4. The trend was consistently upward in all three major locations for play equipment injury — schools/day care centres/public administration areas (84% increase), places of recreation (83% increase) and the home (75% increase).

Yearly trend in child and adult playground equipment fall injury admission rates (July 1994-June 2004) **Figure 2**



Source: VAED July 1994-June 2004, all public and private hospitals

Yearly trend in child and adult playground equipment fall injury admission rates for arm fracture and head injury (July 1994-June 2004) **Figure 3**



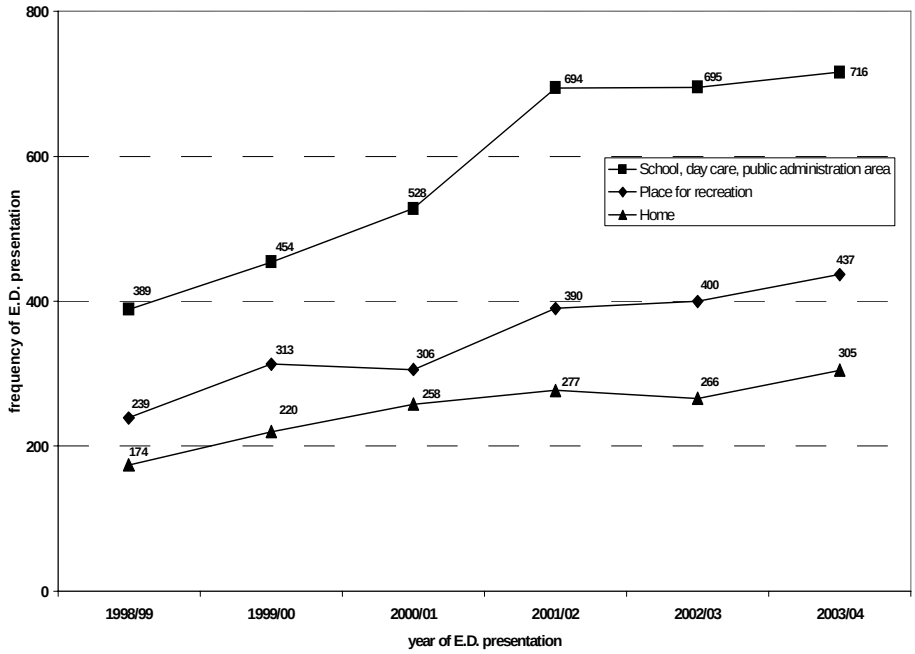
Source: VAED July 1994-June 2004, all public and private hospitals

Pattern of injury

Table 1 summarises the frequency and pattern of hospital admissions and E.D. presentations (non-admissions) for playground equipment fall injuries including data on the equipment on which the injury occurred.

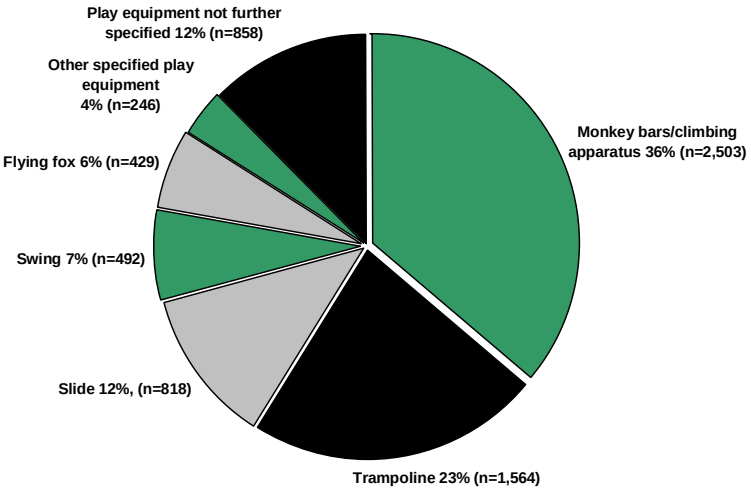
- Overall, males are only slightly overrepresented (51%). The gender difference is more pronounced for admissions (males 54%, females 46%)
- Most playground equipment fall injuries occurred in children aged 0-14 years (96%). The peak age groups for fall injury were 5-9 year olds (62% overall) and 0-4 year olds (19%). The mean age for admissions was 7.7 years compared with 7.3 years for E.D. presentations.
- The upper extremity was the most common body site injured accounting for 80% of admissions and 60% of presentations.
- Head, face and neck injuries were more frequent in E.D. presentations than admissions (17% cf. 11%).
- Fractures were the most common injury accounting for 85% of admissions and 47% of E.D. presentations. Dislocations, sprains and strains were common among E.D. presentations (21%).
- The most frequently occurring specific injury was forearm/elbow fracture accounting for 50% of all playground equipment fall injuries (56% of admissions and 22% of presentations).
- Reliable location data were only available for E.D. presentations. Analysis showed that the three major locations for injury were: schools, day care centres and public administration area (37%), home (32%) and place for recreation – public and amusement parks (20%).

Yearly trend in playground equipment injury presentations by location (July 1998-June 2004) **Figure 4**



Source: VEMD - presentations (non-admissions)

Hospital treated playground equipment fall injury: equipment items (July 2002-June 2004) **Figure 5**



Source: VAED - admissions and VEMD - presentations (non-admissions)

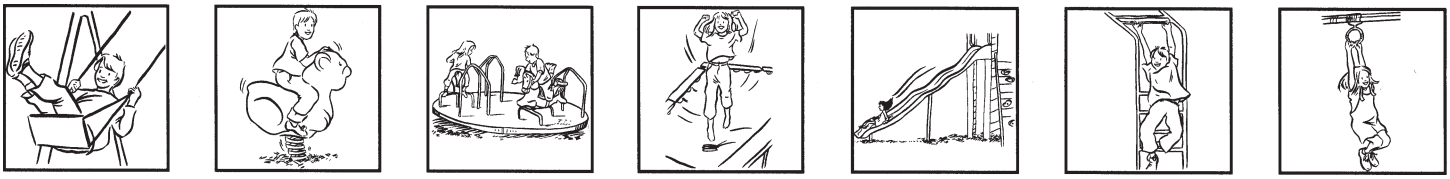
Frequency and pattern of hospital-treated playground equipment fall injury (July 2002-June 2004)

Table 1

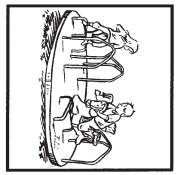
	Playground equipment fall hospital admissions (n=3,177)		Playground equipment fall E.D. presentations (non-admissions) (n=3,733)		Playground equipment fall hospital-treated injuries (n=6,910)	
	Frequency	***Proportion (%)***	**Frequency**	***Proportion (%)***	**Frequency**	***Proportion (%)***
Gender						
Male	1,711	*53.9*	1,783	*47.8*	3,494	*50.6*
Female	1,466	*46.1*	1,950	*52.2*	3,416	*49.4*
Age group						
0-4 years	532	*16.7*	807	*21.6*	1,339	*19.4*
5-9 years	2,045	*64.4*	2,230	*59.7*	4,275	*61.9*
10-14 years	477	*15.0*	569	*15.2*	1,046	*15.1*
15-24 years	59	*1.9*	72	*1.9*	131	*1.9*
25+ years	64	*2.0*	55	*1.5*	119	*1.7*
Mean age of injured persons	*7.7 years*		*7.3 years*		*7.5 years*	
Equipment						
Monkey bars/climbing apparatus	1,258	*39.6*	1,245	*33.4*	2,503	*36.2*
Trampoline	605	*19.0*	959	*25.7*	1,564	*22.6*
Slide	368	*11.6*	450	*12.1*	818	*11.8*
Swing	212	*6.7*	280	*7.5*	492	*7.1*
Flying fox	219	*6.9*	210	*5.6*	429	*6.2*
Seesaw	22	*<1*	18	*<1*	40	*<1*
Tree house/playhouse	29	*<1*	13	*<1*	42	*<1*
Other specified playground equipment	164	*5.2*	N/A	*N/A*	164	*2.4*
Playground equipment NFS	300	*9.4*	558	*14.9*	858	*12.4*
Body site injured						
Head/face/neck	361	*11.4*	645	*17.3*	1,006	*14.6*
Trunk	66	*2.1*	159	*4.3*	225	*3.3*
Upper extremity	2,481	*78.1*	2,274	*60.9*	4,755	*68.8*
Lower extremity	256	*8.1*	434	*11.6*	690	*10.0*
Other specified body region	0	*0*	152	*4.1*	152	*2.2*
Unspecified body region	13	*<1*	69	*1.8*	82	*1.2*
Nature of injury						
Fracture	2,710	*85.3*	1,753	*47.0*	4,463	*64.6*
Dislocation/sprain or strain	56	*1.8*	767	*20.5*	823	*11.9*
Open wound	132	*4.2*	341	*9.1*	473	*6.8*
Superficial	25	*<1*	295	*7.9*	320	*4.6*
Injury to muscle or tendon	4	*<1*	113	*3.0*	117	*1.7*
Intracranial	82	*2.6*	99	*2.7*	181	*2.6*
Other specified nature of injury	28	*<1*	187	*5.0*	215	*3.1*
Unspecified nature of injury	140	*4.4*	178	*4.8*	318	*4.6*
Location[(1)]						
Home	N/A		1,197	*32.1*	N/A	
School/day care/pub admin area	N/A		1,380	*37.0*	N/A	
Place for recreation	N/A		737	*19.7*	N/A	
Sports and athletics areas	N/A		66	*1.8*	N/A	
Other specified places	N/A		187	*5.0*	N/A	
Unspecified places	N/A		166	*4.4*	N/A	
Length of stay						
Less than 2 days	2,618	*82.4*	N/A		N/A	
2-7 days	529	*16.7*	N/A		N/A	
8-30 days	28	*<1*	N/A		N/A	
31+ days	2	*<1*	N/A		N/A	

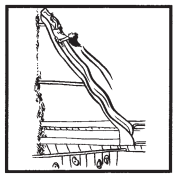
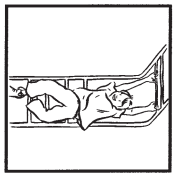
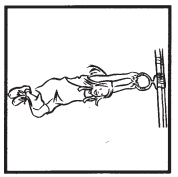
Source: VAED - admissions and VEMD - presentations (non-admissions)

Note: (1) Due to the lack of a specific code for public parks in the VAED and generally poor reporting of location on that database location analysis is included for VEMD data only.







Frequency and pattern of fall injury for specific types of playground equipment (July 2002-June 2004)

Table 2

	Climbing apparatus/ monkey bars				Trampolines				Slides				Swings				Flying fox			
	Admissions (n=1,258)		Presentations/non-admissions (n=1,245)		Admissions (n=605)		Presentations/non-admissions (n=959)		Admissions (n=368)		Presentations/non-admissions (n=450)		Admissions (n=212)		Presentations/non-admissions (n=280)		Admissions (n=219)		Presentations/non-admissions (n=210)	
Gender																				
Male	575	*45.7*	475	*38.2*	337	*55.7*	509	*53.1*	237	*64.4*	239	*53.1*	116	*54.7*	143	*51.1*	117	*53.4*	95	*45.2*
Female	683	*54.3*	770	*61.8*	268	*44.3*	450	*46.9*	131	*35.6*	211	*46.9*	96	*45.3*	137	*48.9*	102	*46.6*	115	*54.8*
Age group																				
0-4 years	90	*7.2*	70	*5.6*	121	*20.0*	253	*26.4*	124	*33.7*	190	*42.2*	54	*25.5*	98	*35.0*	8	*3.7*	14	*6.7*
5-9 years	1,028	*81.7*	1,018	*81.8*	297	*49.1*	421	*43.9*	196	*53.3*	202	*44.9*	84	*39.6*	126	*45.0*	155	*70.8*	157	*74.8*
10-14 years	131	*10.4*	148	*11.9*	143	*23.6*	211	*22.0*	34	*9.2*	44	*9.8*	49	*23.1*	43	*15.4*	41	*18.7*	32	*15.2*
15-24 years	7	*<1*	1	*<1*	29	*4.8*	49	*5.1*	2	*<1*	6	*1.3*	12	*5.7*	7	*2.5*	4	*1.8*	2	*1.0*
25+ years	2	*<1*	5	*<1*	15	*2.5*	24	*2.5*	12	*3.3*	8	*1.8*	13	*6.1*	5	*1.8*	11	*5.0*	5	*2.4*
Missing	0	*0.0*	3	*<1*	0	*0.0*	1	*<1*	0	*0.0*	0	*0.0*	0	*0.0*	1	*<1*	0	*0.0*	0	*0.0*
Mean age of injured person	*7.0 yrs*		*7.3 yrs*		*8.5 yrs*		*8.2 yrs*		*6.9 yrs*		*6.2 yrs*		*9.8 yrs*		*7.0 yrs*		*9.7 yrs*		*8.2 yrs*	
Body site injured																				
Head/face/neck	79	*6.3*	108	*8.7*	84	*13.9*	198	*20.6*	48	*13.0*	89	*19.8*	45	*21.2*	68	*24.3*	17	*7.8*	28	*13.3*
Trunk	22	*1.7*	52	*4.2*	13	*2.1*	37	*3.9*	8	*2.2*	18	*4.0*	6	*2.8*	10	*3.6*	1	*<1*	14	*6.7*
Upper extremity	1,107	*88.0*	973	*78.2*	417	*68.9*	448	*46.7*	275	*74.7*	257	*57.1*	134	*63.2*	151	*53.9*	182	*83.1*	145	*69.0*
Lower extremity	45	*3.6*	54	*4.3*	88	*14.5*	211	*22.0*	35	*9.5*	60	*13.3*	27	*12.7*	26	*9.3*	19	*8.7*	6	*2.9*
Other specified body site	0	*0.0*	42	*3.4*	0	*0.0*	52	*5.4*	0	*0.0*	21	*4.7*	0	*0.0*	24	*8.6*	0	*0.0*	14	*6.7*
Unspecified body site	5	*<1*	16	*1.3*	3	*<1*	13	*1.4*	2	*<1*	5	*1.1*	0	*0.0*	1	*<1*	0	*0.0*	3	*1.4*
Nature of injury																				
Fracture	1,131	*89.9*	752	*60.4*	488	*80.7*	335	*34.9*	316	*85.9*	211	*46.9*	160	*75.5*	105	*37.5*	198	*90.4*	110	*52.4*
Open wound	31	*2.5*	46	*3.7*	26	*4.3*	120	*12.5*	15	*4.1*	43	*9.6*	15	*7.1*	34	*12.1*	4	*1.8*	10	*4.8*
Superficial	9	*<1*	72	*5.8*	5	*<1*	73	*7.6*	3	*<1*	48	*10.7*	2	*<1*	25	*8.9*	1	*<1*	17	*8.1*
Intracranial	23	*1.8*	18	*1.4*	8	*1.3*	28	*2.9*	12	*3.3*	11	*2.4*	17	*8.0*	13	*4.6*	4	*1.8*	9	*4.3*
Dislocation/sprain and strain	15	*1.2*	216	*17.3*	25	*4.1*	261	*27.2*	1	*<1*	83	*18.4*	4	*1.9*	59	*21.1*	4	*1.8*	38	*18.1*
Other specified nature of injury	16	*1.3*	104	*8.4*	16	*2.6*	95	*9.9*	10	*2.7*	34	*7.6*	7	*3.3*	25	*8.9*	3	*1.4*	18	*8.6*
Unspecified nature of injury	33	*2.6*	37	*3.0*	37	*6.1*	47	*4.9*	11	*3.0*	20	*4.4*	7	*3.3*	19	*6.8*	5	*2.3*	8	*3.8*
Location [(1)]																				
Home			70	*5.6*			798	*83.2*			107	*23.8*			131	*46.8*			13	*6.2*
School/day care/pub admin area			887	*71.2*			11	*1.1*			116	*25.8*			24	*8.6*			95	*45.2*
Place for recreation			200	*16.1*			38	*4.0*			165	*36.7*			78	*27.8*			78	*37.1*
Sports and athletics areas			23	*1.8*			14	*1.5*			9	*2.0*			8	*2.9*			6	*2.9*
Other specified area			31	*2.5*			32	*3.3*			33	*7.3*			26	*9.3*			8	*3.8*
Unspecified area			34	*2.7*			66	*6.9*			20	*4.4*			13	*4.6*			10	*4.8*
Length of stay																				
Less than 2 days	1070	*85.1*	N/A		476	*78.7*	N/A		290	*78.8*	N/A		163	*76.9*	N/A		188	*85.8*	N/A	
2-7 days	177	*14.1*	N/A		124	*20.5*	N/A		74	*20.1*	N/A		44	*20.8*	N/A		29	*13.2*	N/A	
8-30 days	10	*<1*	N/A		5	*<1*	N/A		4	*1.1*	N/A		4	*1.9*	N/A		2	*<1*	N/A	
31+ days	1	*<1*	N/A		0	*0.0*	N/A		0	*0.0*	N/A		1	*<1*	N/A		0	*0.0*	N/A	
Mean length of stay	*1.0 days*		N/A		*1.1 days*		N/A		*1.1 days*		N/A		*1.3 days*		N/A		*1.0 days*		N/A	

Source: VAED - admissions and VEMD - presentations (non-admissions)

Note: (1) Due to the lack of a specific code for public parks in the VAED and generally poor reporting of location on that database location analysis is included for VEMD data only.

Equipment type

The types of playground equipment most frequently associated with fall injuries were climbing apparatus/monkey bars (36%), trampolines (23%), slides (12%), swings (7%) and flying foxes (6%) (Figure 5). Ranking on frequency was consistent for admissions and E.D. presentations (non-admissions) (Table 1). Table 2 summarises and compares the frequency and pattern of fall injury from these different equipment types.

Climbing apparatus (mostly monkey bars)

(n=2,503 hospital-treated injuries, average annual frequency n=1252)

Over the two-year period July 2002-June 2004 there were 1,258 admissions and 1,245 E.D. presentations (non-admissions) to Victorian hospitals for fall injuries related to climbing apparatus (mostly monkey bars). Table 2 shows the pattern of injury in admissions and E.D. presentations (non-admissions) separately. The pattern is similar at both levels of injury severity except that females are more likely than males to present to the E.D. with monkey bar-related injuries (F62% cf. M38%) but the gender difference is not as apparent in admitted cases (F54% cf. M46%). Fractures are more prominent among hospital admissions than E.D. presentations (90% cf. 60%).

For most of the following analyses VAED admissions and VEMD E.D. presentations data were aggregated. Only VEMD data is presented for location.

Frequency, age and gender

Females were over-represented in hospital-treated monkey bar related falls (58%, n=1,453 hospital-treated injury cases). This was the only type of equipment for which female cases outnumbered male cases. Monkey-bar related fall injuries occurred mostly in the 5-9 year age group (82%, n=2,046).

Location

Most monkey-bar fall injuries occurred in schools, day care and public administration areas (71%, n=887) followed by places for recreation (16%, n=200) and the home (6%, n=70).

Injury type and body site

Upper extremity fractures accounted for 72% of all hospital-treated monkey bar fall injuries (n=1,089), the majority of which are elbow and forearm fractures (n=1,202, 66% of upper extremity fractures). Shoulder and upper arm fractures (n=312) and wrist and hand fractures (n=295) account for a further 17% and 16% of upper extremity fractures, respectively. An additional 7% of all hospital-treated monkey bar fall injuries (n=169) were sprains and strains of the upper extremity (mostly elbow and wrist).

Admitted cases: Length of stay

Eighty-five percent of admitted injured persons (n=1,070) stayed in hospital for less than two days. The average length of stay was one day. The following are descriptions of injuries and treatment for a sample of the most serious cases (length of stay greater than 5 days) constructed from coded data on the VAED:

- *Female aged 9 years, sustained fractures of the lumbar vertebra at L2 and L3 level after falling from some kind of climbing apparatus at a school playground. These injuries required a hospital stay of 16 days and procedures including traction.*
- *Female aged 5 years, sustained a supracondylar fracture of the humerus after falling from climbing apparatus at a school playground. This injury required a closed reduction of the fracture with internal fixation, and a 17-day stay in hospital.*
- *Male aged 7 years, sustained a massive parenchymal disruption of the spleen after falling from climbing apparatus in an unspecified location. This injury required an 11-day stay in hospital.*
- *Female aged 10 years, sustained a fracture of the trochanteric section of femur after falling from some kind of climbing apparatus at a school playground. These injuries required a hospital stay of 39 days and procedures including traction.*
- *Female aged 11 years, sustained fractures of the base of the skull, facial bones (including the nose) and open wounds of the head after falling from climbing apparatus in an unspecified location. These injuries required surgery including the reduction of the fracture of nasal bone and excision procedures on other musculoskeletal sites. The injuries required an 11-day stay in hospital.*

Contributory factors/circumstances of injury

VEMD case narratives provide sparse additional information on the circumstances of the injury other than naming monkey bars as the apparatus involved. Informative narratives indicate that both equipment-related factors (e.g. height of equipment and diameter of bars) and environmental and behavioural factors (e.g. inadequate surfacing, hazardous surrounds and child behaviour) contribute to injury events.

Equipment and environment related factors

- *Female, aged 8, wrist injury at school when she fell 3 metres from monkey bars.*
- *Female, aged 11 brought in by ambulance from school after head injury sustained by falling 2 metres from monkey bars onto the back of her head.*
- *8 year-old male, injured at school, sustained a fractured radius/ulna when he fell from monkey-bars (approx 2-3 metres height) and landed on tanbark surface.*
- *3 year-old injured at home when she fell from monkey bars approximately 2 metres high sustaining nose bleed from both nostrils, swollen bridge and swollen upper lip with laceration.*
- *Male aged 10 years playing on monkey bar at a caravan park, fell 2 metres onto bark chips, spine immobilized at scene prior to ambulance arrival.*
- *Female aged 9 years playing on the monkey bars at school, fell approximately 2 metres to the ground landing heavily on right arm and shoulder.*
- *6 year-old injured whilst at school when she fell from monkey bars approx 2 metres sustaining a fracture of the left elbow.*
- *6 year-old male injured at school playing on monkey bars when he lost grip of the equipment.*
- *Female aged 9 years injured in a park playing on monkey bars when she lost grip and fell.*
- *Female aged 7 injured at primary school, climbing on monkey bars, lost grip and slipped from equipment - sweaty hands.*
- *Male 6 years old lost grip on monkey bars at school and landed on elbow.*
- *5 year-old male, head injury at home when he face-planted the concrete after falling off monkey bars.*
- *Male, aged 11 years, lower leg injury when he fell off monkey bars at school onto metal platform.*
- *7 year-old male injured at a place for recreation, sustained fractured radius and ulna when he fell from monkey bars landing on wooden surface.*
- *6 year-old male injured at a place for recreation when he fell off monkey bar and hit head against other piece of playground equipment.*
- *5 year-old female injured at an athletics and sports area, fell from monkey bars onto barbed wire now presenting with laceration to the labia.*

Behavioural factors

- *Male, 10 years old, sustained a head injury with loss of consciousness. Was playing on monkey bar, hanging up side down when other kids pulled him off and he hit his head. Now has tenderness of the neck.*
- *9 year-old female injured at school when playing on monkey bars, she was struck by fellow student and fell onto outstretched hand.*
- *Male, 4 years old, injured at a place for recreation, fell off monkey bar when another kid pushed him from behind, landed on left arm and injured his wrist, crying with pain.*

Trampolines (including mini-trampolines)

(n=1,564 hospital-treated injuries, average annual frequency n=782)

Over the two-year period July 2002-June 2004 there were 605 admissions and 959 E.D. presentations to Victorian hospitals for injuries resulting from trampoline falls.

Table 2 shows the pattern of injury in admissions and presentations separately. The pattern is broadly similar except that two thirds of admissions have injuries to the upper extremity compared to a little less than half of E.D. presentations. Lower extremity and head/face/neck injuries are more prominent among E.D. presentations.

For most of the following analyses VAED admissions and VEMD E.D. presentations data were aggregated. Only VEMD data is presented for location.

Frequency, age and gender

Males accounted for 58% of hospital-treated trampoline fall injuries (n=846 hospital-treated injuries). Nearly half of trampoline fall injury occurred in the 5-9 year age group (46%, n=718). A further 30% (n=472) of those injured were aged 10 years and above. A higher proportion of older children (10-14 years) were injured in falls from trampolines than on any other type of playground equipment (23%, n=354).

Location

Unlike for other types of playground equipment, most trampoline fall injuries occurred in the home (83%, n=798).

Injury type and body site

Upper extremity fractures accounted for 43% of all hospital-treated trampoline fall injuries (n=667), nearly two-thirds of which were forearm and elbow fractures (n=420, 63% of upper extremity fractures). Shoulder and upper arm fractures accounted for a further 23% of upper extremity fractures (n=151) and wrist fractures 14% (n=96, all of which were non-admissions). Other injuries include lower extremity fractures (9%, n=134), upper extremity dislocations, sprains/strains (8%, n=127) and lower extremity dislocation, sprains/strains (7%, n=106).

Admitted cases: Length of stay

Seventy-nine percent of admitted cases (n=476) stayed in hospital for less than 2 days and 21% (n=142) stayed for between 2 and 7 days. The average length of stay

was 1.1 days. The following are descriptions of injuries and treatment for a sample of the most serious cases (length of stay greater than 5 days) constructed from coded data recorded on the VAED:

- *Female aged 14 years sustained an open fracture of the shaft of tibia after falling from a trampoline at a sports and athletics area. This injury required an open reduction of the fracture with internal fixation, and a 12-day stay in hospital.*
- *Male aged 7 years, sustained fractures of the shaft of femur and pelvis after falling from a trampoline in an unspecified location. This injury required multiple surgery and immobilisation and traction of the fractured pelvis, and a 24-day stay in hospital.*
- *Male aged 8 years, sustained a fracture of the upper end of the ulna and a medial dislocation of the elbow after falling from a trampoline in an unspecified location. These injuries required closed reduction of the dislocated elbow, open reduction of the fractured ulna and an 11-day stay in hospital.*
- *Male aged 14 years, sustained a haematoma of the spleen after falling from a trampoline at home. This injury required a hospital stay of 6 days.*
- *Female aged 9 years ruptured her anterior cruciate ligament after falling from a trampoline at school. These injuries required a knee reconstruction, other incision procedures on the knee and a 6-day stay in hospital*

Contributory factors

Narrative data on E.D. presentations extracted from the VEMD provide little additional information on the circumstances of the injury other than naming trampolines as the item of playground equipment involved. Informative narratives indicate that equipment related factors such as exposed springs and metal frame and environmental and behavioural factors such as hazards in surrounds and children sharing trampoline and horseplay contribute to injury events.

Equipment and environment related factors

- *Fracture of tibia and fibula, child running to jump on in-ground trampoline right foot caught in frame, obvious deformity of right leg.*
- *Bouncing on a trampoline, tried to do a belly-flop but hit edge of trampoline with chin.*
- *6 year-old male injured at home, sustained a 2 cm laceration over his left eye post hitting head on trampoline frame.*
- *38 year-old female injured at a place for recreation, sustained bruising of the left side of chest when trampoline overturned.*
- *5 year-old male fell off trampoline at home and cut eyebrow on the spring.*
- *Female aged 4 years unspecified injury after she fell from trampoline and got left knee caught in springs, pain underneath knee, location of injury event unspecified.*
- *8 year-old male sustained left knee injury at home on trampoline, pain and swelling after he got caught in between springs.*
- *4 year-old male injured at home when he struck his forearm on metal trampoline frame.*
- *6 year-old male injured at home, laceration to his forehead when he fell onto springs on trampoline.*
- *1 year-old male injured at home, lacerated forehead when he hit a spring on a trampoline, cried straight away.*

- *8 year-old male injured at home, laceration to right leg after landing on the spring on the trampoline.*
  9 year-old female injured at home in backyard, jumping on trampoline when foot got stuck in springs.
- *11 year-old female injured at home fell off trampoline landing on side step of trampoline, braces stuck to her upper lip.*
- *Male aged 7 years injured at home, fell off trampoline, right foot stuck between springs of trampoline.*
- *Female aged 5 years, laceration to left ear caught in spring of a trampoline at home.*
- *6 year-old male in the garden trampolining, overbalanced with struck arm on metal trampoline frame.*
- *5 year-old female injured at home post fall on trampoline, hit head on metal side bar, laceration to the back of her head.*
- *Female aged 9 years injured at home fell from trampoline hitting elbow on concrete.*
- *Female aged 7 years fell off the trampoline and landed on concrete, injury to the arm (shoulder) right side, location unspecified.*
- *12 year-old male, fell from trampoline at home onto wooden sleeper, painful left forearm, no obvious deformity but laceration to site.*
- *7 year-old male injured at home in a fall from a trampoline, landed on handle bar of bicycle, had bloody nose and vomited.*
- *4 year-old male, fell off trampoline at home onto concrete, query loss of consciousness.*
- *Male, aged 10 years, upper arm and elbow injury post fall from trampoline landing on piece of wood.*
- *5 year-old male injured at home, laceration to forehead from falling off trampoline and hitting head on brick wall.*
- *3 year-old male injured at home, sustained lacerated forearm and forehead when he fell from trampoline onto pebbles.*
- *Male aged 5 years injured forehead when he bounced off trampoline and hit pot plant at home, cried straight away and sleepy at present.*
- *Male, aged 9 years, injured at home in backyard, hit head on steel bar when trampolining, cut to forehead.*
- *2 year-old male injured at home when jumping on trampoline he fell off onto concrete.*
- *12 year-old male with neck pain since falling off trampoline and hitting a metal edge.*
- *24 year-old female, sustained fracture of the head after falling from trampoline onto concrete.*
- *Male aged 6 years, was jumping on trampoline at home, fell off trampoline and landed on concrete with left elbow taking force of the fall.*
- *8 year-old female injured at home, fell off trampoline onto concrete, no loss of consciousness, back pain and grazing to upper right side of back.*
- *2 year-old female, injured post fall off trampoline onto brick at home.*
- *Male aged 9 years injured at home when he fell off trampoline striking arm on piece of timber saw.*
- *Female aged 7 years injured at home, when jumping on the trampoline she fell on a ball on the trampoline and landed on the ground, now has sore left wrist.*
- *8 year-old male, injured at home, now has painful back/chest post falling off trampoline onto cubby.*
- *Male, 5 years old, playing on trampoline at home when he grabbed branch of tree, fell hitting his head on dog kennel.*

Behavioural factors

- *6 year-old male whilst on trampoline at home this afternoon he was knocked to floor of trampoline by his brother.*
- *12 year-old female injured at home, sustained a small laceration underneath her nose after being hit by another person when on trampoline.*
- *Male, aged 15 years has sore right elbow from trampoline injury at home, brother fell on his extended right arm.*
- *8 year-old female backache after jumping off a roof at home onto a trampoline, otherwise well.*
- *6 year-old female injured at home, laceration to back of head, collision of heads while jumping on trampoline.*
- *2 year-old female, unspecified location, jumping on trampoline, injured caused by her falling and friend jumping on her arm.*
- *Female aged 11 years, injured at home, pushed onto the metal bars of the trampoline this afternoon*

Slides

(n=818 hospital-treated injuries, average annual frequency n=409)

Over the two-year period July 2002-June 2004 there were 368 admissions and 450 E.D. presentations to Victorian hospitals for injuries caused by falls from slides. Table 2 shows the pattern of injury in admissions and presentations separately. Males comprise a higher proportion of admissions than presentations (64% cf. 43%). Over half (56%) of the more serious injuries (admitted cases) occurred in schools and public buildings compared with 27% of E.D. presentations.

For most of the following analyses VAED admissions and VEMD E.D. presentations data were aggregated. Only VEMD data is presented for location.

Frequency, age and gender

Males were over-represented in hospital-treated slide fall injury cases (58%, n=478). Slide fall injuries most frequently occurred in the 5-9 years age group (49%, n=398) followed by the 0-4 years age group (26%, n=214).

Location

Slide fall injury occurrence was spread fairly evenly across three locations: places for recreation (38%, n=165) , schools, day care and public administration areas (26%, n=116), and the home (24%, n=107).

Injury type and body site

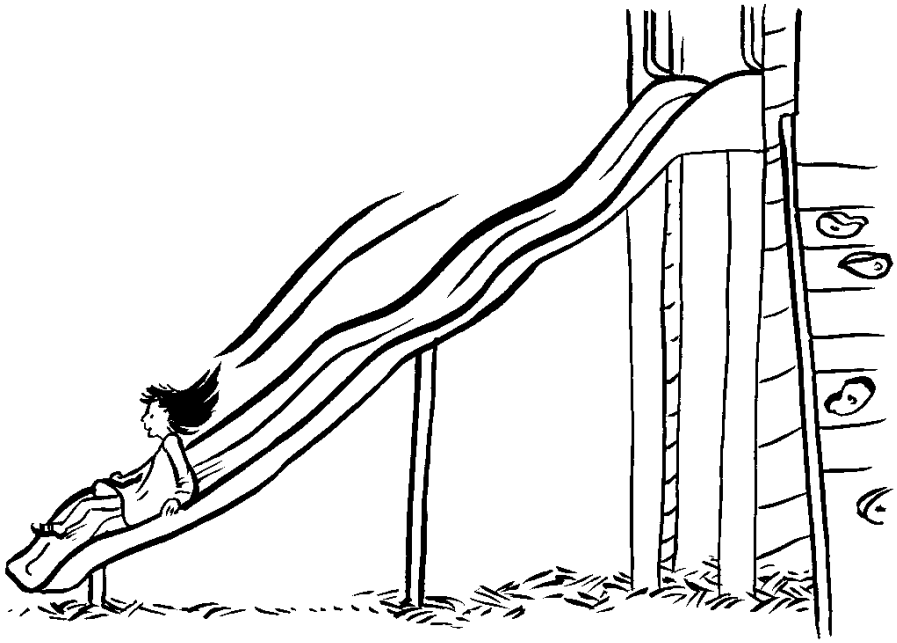
Upper extremity fractures accounted for 55% of all hospital-treated slide fall injuries (n=291); the majority of these were forearm and elbow fractures (n=291,

65% of upper extremity fractures). Shoulder and upper arm fractures account for a further 19% of upper extremity fractures (n=85) and wrist and hand fractures for 17% (n=75, all of which were non-admissions). Lower extremity fractures (7%, n=61), open wounds of the head and face (7%, 55) and upper extremity dislocations, sprains/strains (6%, n=45) were also common.

Admissions: Length of stay

Seventy-nine percent of admitted injured persons (n=290) stayed in hospital for less than 2 days and 20% (n=74) stayed for between 2 and 7 days. The average length of stay was 1.1 days. The following are descriptions of injuries and treatment for a sample of the most serious cases (length of stay greater than 5 days) constructed from coded data on the VAED:

- *Male aged 9 years, sustained a supracondylar fracture of the humerus and a fracture of the shaft of the ulna after falling from a slide in an unspecified place. Procedures and treatments included open reduction of fracture of humerus and due to complications the patient needed continuous ventilatory support and a hospital stay of 19 days.*
- *Female aged 6 years, sustained a massive parenchymal disruption of the spleen and injuries to other intra-abdominal organs after falling from a slide in an unspecified location. These injuries required an 8-day stay in hospital.*
- *Female aged 28 years, sustained a fracture of the lumbar vertebra at L1 level after falling from a slide in an unspecified location. This injury required an 8-day stay in hospital and procedures such as internal fixation of spine and a number of general allied health interventions.*
- *Male aged 10 years, sustained a fracture of the shaft of femur after falling from a slide at a school playground. These injuries required a hospital stay of 19 days and procedures including surgery.*



- *Male aged 45 years, sustained fractures of the lower end of the tibia with fracture of fibula after falling from a slide in an unspecified location. These injuries required closed reduction of the fracture of the shaft of tibia and a 6-day stay in hospital.*

Contributory factors

VEMD case narratives mostly provided only one piece of additional information: the type of playground equipment involved. However, analysis of the more informative narratives indicated that equipment design, environmental and behavioural factors all played some role in slide fall injuries.

Equipment and environment related factors

- *10 year-old male, brought in by ambulance, fractured his radius/ulna in a fall from 2 metre slide onto bark.*
- *Female 4 years old, injured at day care, fractured radius/ulna after falling onto grass off a slide approximately 2 metres high.*
- *5 year-old male, injured left arm at elbow following a fall from side of slide approximately 1.5 metres high, possible fracture.*
- *3 year-old male injured at home, head injury with no loss of consciousness, fell 1.5 metres from a slide cried straight away but has been vomiting and drowsy since.*
- *2 year-old male injured at a place for recreation, jumped from top of slide yesterday 5 feet high now has left leg limp and severe foot pain.*
- *Male, aged 15 years, injured at shopping centre when he fell off slide about 2 meters, landing on a bench, loss of consciousness for approximately 2 minutes, sustained haematoma to lumbar spine and pain to the left foot.*

- *Female, aged 11, injured when she fell 2 metres onto her back from the top of a slide at school.*
- *5 year-old female, injured at a place for recreation, fell 2 metres from a slide onto left wrist, has pain and obvious deformity of wrist.*
- *6 year-old male, head injury sustained at a place for recreation when patient fell approximately 2.5 metres from top of spiral slide onto bottom section of slide landing on abdomen.*
- *Female, aged 6 years, injured at a place for recreation, injury to the head (face - general), fall approximately 2-3 metres off a slide onto grass, grazes to chin.*
- *4 year-old male, injured at a park when playing on slide, injured caused by him falling approximately 2 metres from the top of the slide.*
- *Male 6 years old injured at a playground when playing on a slide caused by fell 2 metres off a slide*
- *2 year-old male, injured at a place for recreation, musculoskeletal injury after fall from a slide from 2 metres, landed on his face, hyperextension of neck and pain.*
- *4 year-old male sustained laceration to right side of head after fall from slide onto concrete at home.*
- *3 year-old female injured at school/ day care/public administration area, sustained laceration to lip when fell from slide and punctured lip with pencil.*
- *Male aged 2 years fell more than 1 metre from slide onto metal surface, unable to be comforted at scene and child has quiet fixing gaze, unable to weight bear on right leg since fall.*
- *2 year-old female, head injury at a park, fell off slide and landed onto wooden steps laceration to the back of head has been falling asleep in car and is a bit vague at present.*

Behavioural factors

- *Female, aged 5 years, injured in a park when pushed from slide by younger sister; fall from approximately halfway down the slide.*
- *9 year-old male was at school, whilst climbing slide he was pushed from behind and landed face first onto bark on the ground.*
- *One year-old male injured while sitting on top of a plastic slide at home, his brother pushed it and it fell side ways, slide landed on child.*
- *Male, aged 4 years, injured at home in backyard when playing on a slide, he got pushed off onto concrete floor.*
- *13 year-old female sustained musculoskeletal injury at a park when she came off the end of a slide with four other children landing behind her, her right foot became wedged and twisted, now swollen.*

Swings

(n=492 hospital-treated injuries, average annual frequency n=246)

Over the two-year period, July 2002-June 2004, there were 212 admissions and 280 E.D. presentations to Victorian hospitals for injuries related to falls from swings. Table 2 shows the pattern of injury in admissions and presentations separately. The pattern is broadly similar except that, as expected, fractures are more frequent among hospital admissions than E.D. presentations (76% cf. 38%) and schools are a more prominent location for serious injury (cases requiring hospital admission) than less serious injury (cases presenting to E.D.).

For most of the following analyses VAED admissions and VEMD E.D. presentations data were aggregated. Only VEMD data is presented for location.

Frequency, age and gender

Males were over-represented in hospital-treated swing fall injury cases (males 53%, n=259; females 47%, n=233). Swing-related fall injury most commonly occurred among children aged 5 to 9 years (43%, n=210) and aged 0 to 4 years (31%, n=152).

Location

Nearly half of fall injuries from swings occurred in the home (47%, n=131), and a further 28% occurred in places for recreation, (n=78).

Injury type and body site

Upper extremity fractures accounted for 45% of all hospital-treated swing-related fall injuries (n=225), the majority of which were elbow and forearm fractures (n=162, 72% of upper extremity fractures). Upper extremity dislocations, sprains/strains (8%, n=37), lower extremity fractures (7%, n=35) and intracranial injuries (6%, n=29) were also fairly common

Admissions: Length of stay

More than three-quarters of admitted persons stayed in hospital for less than 2 days (77%, n=163) and 21% stayed for between 2 and 7 days (n=44). The average length of stay was 1.3 days.

The following are descriptions of injuries and treatment for a sample of the most serious cases (length of stay greater than 5 days) constructed from coded data on the VAED:

- *Male aged 6 years, sustained a fracture of the femur after falling from a swing. This injury required a stay in hospital of 41 days and procedures included traction and physiotherapy.*
- *Male aged 20 years had a 16-day hospital stay after sustaining a fracture of the 6th cervical vertebra and central cord syndrome of the cervical spinal cord. The injury was a result of a fall from a swing. Procedures required included decompression of the cervical spinal cord, bone grafts, and continuous ventilatory support for between 24 and 96 hours.*
- *Male aged 7 years, sustained an injury to his spleen after falling from a swing in an unspecified location. This injury required a 9-day stay in hospital and a number of general allied health interventions.*
- *Male aged 6 years, sustained a fracture of the shaft of femur after falling from a swing in an unspecified location. This injury required immobilisation or traction of the pelvis and a hospital stay of 12 days.*
- *Male aged 11 years, sustained fractures of the talus, radius, tibia and femur after falling from a swing in an unspecified location. These injuries required multiple instances of surgery, a number of general allied health interventions and a 9-day stay in hospital.*

Contributory factors/circumstances of injury

Although most case narratives recorded on the VEMD only stated that the child fell from a swing, the more informative narratives indicated that contributory factors include fall height, incorrect siting and inappropriate landing surface (mostly concrete).

Equipment and environment related factors

- *6 year-old male, injured at home when he fell from the top of the swing set (approximately 2 metres) onto the left shoulder.*
- *Male, aged 1 year, musculoskeletal injury to the shoulder after falling off a swing at a park, father states fall height would have been about 6 feet.*
- *12 year-old male has a painful right knee and foot following fall from swing approximately 5 metres high in a park.*
- *9 year-old male, head injury after fall from swing in park, hit head on pole, feeling dizzy.*
- *2 year-old female injured at home when she fell off a swing onto concrete and hit the back of her head.*
- *4 year-old female, sustained a head injury with no loss of consciousness but had unusual behaviour post fall off swing onto concrete on back hitting head, has been drowsy since.*
- *Male, 8 years old, injured at a place for recreation, head injury after fall from swing when hit back of head on concrete now nauseated.*
- *3 year-old male, injured at a place for recreation, head injury when he fell from swing and landed on concrete striking head.*

Flying foxes (track rides/sliders)

(n=429 hospital-treated injuries, average annual frequency n=215)

Over the two-year period July 2002-June 2004 there were 219 admissions and 210 E.D. presentations to Victorian hospitals for injuries related to falls from flying foxes (track rides/sliders). The pattern of injury, as shown in table 2, is broadly similar at both levels of severity except that males comprised a higher proportion of admissions than presentations. The most common location of injury was school/public building at both levels of severity but the proportion of cases that occurred in the school setting was much higher for admissions (71%) than E.D. presentations (48%).

For most of the following analyses VAED admissions and VEMD E.D. presentations data were aggregated. Only VEMD data is presented for location.

Frequency, age and gender

There was no gender difference in injury occurrence. Three-quarters of those injured were aged between 5 and 9 years (74%, n=312).

Location

Flying fox-related fall injuries were less likely to occur in the home than other playground equipment-related fall injuries (except monkey bars/climbing apparatus). They most frequently occurred in schools, day care and public administration areas (45%, n=95), followed by places for recreation (37%, n=78).

Injury type and body site

Upper extremity fractures accounted for more than two-thirds (68%) of all hospital-treated flying fox fall injuries (n=284), the majority of these were forearm and elbow fractures (n=177, 62% of upper extremity fractures). Shoulder and upper arm fractures account for a further 17% of upper extremity fractures (n=48) and wrist fractures for 15% (n=43, all of which were non-admissions).

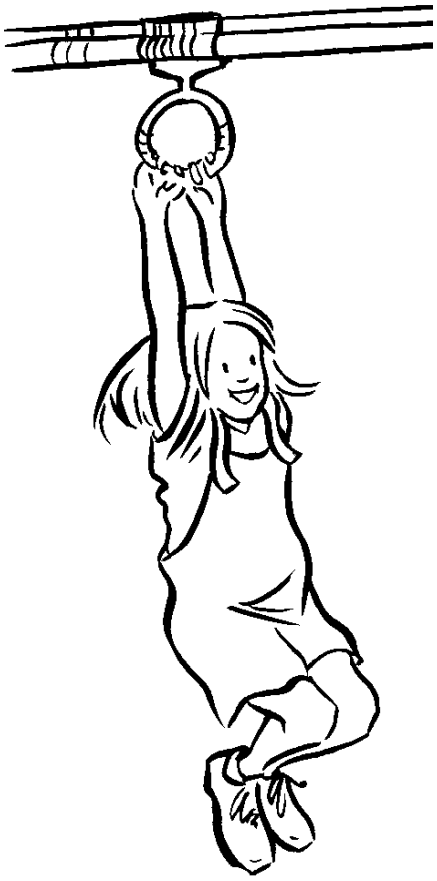
Admissions: Length of stay

Eighty-six percent of admitted injured persons (n=188) stayed in hospital for less than 2 days and 13% stayed for between 2 and 7 days (n=29). The average length of stay was 1 day. The following are descriptions of injuries and treatment for a sample of the most serious cases (length of stay greater than 5 days) constructed from coded data on the VAED:

- *Male aged 8 years, sustained a fracture of the shaft of the femur after falling from a flying fox in an unspecified location. This injury required a 10-day hospital stay and surgery to reduce the fracture.*
- *Male aged 9 years, sustained open fractures of the radius and ulna after falling from a flying fox at a school playground. These injuries required multiple surgery and a hospital stay of 6 days.*
- *Female aged 19 years, sustained a severe open wound of the knee after falling from a flying fox at a sport and athletics location. She required surgery to repair the wound of skin and subcutaneous tissue, and a 6-day stay in hospital.*
- *Female aged 65 years, sustained a trimalleolar fracture of the ankle after falling from a flying fox in an unspecified location. This injury required surgery to repair the fractures and a 9-day stay in hospital.*
- *Female aged 25 years, sustained fractures of the femur, radius and other parts of the forearm in addition to dislocations of the hip and wrist after falling from a flying fox at a farm. These injuries required multiple surgery and allied health interventions and a 6-day stay in hospital.*

Contributory factors/circumstances of injury

Most narratives on VEMD gave only one extra piece of information (the type of equipment involved) over and above that covered by the injury surveillance codes. Analysis of the more informative narrative data indicated that equipment related factors (mostly fall height) interacting with landing surface, environmental hazards and inappropriate behaviour of others contributed to flying fox-related fall injuries.



Equipment and environment related factors

- *Male 7 years old, fell about 2 metres from a flying fox in a place for recreation, right arm pain and deformity.*
- *10 year-old male, multiple trauma when he fell from a flying fox at moderate speed, fell approximately 2 metres with loss of consciousness, neck pain with pins and needles on lateral aspect of right leg, location unspecified.*
- *5 year-old female, fell approximately 2 metres off a flying fox at school, sustained a fracture/dislocation of the wrist.*
- *7 year-old male fell 2 metres from flying fox at school.*
- *6 year-old male injured at a place for recreation when he fell 2 metres from a flying fox onto his face and chin, also injured his left forearm.*
- *Female, aged 25 years injured at an athletics and sports area when she fell 4 metres from a flying fox.*
- *Male, 43 years injured at home after falling 5 metres from a flying fox.*
- *7 year-old male injured at a place for recreation, fell from flying fox approximately 2 metres, clavicle deformity.*
- *8 year-old male fell 1.5 metres off flying fox at school, has right loin/ flank pain.*
- *Female aged 7 years at a place for recreation, fell 2 metres off a flying fox, now has painful left arm.*
- *6 year-old male, fell at least 1.8 metres from a flying fox landed on bark covered ground but hit right side of head first.*
- *Female 6 years old, fell from flying fox approximately 2 metres landing onto bark has pain to right arm and is not able to move it today.*
- *7 year-old female injured at a place for recreation, sustained fracture radius/ulna following fall from flying fox, approximately 1.5metres.*
- *9 year-old female, head injury in the park- fell 2 metres from flying fox onto asphalt, is now walking around dizzy and has abdomen and neck*

pain brought in by ambulance in hard collar.

- *7 year-old female, injured at primary school caused by falling 2 metres off flying fox.*
- *Female, 9 years old, fell from flying fox 1.5 metres, she tried to grab bar and missed and fell onto back, brought in by ambulance complaining of back and right wrist pain - did not hit head.*
- *6 year-old female has neck stiffness and pain post falling off a flying fox approximately 6 feet high, location unspecified.*
- *9 year-old male, fall from flying fox at school, fell approximately 2 metres now has neck pain radiating down spine.*
- *8 year-old male injured at a park when he lost grip on the flying fox.*
- *11 year-old female at school, fell off a flying fox hitting her head on a steel plate.*

Behavioural factors

- *Male aged 9 years, playing on flying fox at a park, was pushed and fell landing on arm.*
- *Male aged 7 years at primary school, was on flying fox - pushed off and fell.*

Other causes of playground equipment injury

The VEMD was used to source data on non-fall playground equipment injuries for both admissions and presentations as there are no codes on the VAED to identify non-fall injury.

In total there were 952 non-fall playground equipment-related injury presentations to Victorian emergency departments over the two-year period July 2002-June 2004 — 83 hospital admissions and 869 E.D. presentations (Table 3). The majority of these injuries occur in children aged 0-14 years (91%, n=867).

Major causes of other hospital treated playground equipment injury, excluding falls, (July 2002-June 2004) **Table 3**

Injury cause	Departure Class: Admissions n	Admissions %	Presentations n	Presentations %	Total n	Total %
Struck by collision with object	36	43.4	417	48.0	**453**	47.6
Struck by collision with person	14	16.9	149	17.1	**163**	17.1
Cutting/piercing object	10	12.0	51	5.9	**61**	6.4
Contact burn	0	0	1	<1	**1**	<1
Other specified external causes	13	15.7	203	23.4	**216**	22.7
Unspecified causes	10	12.0	48	5.5	**58**	6.1
Total	**83**	**100**	**869**	**100**	**952**	100

Source: VEMD July 2002-June 2004, admissions and non-admissions included in analysis

Struck by/collision with object (n=453, average annual frequency n=227)

Ninety-one percent of playground equipment-related struck by collision with object injuries occurred among children aged between 0 and 14 years (n=412).

The overall male:female ratio was 59:41 and males were over-represented in all age groups.

The most frequently injured body site was the face (26%, n=120), followed by the head (18%, n=82), hand (8%, n=35), ankle (6%, n=26) and lower leg (5%, n=24). The most common specific injuries were open wounds of the face (18%, n=83) and head (9%, n=43), superficial injuries of the face (5%, n=22) and head (5%, n=22) and ankle sprains/strains (4%, n=16).

Items of equipment most commonly involved in these incidents were trampolines (30%, n=136), swings (21%, n=97) and slides (14%, n=62). Injuries most often occurred in the home (47%, n=211) followed by places for recreation (25%, n=115) and schools and public buildings (17%, n=78).

Informative narratives show that equipment related factors (equipment instability and collapses, entrapment of digits in moving parts, loose parts) and environmental factors (poor maintenance, hazards in environment) contributed to injury events.

Struck by/collision with person (n=163, average annual frequency n=82)

Almost all injuries related to playground equipment caused by struck by/collision with person occurred to children aged 0-14 years (95%, n=155). More than half of these injury cases were in children aged 5-9 years (52%, n=80). The overall male:female ratio was 53:47; males were over-represented in all age groups except 10-14 year olds.

The most frequently injured body sites were the face (14%, n=23) and the lower leg (14%, n=23), followed by the head (11%, n=18), forearm (11%, n=18), wrist (9%, n=14) and elbow (7%, n=12). The most common specific injury was lower leg fracture (9%, n=14) followed by open wounds of the face (6%, n=10) and forearm (6%, n=9) and wrist fractures (5%, n=8).

Items of equipment most commonly involved in these incidents were trampolines (n=87, 53%) and slides (n=27, 17%). Injuries most often occurred in the home (62%, n=101).

Due to the nature of these injuries (i.e., caused by collision with other persons) there were no obvious narratives detailing equipment related factors contributing to injury events although some factors related to behaviour were identified.

Cutting and piercing
(n=61, average annual frequency n=31)

Cutting and piercing injuries related to playground equipment were most common in children aged 5-9 years (38%, n=23), followed by children 0-4 years (34%, n=21) and children aged 10-14 years (16%, n=10). The overall male: female ratio was 59:41 and males were over-represented in all age groups except 5-9 year olds.

The most frequently injured body sites were the face (38%, n=23), the hand (16%, n=10) and the head (16%, n=10). The most common specific injury was open wound to the face (33%, n=20), followed by open wounds to the hand (15%, n=9).

The types of equipment most commonly involved in these incidents were trampolines (34%, n=21) and slides (20%, n=12). Injuries most often occurred in the home (61%, n=37).

Informative narratives indicate that equipment-related factors, such as sharp protusions and behavioural factors such as holding slides when playing on equipment contributed to injury events.

Other specified and unspecified injuries
(n=275, average annual frequency n=138)

The remaining injuries were coded to 'other specified' or 'unspecified' causes. Nearly three-quarters of these injuries involved children aged 0-9 years (72%, n=198), with children aged 10-14 accounting for a further 17% (n=48). Gender distribution was even (50.5% male, 49.5% female).

The most frequently injured body sites were the lower leg (13%, n=39) and ankle (13%, n=37), followed by the knee (11%, n=18) and foot (11%, n=18). The most common specific injuries were lower leg fractures (8%, n=22) and ankle sprain/strains (8%, n=22), followed by knee sprains/strains (6%, n=16) and wrist fractures (5%, n=13). Many injuries were inversion injuries of the ankles or knees (particularly on trampolines).

Items of equipment most commonly involved in these incidents were trampolines (41%, n=113), slides (29%, n=79), swings (9%, n=24) and monkey bars (8%, n=22). Injuries most often occurred in the home (42%, n=115) followed by places for recreation (25%, 68).

Informative narratives show that a variety of factors (commonly awkward landing) contributed to injuries.

Discussion

Playing on playground equipment provides physical, developmental and social benefits. However, each year at least 3,800 Victorians, mostly children, receive hospital treatment for playground equipment-related injuries (including trampoline injuries). Playground equipment is linked to more child hospitalisations than any other grouping of consumer products used by children (aged 0-14 years). Falls and other injuries from playground equipment accounted for 12% of all child injury admissions and at least 4% of all child injury E.D. presentations (non-admissions) in Victoria over the two-year period 2002/4.

Playground equipment injuries most commonly occur in children aged 0-14 years (predominantly 5-9 year olds) and are mostly caused by falls. Trend data indicate that the playground equipment fall injury admission rate for children increased by 20% over the decade to 2003/4 but this may be related to increased exposure due to increased participation or expansion of play facilities.

Monkey bars accounted for 36% of playground equipment fall injuries in Victoria over the two-year period 2002/4. This is expected considering research on playground exposure has found that monkey bars/climbing equipment are much more popular than any other piece of playground equipment (Nixon et al., 2003). Nonetheless, based on frequency data, reduction of injurious falls from monkey bars should be a high priority for injury prevention.

Arm fracture from falls from playground equipment is the most common playground injury accounting for 51% of hospital-treated playground equipment injuries over the two-year period 2002/4. Although fractures during childhood can be considered normative and an acceptable risk of children's play activities a recent study found that falls from playground equipment were more likely to produce serious fractures than falls from standing height on the playground (Fiissel et al 2005).

Results from this study showed that children who fell from the playground equipment were almost four times more likely than their counterparts who fell from standing height in the playground to sustain a major fracture that required reduction (manipulation). These major fractures are more painful, need more surgical care, involve a higher risk of impaired function and therefore are unlikely to be considered by parents as an acceptable risk. Fractures of this kind could also have the added disadvantage of being associated with decreased participation in play equipment use by the injured child in the future.

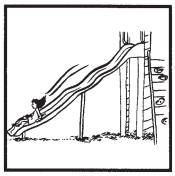
Analytic studies conducted in Victoria and elsewhere have shown strong associations between playground fall injury (and arm fracture) and the following factors:

Equipment-related risk factors
- the height of the equipment (Chalmers et al., 1996; Mott et al., 1997; Mowat et al., 1998; Macarthur et al., 2000; Laforest et al., 2001; Sherker et al., 2005);
- the height of the fall (Macarthur et al., 2000; Sherker et al., 2005); and
- inadequate hand/guardrails (Mowat et al., 1998).

Surface-related risk factors
- surface impact attenuation (Laforest et al., 2001; Sherker et al., 2005);
- the use of inappropriate (non-impact absorbing) surface material (Chalmers et al., 1996; Mowat et al., 1998; Laforest et al., 2001);
- surfacing not meeting recommended standards (Mowat et al., 1998); and
- inappropriate undersurfacing substrate material (soil rather than sand under tanbark) (Sherker et al., 2005).







The weight of evidence from analytical studies clearly shows that falling from playground equipment heights greater than 1.5m significantly increases children's risk of injury (Chalmers et al., 1996; Mott et al., 1997; Macarthur et al., 2000; Sherker et al., 2005). The most recent of these studies, a case-control study conducted in Victoria by MUARC researchers, involved 402 children aged under 13 years who fell from school or pre-school playground equipment and sustained upper limb fracture, and 283 controls who fell and landed on their arm without fracture (Sherker et al., 2003). The major study finding was that children who fell from equipment heights greater than 1.5 m were 2.4 times more likely to sustain arm fracture than children who fell from equipment heights 1.5m or less ($p<0.01$) (Sherker et al., 2005). This confirmed findings from earlier studies conducted in New Zealand (Chalmers et al., 1996), Wales (Mott et al., 1997) and Canada (Macarthur et al., 2000).

Australian playground safety standards are framed to minimise the risk of potentially fatal head (brain) injury and recommendations on maximum playground equipment height (2.5m) and surface depth (20cm) are based on critical head impact criteria (HIC) derived from laboratory studies. When the height requirements for the new (2004) playground equipment standard—AS 4685.1-2004: General safety requirements and test methods)— were being developed, the Standards committee was asked by researchers to consider the injury prevention benefits, in terms of arm fracture reduction, of reducing the maximum free fall height to at least 1.9 metres but preferably 1.5m. After considerable debate, the Committee decided to maintain the focus on head injury prevention in determining the general maximum free height of fall requirement for playground equipment (which remained at 2.5m), but reduced the maximum equipment height requirement for supervised early childhood equipment to 1.5m and for 'upper body' equipment to 2.2m. 'Upper body' equipment is defined in the new Standard as equipment from which suspension is intended using the hands without foot support, such as monkey bars/horizontal ladder (Standards Australia, 2004).

The effect of these height reductions on the incidence of playground equipment injury in children is likely to be limited because 86% of playground equipment-related arm fractures occur in children aged over 5 years. Also, the results from the Victorian case control study showed diminishing return in terms of arm fracture risk reduction as the height of equipment increased from 1.5m, with no significant effect for fall heights over 2m (Sherker et al., 2005). Consumers (government and private) should consider these research results when purchasing playground equipment, especially climbing apparatus/ monkey bars. Also, innovative landscaping solutions (mounding and excavation) have the potential to reduce the free fall height from slides and climbing apparatus in playgrounds without diminishing challenge.

One other design issue that may contribute to falls from monkey bars/climbing apparatus by young children is the diameter of the rungs. In a recent exploratory field study designed to test whether wrist guards have the potential to protect against wrist/forearm injuries in bicycling, micro-scooter riding and monkey bar play (Cassell et al., 2005), the researchers noted that the grip of smaller children on the rungs of the monkey bars in the junior school playground was generally tenuous when traversing the monkey bars with and without wristguards. The diameter of the monkey bar rungs on the modular playground equipment designed for the younger school children (5-7 year-olds) was 38mm, which is greater than the diameter recommended for five percentile 5 years-olds (32 mm), the 'minimum user' of the equipment. (On safety design principles, equipment should be designed for the minimum user.) The diameter of the rungs on the 'junior' monkey bar was, in fact, larger than the rung diameter of the full-size monkey bars in the school playground.

Surfacing type and depth cannot be considered in isolation from equipment height. Schools and local councils in Victoria mostly use loose fill (tanbark/wood chip) surfacing in playgrounds because of the comparatively high up-front cost of installing rubber-based alternatives and lack of studies on the injury prevention effectiveness of rubber. Sherker et al. (2005) reported from their case control study that only 4.7% of the 402 school playgrounds in which arm fractures occurred complied with the recommended depth of tanbark (20cm) in the Australian Standard. In the fall zones where children landed, tanbark surface depth ranged from 0-27.1 cm with a mean depth of 11.1 cm. Because surface depth compliance was so bad, the study was underpowered and results were inconclusive with regard to the contribution of surface depth to children's risk of arm fracture. Previous studies have been similarly disadvantaged (Chalmers et al., 1996; Macarthur et al., 2000). At this stage, because of poor compliance, no 'real world' study has yet linked inadequate surface depth to increased risk of injury. Laboratory study findings form the basis of surfacing depth requirements in safety standards and are based on head impact criteria.

In an associated MUARC study the performance of playground surfacing materials were evaluated using a headform drop test involving both laboratory and in situ measurements (Gunatilaka et al., 2004). The study found that loosely filled tanbark at the 20cm depth recommended in the Australian Standard (AS/NZS 4422:1996 Playground surfacing-Specifications, requirements and test methods) had excellent impact attenuating properties, and compacted tanbark down to a depth of 8cm performed satisfactorily. However, when compacted tanbark depth fell below 8cm it was found to be incapable of attenuating impact and therefore would not protect against serious head injury. In a further study, the in situ performance of tanbark was monitored in three playgrounds over time to determine a schedule for surface maintenance to minimise injury risk (Sherker et al., 2005). From the initial 20cm surface the depth reduced by an average of 25% in the high and low use test areas of the playgrounds after 8 weeks installation. Predictive modelling showed that continued depth reduction could lead to an unacceptably high risk of serious head injury for 1m falls after approximately 100 days, which indicated that maintenance of playground tanbark should occur at intervals no greater than 3 months (Sherker et al., 2005).

Anecdotal evidence indicates that government schools cannot afford to meet this schedule out of their recurrent maintenance budgets and this issue needs to

be addressed. Overall, rubber-based bilaminate playground surfacing materials have superior impact attenuation properties to tanbark and do not deteriorate (Gunatilaka et al., 2004), but the initial cost outlay is also apparently prohibitive for local councils and schools (Sherker & Ozanne-Smith, 2004). Further research is also required to determine the specific protective effects of the rubber materials for arm fracture prevention and any unwarranted effects. A mix of surfaces may be a less expensive option with rubber-based surfaces used in high traffic areas (underneath swings and at the landing area of slides) and loose fill in lower traffic areas. A comparative cost study should be done to determine if and when the initial outlay on rubber-based surfacing (full coverage of fall zones or in high traffic areas only) matches the cost of installation and maintenance of tanbark to a compliant level, to enable informed decision-making.

Recent playground equipment injury prevention initiatives in Victoria have mostly been focussed on improving the safety of equipment in local government-controlled playgrounds. However, available trend data for E.D. presentations provide no evidence of a decrease in play equipment injury in public parks, relative to schools and the home. Less consistent attention has been paid to the safety of playground equipment installed in pre-schools and schools (particularly in relation to meeting the surfacing depth requirements in the Australian Standard) and no attention to the safety of playground equipment installed in private backyards. Hospital injury surveillance data shows that, overall, about one-third of playground equipment injuries occur in the backyards of private homes. A concerted awareness raising and education campaign is required to educate parents about the relevance of the provisions of the new playground safety standards to their decision-making on the selection, siting, installation (including surfacing and substrate) and maintenance of playground equipment in their own backyards, and the need for active supervision of young children using playground equipment.

The safety of trampolines was fully canvassed in a previous issue of Hazard (Murphy C. Trampoline Injuries, Hazard Edition 42, March 2000) which provided the evidence base for advocacy for the development of a voluntary Australian safety standard for trampolines, released in 2003 (AS 4989-2003 Trampolines). This was a softer approach to trampoline injury prevention than advocated by researchers and physicians in the United States, where the American Academy of Pediatrics (AAP) has called for the restriction of trampoline use to supervised training programs and a ban on trampoline use in the home environment, routine physical education classes and outdoor playgrounds.

AS 4983 - 2003 Trampolines and the revised Standard that is scheduled for released in March 2006 (DR 05284 to be AS 4989-200X – Trampolines-Safety Aspects), concentrate on safety aspects such as padding design, protection of sharp edges, safety marking and consumer education. In summary, manufacturers and suppliers are required to pad the entire top surface of the frame and suspension system, provide instructional material for the assembly, maintenance and safe use of trampolines, and include suitable product markings.

In addition to installation and maintenance instructions, the original and revised Standards recommend that, at a minimum, the safety information packet should include:

(1) *Warning information* which is readily visible (minimum letter height 5mm) and has good pictorial, word and message legibility and includes at least the following information:

(a) Do not use trampoline without knowledgeable supervision

(b) Do not attempt or allow somersaults

(c) Do not allow more than one person on the trampoline

(d) Do not use trampolines when wet

(e) Do not jump onto or off the trampoline

(f) Do not use a trampoline while under the influence of alcohol or drugs

(2) Safe use instructions

(a) Read all instructions before using the trampoline

(b) Allow only one person on the trampoline at any time. Use by more than one person at the same time can result in serious injury

(c) Use the trampoline only with mature, knowledgeable supervision at all times.

(d) Inspect the trampoline before each use. Make sure that the frame padding is correctly and securely positioned. Replace any worn, defective, or missing parts.

(e) Keep objects away which could interfere with the user. Maintain a clear area around, above, and under the trampoline.

(f) Learn fundamental bounces and body positions thoroughly before trying more advanced skills.

On-trampoline labelling requirements include the permanent display of the words 'Do not use without frame pads' plus the warning information and safe use instructions in a contrasting colour to its surroundings on the frame padding and the bed of the trampoline.

Both the current and the proposed revised Standard also require that manufacturers supply additional written and pictorial instructional information to aid the user in learning fundamental trampolining skills (sample instructional material is provided in an appendix) and information on trampoline safety and injury prevention, the supervisor's role in preventing injuries and the responsibilities of the owner, supervisor and user.

The full impact of the revised standards for playground equipment and trampolines, and related educational initiatives, on child injury rates should become apparent over the next five years. Currently, overall hospital admissions rates for playground equipment injury, extracted from VAED, show an upward trend over the ten-year period 1994/5 to 2003/4, although a downturn is evident in the latest year of data (2003/4).

It is not currently possible to 'unpack' reliable data on the mechanisms of child playground equipment injury, or any other consumer product-related injury, from the emergency department collection (VEMD) because narrative data are incomplete and the quality

of recorded narratives varies across and within contributing hospitals. The review of the Australian consumer product safety system conducted by the Productivity Commission will be published shortly and will include recommendations to address national data capture and data quality shortfalls in the area of consumer product safety. Options under consideration include the establishment of an Early Warning Information System (EWIS) possibly based on hospital admissions data, or an upgrade of data collected from both currently monitored hospitals across Australia (for example, a sample of Victorian hospitals contributing to VEMD) and a small number of additional hospitals (Productivity Commission, 2005). Strong representation has been made to the Productivity Commission to the effect that existing hazards warrant as much or more attention than new hazards identified from the proposed Early Warning Information System.

Recommendations

Injury prevention

- When planning playgrounds and purchasing playground equipment, especially climbing apparatus/ monkey bars, consumers (government and private) should consider research evidence that show that the critical free fall height for arm fractures from playground equipment is 1.5m. Innovative landscaping solutions (mounding and excavation) have the potential to reduce the free fall height from slides and climbing apparatus in playgrounds without diminishing challenge.

- Government authorities must find solutions that make the provision and maintenance of Standards-compliant surfacing under playground equipment affordable in all public, pre-school and school playgrounds, whether it is rubber-based, loose fill or a combination of the two.

- Parents purchasing any type of playground equipment for backyard installation must be educated, preferably at point-of-sale, about the relevance of all safety recommendations in the Australian Standards to children using this equipment at home especially with regard to critical fall heights, site selection, surfacing and substrate, ongoing maintenance, safe use and supervision.

Research and data system improvements

- A study is required to determine the effectiveness of rubber-based under-surfacing in preventing arm fracture which addresses biomechanical factors associated with landing.

- A comparative cost study should be commissioned to determine if and when the initial outlay on rubber-based bilaminate surfacing (full coverage of fall zones or in high traffic areas only) matches the cost as well as the effectiveness of installation and maintenance of tanbark to a compliant level, to enable local government and school authorities to make an informed choice on surfacing under playground equipment.

- Changes should be made to the current ICD-10-AM coding of location to include a specific code for place of recreation (public parks and playgrounds). In the current edition of ICD-10-AM, injuries occurring in public parks are coded to 'Other specified place of occurrence'. This code currently includes many other locations such as beaches, forests, public place NOS and railway lines and injuries occurring in public parks cannot be disaggregated.

- Consideration should be given to the establishment of a centralised consumer product injury surveillance system in Victoria and nationally, based on the United States or Norwegian models, as an extension to Victoria's existing hospital-based injury surveillance data systems to monitor the safety of existing products, to provide an early warning system for emerging hazards, and ascertain the effectiveness of interventions.

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Box 1. Methods of extracting playground equipment injuries from hospital injury surveillance datasets

Hospital-treated playground equipment data were extracted from the Victorian Admitted Episodes Dataset (VAED) and the Victorian Emergency Minimum Dataset (VEMD) using different methods due to coding differences.

Victorian Admitted Episodes Dataset (VAED): The VAED records hospital admissions for all Victorian hospitals, both public and private. Up to June 1998 data were coded to the International Classification of Diseases (ICD) version 9. From July 1998 forward, data are coded to ICD version 10 with Australian modifications (adequacy of coding is reviewed every two years and improvements introduced). There is only one code for playground equipment injury in ICD 10: W09 'Fall involving playground equipment'. Sub-codes under W09 identify seven specific items of equipment, namely tree houses, flying foxes, climbing apparatus (including monkey bars), slides, swings, seesaws, trampolines plus 'other' specified equipment and 'unspecified' equipment. For the trend analysis, the ICD9 external cause codes 884.0 'Fall from playground equipment' and 884.5 'Fall from trampoline' were used as these match W09.

Victorian Emergency Minimum Dataset (VEMD): The VEMD records presentations to 28 of the 35 Victorian public hospital emergency departments for 2003-4 and to all 37 hospitals with 24-hour emergency services from the beginning of 2004. Admissions were excluded to prevent double counting. There is no separate code for playground equipment injuries in VEMD. Cases were extracted by word search of specific equipment items in narrative data. This strategy identified playground equipment injury cases from any cause, including falls. Records were checked and wrongly coded cases excluded. For the purpose of comparison with hospital admissions data, falls cases were manually grouped according to the ICD 10-W09 sub-codes.

Box 2. Issues affecting the quality and completeness of playground equipment injury data

The issues identified here provide a typical example of the problems experienced in identifying hospital-treated injuries related to one grouping of consumer products.

Victorian Admitted Episodes Dataset (VAED): The VAED records all injury hospital admissions to Victorian public and private hospitals. All data on VAED are coded; there are no narratives to provide any further information on the mechanism and circumstances of the injury. There is only one playground equipment injury code, which only identifies falls cases (with sub-codes to identify the type of playground equipment from which the fall occurred). Playground injury cases due to other causes, such as cutting/piercing or hit/struck/crush, cannot be identified.

Victorian Emergency Minimum Dataset (VEMD): Two major issues affect the quality and completeness of playground equipment injury data in the VEMD. First injuries involving playground equipment can only be identified by text searching the 'description of injury event' narrative. VEMD narrative data are incomplete and their quality varies across and within contributing hospitals. A recent quality check by VISU, on data submitted for the period July-December 2004, identified that on average only 34% of narratives are graded 'good to excellent', meaning they provide two pieces of information over and above what is known from the coded data. Therefore, beyond mention of the item of playground equipment involved, narratives are unlikely to provide further useful detail on the precise mechanism and circumstances of the injury. Second data selected from the VEMD are not complete because VEMD only contained E.D. presentations data from 28 of the 35 public hospitals with 24-hour Emergency Department service for 18 months of the two-year study period.

- INDEX -

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General Acknowledgements

Participating hospitals

From October 1995
Austin & Repatriation Medical Centre
Ballarat Base Hospital
The Bendigo Hospital Campus
Box Hill Hospital
Echuca Base Hospital
The Geelong Hospital
Goulburn Valley Base Hospital
Maroondah Hospital
Mildura Base Hospital
The Northern Hospital
Royal Children's Hospital
St Vincents Public Hospital
Wangaratta Base Hospital
Warrnambool & District Base Hospital
Western Hospital - Footscray
Western Hospital - Sunshine
Williamstown Hospital
Wimmera Base Hospital
From November 1995
Dandenong Hospital

From December 1995
Royal Victorian Eye & Ear Hospital
Frankston Hospital

From January 1996
Latrobe Regional Hospital

From July 1996
Alfred Hospital
Monash Medical Centre

From September 1996
Angliss Hospital

From January 1997
Royal Melbourne Hospital

From January 1999
Werribee Mercy Hospital

From December 2000
Rosebud Hospital

From January 2004
Bairnsdale Hospital
Central Gippsland Health Service (Sale)
Hamilton Base Hospital
Royal Women's Hospital
Sandringham & District Hospital
Swan Hill Hospital
West Gippsland Hospital (Warragul)
Wodonga Regional Health Group

From April 2005
Casey Hospital

National Injury Surveillance Unit

The advice and technical back-up provided by NISU is of fundamental importance to VISU.

How to access VISU data:

VISU collects and analyses information on injury problems to underpin the development of prevention strategies and their implementation. VISU analyses are publicly available for teaching, research and prevention purposes. Requests for information should be directed to the VISU Co-ordinator or the Director by contacting them at the VISU office.

Contact VISU at:

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Monash University WEB SITE Accident Research Centre

All issues of *Hazard* and other information and publications of the Monash University Accident Research Centre can be found on our internet home page:http://www.monash.edu.au/muarc/visu

Coronial Services

Access to coronial data and links with the development of the Coronial Services statistical database are valued by VISU.

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Victoria The Place To Be

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