



**MONASH** University  
Accident Research Centre

# WOMEN'S INJURY IN THE HOME IN VICTORIA

by

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**Abstract:**

The major home injury problems have been identified for all levels of severity from an analysis of data from the Coroner's Database (deaths), the Victorian Inpatient Minimum Database (hospital admissions) the Victorian Injury Surveillance System (hospital emergency department presentations) and the Extended Latrobe Valley Injury Surveillance project (a regional collection of data on General Practice presentations).

The higher-ranked causes of home injuries to adult women in Victoria are: falls (at all levels of severity); intentional-suicide and self harm (at all levels of severity except GP presentations); accidental poisoning (at the more serious levels of severity-deaths and hospital admission); and cutting/piercing injuries (at all levels of severity except fatalities). Middle-ranked causes at most levels of severity are: intentional-homicide and assaults; hit/struck/crushed; and fire/burns/scalds

The available data on these specific causes have been analysed and literature reviews conducted to inform recommendations for preventive action (strategies and countermeasures). For example, the recommended falls prevention measures include: promote fall-safe design to architects, draftsmen, builders and building suppliers; educate older women, health practitioners and carers about the importance of regular exercise, adequate nutrition (especially calcium intake), periodic medication review, treatment of osteoporosis and home fall hazard assessment and remediation; provide periodic falls risk assessment and tailored falls prevention programs including hip pads for high-risk older women; and develop and implement guidelines for slip resistive surfaces in bathrooms (including bath and shower bases) and kitchens and for outdoor pedestrian surfaces (including house entries and steps).

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**Key Words:**

Home injuries, accidents, injury prevention, epidemiology, countermeasures

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# Contents

<b>ACKNOWLEDGMENTS</b> .....	<b>XV</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>XVII</b>
<b>1 INTRODUCTION, DATA SOURCES AND LIMITATIONS</b> .....	<b>3</b>
1.1 Introduction .....	3
1.2 Aims .....	3
1.3 Key definitions .....	3
1.4 Methods .....	4
1.5 Sources of data and limitations of databases .....	4
1.5.1 Mortality (death) data .....	4
1.5.2 Hospital admissions data .....	6
1.5.3 Hospital emergency department presentations .....	8
1.5.4 General Practice presentations.....	9
1.5.5 Other data.....	10
1.6 Structure of report .....	10
1.7 References .....	11
<b>2. PLACE OF OCCURRENCE OF ALL ADULT INJURY</b> .....	<b>13</b>
<b>3. ADULT FEMALE HOME INJURY DEATHS</b> .....	<b>15</b>
3.1 The home compared to other locations for fatal injury .....	15
3.2 Female home injury deaths: the size of the problem .....	16
3.3 Intentional and unintentional deaths.....	16
3.4 Causes of adult female home injury deaths .....	17
3.5 Changing rates at different ages .....	18
3.6 Summary .....	20
<b>4. ADULT FEMALE HOME INJURY HOSPITAL ADMISSIONS</b> .....	<b>21</b>
4.1 The place of occurrence of injury.....	21
4.2 Female home injury hospitalisations: the size of the problem .....	21
4.3 Major causes of adult female home injury hospital admissions .....	22
4.4 Age of females.....	24
4.5 Type of injury .....	25
4.6 Summary .....	26
<b>5 ADULT FEMALE HOME INJURY HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS</b> .....	<b>27</b>
5.1 Introduction .....	27
5.2 The home compared to other locations of injury resulting in ED presentations .....	27
5.3 Place of occurrence of VISS home injuries.....	28

5.4	Intent of home injuries to women.....	29
5.5	activities at the time of injury .....	30
5.6	Breakdown factors for adult female home injuries: what went wrong?.....	32
5.7	Nature of home injuries to women .....	34
5.8	Body part injured.....	35
5.9	Major causes of home injury .....	36
5.10	Summary .....	37
<b>6.</b>	<b>GENERAL PRACTITIONER (GP) PRESENTATIONS .....</b>	<b>39</b>
6.1	Introduction .....	39
6.2	Place of occurrence (location) of injury presenting to GENERAL PRACTITIONERS.....	39
6.3	Intent of female home injury presenting to general practitioners.....	40
6.4	Time of injury.....	40
6.5	Causes of injury .....	40
6.6	Age of women presenting to General Practitioners.....	41
6.7	Activity at time of injury .....	42
6.8	Breakdown event: what went wrong .....	42
6.9	Nature of injury .....	42
6.10	Body part injured .....	42
6.11	Disposal after General Practitioner consultation.....	43
6.12	Summary .....	43
<b>7.</b>	<b>OVERVIEW OF MAJOR CAUSES OF HOME INJURY TO WOMEN.....</b>	<b>47</b>
<b>8.</b>	<b>FALLS.....</b>	<b>51</b>
8.1	Deaths.....	52
8.1.1	The size of the problem .....	53
8.1.2	Causes (mechanisms) of fall deaths.....	53
8.1.3	Nature of injury.....	54
8.1.4	Fall injury rates at different ages .....	54
8.2	Hospital admissions.....	54
8.2.1	The size of the problem .....	54
8.2.2	Causes (mechanisms) of hospitalised fall injury .....	54
8.2.3	Age of hospitalised women.....	54
8.2.4	Nature of injury.....	55
8.3	Hospital emergency department presentations (including admissions).....	55
8.3.1	The size of the problem .....	56
8.3.2	Causes (mechanisms) of emergency department presentations for fall injuries.....	56
8.3.3	Age factors.....	59
8.3.4	Time of injury .....	59
8.3.5	Place of occurrence (location) .....	59
8.3.6	Activity being undertaken at the time.....	59
8.3.7	Nature of injury and body part injured .....	60
8.3.8	Breakdown factors-what went wrong .....	60

8.3.9	Disposal of patients from hospital emergency department.....	60
8.4	General Practitioner presentations.....	61
8.4.1	The size of the problem .....	61
8.4.2	Causes (mechanisms) of General Practitioner presentations for home fall injury.....	61
8.4.3	Nature of injury and body part injured .....	62
8.4.4	Disposal of patients.....	62
8.5	Discussion and recommendations .....	63
8.6	References .....	81
<b>9.</b>	<b>SUICIDE AND SELF-INFLICTED INJURY .....</b>	<b>83</b>
9.1	Deaths - suicides.....	84
9.1.1	The size of the problem .....	84
9.1.2	Causes (mechanisms) of suicides .....	84
9.1.3	Motives (reasons) for suicide.....	87
9.1.4	Rates of suicide at different ages .....	88
9.2	Hospital admissions.....	88
9.2.1	The size of the problem .....	89
9.2.2	Causes (methods) of self inflicted injury .....	89
9.2.3	Age of hospitalised women.....	90
9.2.4	Nature of injury.....	90
9.3	Hospital emergency department presentations (including admissions).....	90
9.3.1	The size of the problem .....	90
9.3.2	Causes (mechanisms) of self inflicted injury.....	90
9.3.3	Age factors.....	95
9.3.4	Time of injury .....	95
9.3.5	Place of occurrence (location) .....	95
9.3.6	Nature of injury.....	95
9.3.7	Breakdown factors .....	95
9.3.8	Disposal of patients from emergency departments.....	95
9.4	General Practice presentations .....	96
9.5	Discussion and recommendations .....	96
9.6	References .....	107
<b>10.</b>	<b>CUTTING AND PIERCING INJURY.....</b>	<b>109</b>
10.1	Deaths.....	110
10.2	Hospital admissions .....	110
10.2.1	The size of the problem .....	110
10.2.2	Causes of hospitalisations.....	110
10.2.3	Age factors.....	110
10.2.4	Nature of injury.....	111
10.3	Hospital emergency department presentations (including admissions) .....	111
10.3.1	The size of the problem .....	111
10.3.2	Causes (mechanisms) of Emergency Department presentations .....	111
10.3.3	Age of injured women .....	114
10.3.4	Time of injury .....	114
10.3.5	Place of occurrence (location) of injury .....	114
10.3.6	Context of injury (activity being undertaken).....	114
10.3.7	Breakdown factors (what went wrong).....	115

10.3.8	Nature of injury and body part injured .....	115
10.3.9	Disposal of patients from emergency department .....	115
10.4	General Practice presentations .....	116
10.4.1	The size of the problem .....	116
10.4.2	Causes (implements involved).....	116
10.4.3	Context of injury.....	116
10.4.4	Body parts injured.....	116
10.4.5	Nature of injuries .....	116
10.4.6	Disposal of patients.....	116
10.5	Discussion and recommendations .....	117
10.6	References.....	131
<b>11.</b>	<b>ACCIDENTAL POISONING BY DRUGS, MEDICANTS AND BIOLOGICALS AND BY 'OTHER SUBSTANCES'</b> .....	<b>133</b>
11.1	Deaths.....	134
11.1.1	The size of the problem .....	134
11.1.2	Causes of deaths (poisoning agents).....	134
11.1.3	Contributory factors.....	136
11.1.4	Rates at different ages.....	136
11.2	Hospital admissions .....	136
11.2.1	The size of the problem .....	136
11.2.2	Causes (poisoning agents involved) .....	137
11.2.3	Age factors.....	139
11.2.4	Nature of injury.....	139
11.3	Hospital emergency department presentations (including admissions) .....	139
11.3.1	The size of the problem .....	139
11.3.2	Causes - poisoning agents involved.....	139
11.3.3	Contributory factors to accidental poisoning.....	142
11.3.4	Age factors.....	143
11.3.5	Time of injury .....	143
11.3.6	Place of occurrence (location) of injury .....	143
11.3.7	Activity being undertaken at time of injury (context) .....	143
11.3.8	Nature of injury and body part injured .....	143
11.3.9	Identified breakdown factors (what went wrong).....	143
11.3.10	Disposal of patients .....	143
11.4	General Practitioner presentations .....	144
11.5	Discussion and recommendations .....	144
<b>12.</b>	<b>HIT/STRUCK/CRUSHED INJURY .....</b>	<b>147</b>
12.1	Deaths.....	147
12.1.1	The size of the problem .....	147
12.2	Hospital admissions .....	148
12.2.1	The size of the problem .....	148
12.2.2	Cause of hospitalisations .....	148
12.2.3	Age factors.....	148
12.2.4	Nature of injury.....	148
12.3	Hospital emergency department presentations (including admissions) .....	148
12.3.1	The size of the problem .....	149
12.3.2	Causes of hit/struck/crushed injury presentations.....	149

12.3.3	Age of injured women .....	150
12.3.4	Time of injury .....	150
12.3.5	Place of occurrence (location) of injury .....	151
12.3.6	Activity being undertaken at time of injury .....	151
12.3.7	Nature of injury and body part injured .....	151
12.3.8	Breakdown factors - what went wrong .....	151
12.3.9	Disposal of patients.....	152
12.4	General Practice presentations .....	152
12.4.1	The size of the problem .....	152
12.4.2	Causes of injuries.....	152
12.4.3	Body parts injured.....	153
12.4.4	Nature of injuries .....	153
12.4.5	Disposal of patients.....	153
12.5	References .....	156
<b>13.</b>	<b>FIRE, BURN AND SCALD INJURY .....</b>	<b>157</b>
13.1	Deaths.....	158
13.1.1	The size of the problem .....	158
13.1.2	Causes of fire/burn/scald deaths .....	158
13.2	Hospital admissions .....	159
13.2.1	The size of the problem .....	159
13.2.2	Causes of fire/burns/scald hospital admissions.....	160
13.2.3	Age-related factors.....	160
13.2.4	Nature of injury.....	160
13.3	Hospital emergency department presentations (including admissions) .....	160
13.3.1	The size of the problem .....	160
13.3.2	Causes of fire/burn/scald injuries .....	160
13.3.3	Age-related factors.....	162
13.3.4	Time of injury .....	162
13.3.5	Place of occurrence (location) .....	162
13.3.6	Activity being undertaken at the time of injury .....	162
13.3.7	Breakdown factors - what went wrong .....	162
13.3.8	Nature of injury and body part injured .....	162
13.3.9	Disposal of patients from emergency department .....	162
13.4	General Practice presentations .....	163
13.4.1	The size of the problem .....	163
13.4.2	Causes of fire/burn/scald injuries .....	163
13.4.3	Nature of fire/burns/scalds injuries.....	163
13.4.4	Body parts injured.....	163
13.4.5	Disposal of fire/burns/scalds patients .....	163
13.5	Discussion and recommendations .....	164
13.6	References.....	177
<b>14.</b>	<b>INTENTIONAL ASSAULTIVE INJURY (HOMICIDE AND INJURY PURPOSELY INFLICTED BY ANOTHER).....</b>	<b>179</b>
14.1	Homicides .....	180
14.1.1	The size of the problem .....	180
14.1.2	Causes (methods) of homicide.....	180
14.1.3	Assailants' relationship to victim .....	181
14.1.4	Rates at different ages.....	181

14.2	Hospital admissions .....	181
14.2.1	The size of the problem .....	181
14.2.2	Causes of assaultive injury .....	182
14.2.3	Age factors.....	182
14.2.4	Nature of injury.....	182
14.3	Hospital emergency department presentations (including admissions) .....	182
14.3.1	The size of the problem .....	182
14.3.2	Causes of assaultive injury .....	182
14.3.3	Assailants' relationship to victim .....	184
14.3.4	Age factors.....	186
14.3.5	Time of injury .....	186
14.3.6	Place of occurrence of assaultive injuries.....	186
14.3.7	Activity being undertaken at the time of injury .....	186
14.3.8	Nature of injury and body part injured .....	186
14.3.9	Disposal of patients from emergency department .....	186
14.4	General Practice presentations .....	187
14.5	Discussion and recommendations .....	187
14.6	References.....	193
<b>15.</b>	<b>NATURAL AND ENVIRONMENTAL INJURY .....</b>	<b>195</b>
15.1	Deaths.....	195
15.2	Hospital admissions .....	196
15.2.1	The size of the problem .....	196
15.2.2	Causes of natural and environmental injury .....	196
15.2.3	Age factors.....	196
15.2.4	Nature of injury.....	196
15.3	Hospital emergency department presentations (including admissions) .....	196
15.3.1	The size of the problem .....	197
15.3.2	Causes of natural and environmental injuries.....	197
15.3.3	Age factors.....	198
15.3.4	Time of injury .....	199
15.3.5	Place of occurrence (location) of injuries .....	199
15.3.6	Activity being undertaken at the time of injury .....	199
15.3.7	Nature of injury and body part injured .....	199
15.3.8	Disposal of patients.....	199
15.4	General Practitioner presentations .....	200
15.4.1	The size of the problem .....	200
15.4.2	Causes of injury .....	200
15.4.3	Nature of injury.....	200
15.4.4	Body parts injured.....	200
15.4.5	Disposal of patients.....	200
<b>16.</b>	<b>INJURIES FROM CHOKING, SUFFOCATION AND FOREIGN BODY IN ORIFICE .</b>	<b>201</b>
16.1	Deaths.....	201
16.1.1	The size of the problem .....	202
16.1.2	Causes of deaths .....	202
16.2	Hospital admissions .....	202
16.2.1	The size of the problem .....	202
16.2.2	Causes of injury .....	202

16.2.3	Nature of injury.....	203
16.3	Hospital emergency department presentations (including admissions) .....	203
16.3.1	The size of the problem .....	203
16.3.2	Causes of injury .....	203
16.3.3	Age factors.....	204
16.3.4	Time of injury .....	204
16.3.5	Place of occurrence of injury .....	205
16.3.6	Activity being undertaken at the time of injury .....	205
16.3.7	Nature of injury and body part injured .....	205
16.3.8	Breakdown factors - what went wrong .....	205
16.3.9	Disposal from emergency department .....	205
16.4	General Practitioner presentations .....	205
16.4.1	The size of the problem .....	205
16.4.2	Causes of injury .....	206
16.4.3	Nature of injury.....	206
16.4.4	Body part injured .....	206
16.4.5	Disposal of patients.....	206
<b>17.</b>	<b>INJURIES FROM OVEREXERTION AND STRENUOUS MOVEMENTS.....</b>	<b>207</b>
17.1	Deaths.....	207
17.2	Hospital admissions .....	207
17.2.1	The size of the problem .....	207
17.2.2	Age factors.....	208
17.2.3	Nature of injury.....	208
17.3	Hospital emergency department presentations (including admissions) .....	208
17.3.1	The size of the problem .....	208
17.3.2	Causes of injury .....	208
17.3.3	Age factors.....	208
17.3.4	Nature of injury.....	209
17.4	General Practitioner presentations .....	209
17.4.1	The size of the problem .....	209
17.4.2	Causes of injury .....	209
17.4.3	Nature of injury.....	209
17.4.4	Disposal of patients.....	209
17.5	Recommendation .....	209
<b>18.</b>	<b>SUMMARY AND CONCLUSIONS .....</b>	<b>211</b>

## Tables

TABLE 2:1	PLACE OF OCCURRENCE OF FATAL & NON-FATAL INJURIES TO ADULTS (AGED ≥ 15 YEARS) BY SEX ..	14
TABLE 3:1	COMPARATIVE RANKING OF LOCATION OF INJURY EVENT LEADING TO DEATHS FOR ADULTS (AGED ≥ 15 YEARS) BY SEX .....	16
TABLE 3:2	INTENT OF ADULT FEMALE INJURY DEATHS IN THE HOME, 1989-90 TO 1993-94.....	17
TABLE 3:3	FREQUENCY, MEAN ANNUAL RATE (PER 100 000 POPULATION) AND RANK OF MAJOR CAUSES OF ADULT FEMALE INJURY DEATHS IN THE HOME, 1989-90 TO 1993-94.....	18
TABLE 3:4	COMPARISON OF CRUDE MEAN ANNUAL MORTALITY RATES (PER 100 000 POPULATION) AND FREQUENCIES FOR THE FIVE MAJOR CAUSES AND ALL CAUSES BY AGE, 1989-90 TO 1993-94. ....	19
TABLE 4:1	RANKING OF LOCATION OF INJURY HOSPITAL ADMISSIONS FOR ADULT PERSONS (AGED ≥ 15 YEARS) BY SEX .....	22
TABLE 4:2	RANKING OF MAJOR CAUSES OF HOME INJURY HOSPITAL ADMISSIONS AMONG ADULT FEMALES (AGED ≥ 15 YEARS), VIMD 1987-88 TO 1993-94.....	23
TABLE 4:3	CAUSES OF HOME INJURY AMONG ADULT WOMEN (AGED ≥ 15 YEARS): COMPARISON OF AVAILABLE DATA FOR HOSPITAL ADMISSIONS VIMD AND VEMD .....	24
TABLE 4:4	AGE OF ADULT WOMEN (AGED ≥ 15 YEARS) ADMITTED TO HOSPITAL FOR HOME INJURY, VIMD 1987-88 TO 93-94 .....	25
TABLE 5:1	LOCATION OF INJURY TO ADULTS (AGED ≥ 15 YEARS) BY SEX, IN RANK ORDER OF FREQUENCY, VISS HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (ADMISSIONS AND NON-ADMISSIONS) .....	28
TABLE 5:2	PLACE OF OCCURRENCE (LOCATION) OF HOME INJURY TO ADULT FEMALES (AGED ≥ 15 YEARS), VISS HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS .....	29
TABLE 5:3	INTENT OF HOME INJURIES TO ADULT WOMEN (AGED ≥ 15 YEARS), VISS HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (ADMISSIONS AND NON-ADMISSIONS).....	29
TABLE 5:4	ACTIVITIES BEING UNDERTAKEN AT TIME OF HOME INJURY TO ADULT WOMEN (AGED ≥15 YRS), VISS HOSPITAL ED PRESENTATIONS (ADMISSIONS & NON-ADMISSIONS) .....	31
TABLE 5:5	REPORTED BREAKDOWN FACTOR GROUPINGS AND INDIVIDUAL FACTORS WHICH CONTRIBUTED TO HOME INJURY TO ADULT WOMEN (AGED ≥ 15 YEARS), VISS EMERGENCY DEPARTMENT PRESENTATIONS (ADMISSIONS AND NON-ADMISSIONS) .....	33
TABLE 5:6	NATURE OF HOME INJURIES TO ADULT FEMALES (AGED ≥ 15 YEARS), VISS HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (ADMISSIONS AND NON-ADMISSIONS).....	35
TABLE 5:7	BODY PARTS INJURED IN HOME INJURIES TO ADULT FEMALES (AGED ≥ 15 YEARS) VISS EMERGENCY DEPARTMENT PRESENTATIONS .....	36
TABLE 5:8	CAUSES OF HOME INJURY TO ADULT FEMALES (AGED ≥ 15 YEARS), VISS HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (ADMISSIONS AND NON-ADMISSIONS).....	37
TABLE 6:1	LOCATION OF INJURIES TO ADULTS (AGED ≥ 15 YEARS) BY SEX, IN RANK ORDER OF FREQUENCY: ELVIS GENERAL PRACTICE PRESENTATIONS 1994-95 .....	39
TABLE 6:2	INTENT OF ADULT FEMALE HOME INJURY PRESENTING TO ELVIS GENERAL PRACTITIONERS .....	40
TABLE 6:3	RANKED CAUSES OF ADULT FEMALE HOME INJURIES, ELVIS GENERAL PRACTICE PRESENTATIONS..	41
TABLE 6:4	AGE OF ADULT FEMALE PRESENTATIONS FOR HOME INJURY, ELVIS GENERAL PRACTICE PRESENTATIONS 1994-95 .....	42
TABLE 7:1	RANKING OF MAJOR CAUSES OF HOME INJURY TO ADULT WOMEN .....	49
TABLE 8:1	CAUSES (MECHANISMS) OF FALL INJURIES AMONG ADULT WOMEN (AGE ≥ 15 YEARS) THAT OCCURRED IN THE HOME, AT ALL LEVELS OF SEVERITY .....	52
TABLE 8:2	FREQUENCY OF RECORDED DEATHS OF ADULT FEMALES (AGED ≥ 15 YEARS) DUE TO FALLS IN THE HOME IN VICTORIA, 1989-90 TO 1991-92, CFS DATA COMPARED TO ABS DATA.....	53
TABLE 8:3	CAUSES (MECHANISMS) OF 'FALLS-LOSS OF BALANCE' DERIVED FROM AN ANALYSIS OF A SAMPLE OF VISS ADULT FEMALE HOME FALLS CASE NARRATIVES.....	57
TABLE 8:4	CAUSES (MECHANISMS) OF 'SLIPS', DERIVED FROM AN ANALYSIS OF A SAMPLE OF VISS ADULT FEMALE HOME FALLS CASE NARRATIVES.....	58
TABLE 8:5	CAUSES (MECHANISMS) OF 'TRIPS', DERIVED FROM AN ANALYSIS OF A SAMPLE OF FALLS CASE NARRATIVES .....	58
TABLE 9:1	CAUSES (MECHANISMS) OF SUICIDE AND SELF INFLICTED INJURIES THAT OCCURRED IN THE HOME AMONG ADULT WOMEN (AGE >15 YEARS) AT ALL LEVELS OF SEVERITY .....	83
TABLE 9:2	FREQUENCY AND RANKING OF THE METHODS (CAUSES) OF SUICIDE AMONG ADULT WOMEN AGE ≥ 15 YEARS IN THE HOME. ....	85
TABLE 9:3	PHARMACEUTICAL DRUGS REPORTED IN CFS SUICIDE CASE NARRATIVES, 1989-90 TO 1993-94 .....	86
TABLE 9:4	REPORTED MOTIVES FOR SUICIDES IN CFS CASE NARRATIVES 1992-3 TO 1993-4 .....	88

TABLE 9:5 HOSPITAL ADMISSIONS FOR SELF INFLICTED POISONING BY SOLID OR LIQUID SUBSTANCES.....	89
TABLE 9:6 CAUSES (MECHANISMS) OF INTENTIONAL SELF- INFLICTED INJURY (SUICIDE ATTEMPTS AND SELF-HARM) FROM AN ANALYSIS OF SELECTED VISS CASE NARRATIVES.....	91
TABLE 9:7 INVOLVEMENT OF PHARMACEUTICAL DRUGS IN SELECTED VISS SELF-INFLICTED INJURY CASES .....	92
TABLE 10:1 CAUSES OF CUTTING AND PIERCING INJURY THAT OCCURRED IN THE HOME AMONG ADULT WOMEN (AGED ≥ 15 YEARS) AT ALL LEVELS OF SEVERITY .....	109
TABLE 10:2 DETAILED CAUSES (MECHANISMS) OF CUTTING AND PIERCING INJURIES PRESENTING TO VISS HOSPITAL EMERGENCY DEPARTMENTS, FROM AN ANALYSIS OF CASE NARRATIVES. ....	112
TABLE 11:1 CAUSES OF ACCIDENTAL POISONING THAT OCCURRED IN THE HOME AMONG ADULT WOMEN (AGE ≥15 YEARS AND OLDER) AT ALL LEVELS OF SEVERITY .....	133
TABLE 11:2 DRUGS REPORTED IN CASE NARRATIVES OF ADULT FEMALE ACCIDENTAL POISONING HOME INJURY DEATHS BY ‘OTHER SPECIFIED DRUGS AND MEDICINAL SUBSTANCES’ .....	135
TABLE 11.3 CONTRIBUTORY FACTORS TO ACCIDENTAL POISONING HOME INJURY DEATHS OF ADULT WOMEN AGED ≥ 15 YEARS, 1992-93 TO 1993-94 .....	136
TABLE 11:4 PHARMACEUTICAL DRUGS INVOLVED IN VIMD HOSPITAL ADMISSIONS FOR ACCIDENTAL POISONING BY DRUGS, MEDICINAL SUBSTANCES AND BIOLOGICALS .....	138
TABLE 11:5 CAUSES OF ACCIDENTAL POISONING, VISS HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (ADMISSIONS AND NON-ADMISSIONS) .....	140
TABLE 11:6 DRUGS (EXCLUDING ALCOHOL) REPORTED IN ACCIDENTAL POISONING CASE NARRATIVES, VISS HOSPITAL PRESENTATIONS (ADMISSIONS AND NON-ADMISSIONS) .....	141
TABLE 11:7 CONTRIBUTORY FACTORS TO ACCIDENTAL POISONING IN VISS CASE NARRATIVES .....	142
TABLE 12:1 CAUSES OF HIT/STRUCK/CRUSH INJURY AMONG ADULT WOMEN (AGE >15 YEARS) THAT OCCURRED IN THE HOME, AT ALL LEVELS OF SEVERITY .....	147
TABLE 12:2 CAUSES OF HIT/STRUCK/CRUSH INJURIES DERIVED FROM VISS CASE NARRATIVES, PRESENTATIONS AND ADMISSIONS .....	150
TABLE 13:1 CAUSES OF FIRE/BURN/SCALD INJURY AMONG ADULT WOMEN (AGED ≥ 15 YEARS) THAT OCCURRED IN THE HOME, AT ALL LEVELS OF SEVERITY .....	157
TABLE 13:2 CONSUMER PRODUCTS IDENTIFIED IN CASE NARRATIVES AS INVOLVED IN FIRE/BURN/SCALD DEATHS IN THE HOME AMONG WOMEN (AGED ≥ 15 YEARS).....	159
TABLE 13:3 CAUSES OF FIRE/BURN/SCALD INJURIES BASED ON AN ANALYSIS OF VISS CASE NARRATIVES, ADMISSIONS AND NON-ADMISSIONS .....	161
TABLE 14:1 CAUSES OF INTENTIONAL ASSAULTIVE INJURIES THAT OCCURRED IN THE HOME AMONG ADULT WOMEN (AGED ≥ 15 YEARS) AT ALL LEVELS OF SEVERITY .....	179
TABLE 14:2 FREQUENCY AND RANKING OF CAUSES (MEANS) OF HOMICIDE IN THE HOME AMONG ADULT WOMEN (AGED ≥ 15 YEARS).....	180
TABLE 14:3 RELATIONSHIP OF VICTIM TO THE ASSAILANT IN CASE NARRATIVES, HOMICIDES AMONG WOMEN AGED ≥ 15 YEARS IN THE HOME.....	181
TABLE 14:4 CAUSES OF ASSAULTIVE INJURY DERIVED FROM VISS HOSPITAL NARRATIVES <sup>A</sup> .....	183
TABLE 14:5 ASSAILANTS’ RELATIONSHIP TO ADULT FEMALE VICTIMS OF ASSAULTIVE INJURY INFLICTED IN THE HOME (N=427) <sup>A</sup> .....	185
TABLE 15.1:CAUSES OF NATURAL/ENVIRONMENTAL INJURIES THAT OCCURRED IN THE HOME AMONG ADULT WOMEN (AGED ≥ 15 YEARS) AT ALL LEVELS OF SEVERITY .....	195
TABLE 15:2 CAUSES OF NATURAL AND ENVIRONMENTAL HOME INJURIES TO ADULT FEMALES (AGED ≥ 15 YEARS).197	
TABLE 16:1 CAUSES OF INJURIES BY CHOKING, SUFFOCATION AND FOREIGN BODY IN ORIFICE THAT OCCURRED IN THE HOME AMONG ADULT WOMEN (AGED ≥ 15 YEARS) AT ALL LEVELS OF SEVERITY .....	201
TABLE 16:2 DETAILED CAUSES OF CHOKING, SUFFOCATION AND FOREIGN BODY IN ORIFICE HOME INJURY TO ADULT FEMALES (AGED ≥ 15 YEARS) .....	204
TABLE 17:1 CAUSES OF INJURY FROM OVEREXERTION/STRENUOUS MOVEMENT THAT OCCURRED IN THE HOME AMONG ADULT WOMEN (AGED ≥ 15 YEARS) AT ALL LEVELS OF SEVERITY .....	207



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# EXECUTIVE SUMMARY

Home injury is a neglected area of research. This may be because there is a general lack of appreciation of the size and gravity of the home injury problem. Also, the home is perceived to be a difficult setting to access for injury prevention purposes, particularly for adults, because it is part of the private domain. The Department of Human Services commissioned Monash University Accident Research Centre to investigate the size, nature and major causes of women's injury in the home in Victoria and to make recommendations on strategies and countermeasures to reduce the burden of home injury.

## Major findings

- In Victoria, adult injuries are more likely to occur in the home (which includes the living space, garage and yard of a private dwelling, excluding the driveway) than in any other single location.
- The home is the most frequently reported place of occurrence of injury to adult men and women (aged  $\geq 15$  years) for hospital admissions, hospital emergency department presentations and general practitioner presentations.
- According to death data used for this study (drawn from the Victorian Coroners' Facilitation System - CFS) transport areas outrank the home for fatal injury but the CFS under-records elderly fall deaths due to fractured neck of femur. If Australian Bureau of Statistics (ABS) data on these deaths are included then the home outranks transport areas as the foremost location of injury fatalities.
- At all levels of severity, including fatalities, approximately two-fifths (ranging from 37.8% for emergency department presentations to 45.1% for hospital admissions) of women's injuries occur in the home. A similar proportion (39.5%) of men's fatal injuries occur in the home but a lesser proportion, approximately one-quarter (ranging from 23.7% for GP presentations to 26.3% for hospital admissions) of men's non-fatal injuries occur in the home.
- By contrast, a greater proportion of males is injured in production and outdoor areas. These differences in location of injury between males and females are probably explained by differences in their exposure to particular locations.

## Deaths

### *(Victorian Coroners' Facilitation System – CFS)*

- According to the Victorian Coroners' Facilitation System (CFS) data, the home is the second-highest ranked location of fatal injuries to adult women, behind transport locations. However, CFS data underestimates fall-related deaths. If the additional fall-related deaths in older women recorded by the Australian Bureau of Statistics (ABS) are included, then the home outranks transport as the location of most female injury deaths.

- Approximately two-fifths (41.9%) of adult women's injury deaths recorded on the CFS occur in the home. However, if ABS data on falls deaths are included, then home injury deaths account for over one-half (55.8%) of all injury deaths in adult females in Victoria.
- On average, 271 women are fatally injured in the home each year (if ABS data on fall-related deaths are included).
- According to CFS data, over one-half (55.6%) of reported home injury adult female deaths are intentional (suicide and homicide). Unintentional injury accounted for more than a quarter (28.7%) of deaths. However, if ABS home falls death data are included then unintentional injuries account for the majority (58.1%) of home injury deaths.
- The all-cause home injury death rate for women aged 55 years and older was one-and-a-half times that for women aged 15-54 years. This differential would be much greater if ABS data on elderly fall deaths were included.

## **Hospital admissions**

### ***(Victorian Inpatient Minimum Database - VIMD)***

- The home is the highest-ranked location of injury requiring hospital admission.
- Home injury accounts for 45.1% of adult female injury hospital admissions.
- Women aged 60 years and older account for over two-thirds (67.9%) of hospital admissions for home injury.
- Falls cause over two-thirds (68.7%) of home injury hospital admissions. The other major cause of admissions is intentional self-inflicted injury.
- Fractures are the most frequently reported injury accounting for nearly one-half (47.0%) of the home injury admissions.
- Older women are more at risk of admission for fractures, open wounds, bruises and burns, younger women are more at risk of hospitalisation for self-poisoning (intentional and accidental).

## **Hospital emergency department presentations**

### ***(Victorian Injury Surveillance System - VISS)***

- Over one-third (37.8%) of women presenting with injuries to the emergency departments of VISS hospitals are injured in the home.
- Unintentional injury accounts for over four-fifths (84.9%) of VISS home injury presentations.
- The major causes of home injury are falls (37.5%) and cutting and piercing (16.4%).
- Most home injuries occur in the living and sleeping areas (51.2%) and in the garden, garage and yard (27.0%).

- The five most common non-systemic injuries are: cuts and lacerations (21.0%), fractures (18.4%), bruising (10.3%), inflammation/swelling/pain (10%) and sprain or strain (9.9%).
- The five activity groupings most associated with VISS presentations for home injury is: leisure and recreation (excluding sports), miscellaneous household activities, "other" catastrophes, home maintenance and personal activities.
- The five most hazardous individual activities are: "other" leisure/recreation activities, intended self-harm, fight, riot or quarrel, playing (general activity) and cleaning.
- The five environmental factor groupings that are most frequently reported as precipitating injuries to women in the home are (in rank order):
  - their own or another person's actions;
  - structures (particularly stairs and steps and floors and flooring materials, mostly in relation to fall injuries);
  - drugs and medications (particularly the sedative/tranquillisers/psychotropic group) and alcohol (related to deliberate self-harm and accidental overdoses);
  - furniture (particularly chairs, beds, bathtubs and showers, mostly related to fall injuries); and
  - Kitchenware (particularly knives and drinking glasses, mostly related to cuts).

## **General Practitioner (GP) presentations**

### ***(Extended La Trobe Valley Injury Surveillance – ELVIS)***

- Over two-fifths (42.8%) of adult women presenting with injuries to ELVIS GPs are injured in the home.
- Almost all (97.7%) of the home injury presentations to GPs are for unintentional injuries (although intentional injuries may be under-reported and undetected).
- The most frequently occurring injuries are: lacerations (25.0%), sprains and strains (19.5%), bruising (14.9%), bites (10.0%) and burns (6.3%).
- Falls and cutting/piercing are the highest-ranked causes of GP presentations each accounting for approximately one-quarter of the home injury presentations.
- The peak times for home injuries presenting to GPs are from Saturday to Wednesday (inclusive) and in the summer months, January to March.
- Women aged 60 years and older appear more at risk of injury. They comprised 19.5% of the Latrobe Valley Region population in 1994-95 yet accounted for 39.4% of all adult female injury presentations to GPs over the same period.

## **Major causes of injury across all levels of severity**

### **The higher-ranked causes of home injury to adult women are:**

- falls (at all levels of severity if the underestimation on the CFS of fall deaths among elderly women due to fractured neck of femur is taken into account)
- suicide and self inflicted injury (at all levels of severity except General Practitioner (GP) presentations)
- accidental poisoning (at the more serious levels of severity - deaths and hospital admissions)
- cutting and piercing injury (at all levels of severity except deaths)

### **Mid-ranked causes of home injury across most levels of severity in Victoria are:**

- hit, struck and crushing injuries
- fire, burns and scalds
- intentional injury - homicide and assaults

**The lower-ranked causes** are natural and environmental injury (mostly animal-related injury), choking, suffocation and foreign body in orifice and over-exertion injury. The findings and recommendations on these causes included in the report proper are not covered in this summary.

## **Major causes in detail**

### **1. Falls**

Falls are the leading cause of injury to adult women in the home at all levels of severity except fatalities. However, fall-related deaths are underestimated on the Victorian Coroners' Facilitation System because fall-related deaths of older women due to fractured neck of femur are not routinely recorded.

Falls accounted for:

- five per cent of home injury deaths recorded on the CFS (this is a gross underestimation because elderly fractured neck of femur (hip) fall deaths is not included on the CFS)
- over two-thirds (68.7%) of VIMD home injury hospital admissions;
- over one-third (37.5%) of home injury VISS hospital emergency department presentations; and
- approximately one-quarter (26.0%) of ELVIS General Practitioner presentations for home injury.

Overall, fall injuries are mostly caused by slips, trips and stumbles on the same level; same-level falls caused between approximately one-half and three-quarters of fall injuries at every level of severity.

The falls fatalities recorded on the CFS are more likely to be caused by falling from one level to another than from falling on the same level. The data are biased because elderly fractured neck of femur fall deaths are not recorded on the CFS and are generally reported to be same-level falls.

Women aged 60 years and older appeared to be at higher risk of fall injuries at all levels of severity, including fatalities. Risk also appears to increase with age, from age 60 years onwards.

### **Type of injury**

- Head injuries are the most frequently reported cause of fall deaths on the CFS database (ABS data shows fractured neck of femur to be the most common cause of fall-related deaths).
- Fractures account for over two-thirds (68.3%) of VIMD hospital admissions, nearly one-half (48.3%) of VISS emergency department attendances and 16.2% of ELVIS GP presentations.
- Other frequently reported injury groupings are sprains and strains (for emergency department and GP presentations), cuts and lacerations and bruising.

### **Falls on the same level**

The analysis of a sample of VISS one-line case narratives on hospital emergency department presentations (admissions and non-admissions) and all ELVIS GP case narratives reveals a common pattern of causes.

- The prominent causes of same-level falls are: loss of balance, dizziness or fits, body joint 'giving way' (hip, knee or ankle); slips on wet or icy surfaces (indoor and outdoor); and trips involving a broad range of items.
- The slipping surface is described as wet or icy in over one-third of the VISS and ELVIS case narratives but this is probably an underestimation as the quality of the narratives varied. In fact, it is generally accepted that slips typically occur on wet surfaces or a surfaces contaminated with oil or other spills.
- The most frequently reported tripping hazards are: furniture (chairs and beds), steps and stairs, mats, uneven concrete paths, garden surrounds, hoses, cords and animals. These are mostly portable/moveable items which highlights the importance of educating householders to keep indoor and outdoor pathways (especially to the clothesline and car) free of clutter and protruding furniture.

### **Falls from one level to another**

Falls from one level to another account for just over one-half of CFS fatalities, one-third of VISS hospital emergency department and ELVIS GP presentations and a significant proportion of hospital admissions (15.8%).

- At all levels of severity, except hospital admissions, the majority of falls are on indoor and outdoor stairs and steps and from chairs or beds.
- Steps and stairs are involved in one-third of hospital admissions for different level falls. Research shows that high-risk stairs include those with fewer steps, low risers, treads less than

twelve inches deep, abrupt changes of conditions and distracting surrounding vistas. Poor lighting and distracting patterned carpet are particular problems for the elderly.

- Falls from ladders are also a prominent cause of death and injury. The analysis of VISS narratives revealed that using stools and chairs as climbing apparatus when doing household chores was hazardous and that this type of fall was over-represented in VISS hospital admissions in proportion to emergency department presentations.

## **Recommendations**

### **Countermeasures and strategies**

- Continue and expand the education of architects, draftsmen, designers, builders and manufacturers and suppliers of building materials and home appliances and equipment on the safe design of homes using A/NZ 4226-1994 *Guidelines for safe housing design* and other relevant standards as a basis for this education.
- (In partnership with general practitioners, other health professionals and aged care agencies) systematically expand primary and secondary prevention strategies and countermeasures to reduce falls among older women by providing:
  - education (promotion) and counselling about the importance of regular exercise, adequate nutrition and the identification and remediation of home fall hazards;
  - periodic review of medications that increase fall risk;
  - education about the potential benefits and risks of HRT and other drugs used to prevent and treat osteoporosis;
  - periodic assessment of at-risk older women, and the institution of tailored remedial action on identified predisposing and behavioural risk factors for falls and fall injuries; and
  - supportive environments to enable strategies and actions, which promote falls prevention and health maintenance to occur and be maintained.
- Promote the wearing of protective hip pads to women at high risk of fall injury in both the community and aged care settings.
- Promote the use of proven slip resistive surfaces in bathrooms (including bath and shower bases), kitchens and all outdoor pedestrian areas (including entries and steps).
- Widely promote a set of simple guidelines to prevent home fall injuries.

### **Surveillance, research and investigations**

- Improve the reporting of place of occurrence (location) of injury in surveillance systems (particularly VIMD).
- Develop simple guidelines to standardise information on the circumstances and contributory factors to falls in the one-line case narratives in surveillance systems to increase their usefulness.

- Undertake an annual reconciliation of the Victorian home fall deaths data recorded on the Coroners' Facilitation System (CFS) and Australian Bureau of Statistics database.
- Conduct follow-up telephone surveys on injury cases involving slips, trips and stairway/step falls reporting to hospital emergency departments (through VEMD) to provide more information on exposure and the intrinsic, behavioural and environmental factors contributing to injurious falls.
- Advocate for and support the independent testing (under wet conditions) of household pedestrian surface materials advertised as slip-resistant or products advertised as conferring slip resistance to existing indoor and outdoor surfaces (in partnership with CSIRO and the Australian Consumers' Association).
- Support research to underpin the development of guidelines (and ultimately an Australian Standard) on the use of slip-resistive pedestrian surfaces for private dwellings
- Conduct a controlled study in institutional settings for older people with good falls recording systems to evaluate the effectiveness of slip-resistant flooring and floor treatments as falls prevention measures.
- Conduct research to more precisely describe the role and contribution of environmental factors to falls among older women and to better describe the mechanisms by which environmental factors contribute to falls.

## **2. Suicide and self-inflicted injury**

Intentional self-inflicted injury is a high-ranked cause of home injury among adult women at all levels of severity, except for GP presentations.

Intentional self-inflicted injury accounted for:

- approximately one-half (47.0%) of home injury deaths reported on the CFS; and
- a significant proportion of VIMD hospital admissions (7.1%) and VISS emergency department presentations (9.1%).

Women aged 45 years and older are more at risk of suicide. Women aged under 40 years appear to be the highest risk group for both VIMD hospital admissions and VISS emergency department presentations for self inflicted injury, accounting for approximately three-quarters of cases on both these databases.

### **Causes (means) of suicide**

- poisoning by solid and liquid substances (45.2% of suicide cases) mostly by "other specified drugs and medicinal substances";
- hanging, strangulation and suffocation (29.9%) mostly by hanging or suffocation by plastic bags; and
- other gases and vapours (12.6%) almost all by car exhaust (CO) gas.

## **Causes (means) of self inflicted injury**

- Poisoning by solid and liquid substances: 92.4% (VIMD hospital admissions) and 84.9% (VISS hospital ED presentations), mostly by pharmaceuticals; and
- cutting/piercing: 5.5% (VIMD hospital admissions) and 11.1% (VISS hospital ED presentations).

Self-poisoning by pharmaceutical drug overdose is the foremost cause of suicides, hospital admissions and VISS emergency department presentations for self inflicted home injury among women. Prescription drugs predominate. This pattern is also evident in accidental poisoning. The categorisation of pharmaceutical poisoning injury cases as intentional or accidental involves some subjectivity where evidence of intent is equivocal or unavailable. Therefore, intentional and unintentional self poisoning by pharmaceutical drugs are discussed together in chapter 9. Recommendations for prevention focus on measures that have good potential to reduce community access to those drugs that are over-represented in intentional and accidental self-harm cases with some consideration of data on prescriptions.

## **Drugs implicated in self poisoning (suicide and accidental poisoning) deaths**

Information on the drug agents implicated in deaths was only available for 17.0% of the drug-related suicides and 31.6% of drug-related accidental poisoning on the CFS database. Therefore, the findings reported here are tentative because the sample may not be representative and the number of specific drugs in each grouping was small.

When considered together, the pharmaceutical drugs most implicated in suicide and accidental poisoning deaths are:

- tricyclic antidepressants, particularly amitriptyline, doxepin (for suicides) and dotheipin (more prominently in accidental poisoning);
- opioid analgesics, particularly morphine/heroin (for suicides) and methadone (for accidental poisoning);
- benzodiazepine-based hypnotics and sedatives particularly flunitrazepam and temazepam; and
- anxiolytics (particularly diazepam) for accidental poisoning deaths.

## **Drug involved in hospitalisations (intentional and accidental)**

### *Intentional poisoning (suicide attempts)*

The drug groups most frequently involved in VIMD hospital admissions for intentional self inflicted poisoning are:

- tranquillisers and other psychotropics, including antidepressants (56.6%); and
- analgesics, including heroin and other opiates (18.1%).

The number of hospital admissions with heroin involvement could not be disaggregated from other analgesics for self inflicted injury cases on the VIMD. VISS hospital admissions data suggest that

heroin-related admissions for self-inflicted injury are few and that the specific drug most involved in analgesic overdoses is paracetamol.

The specific prescription drugs most implicated in self-inflicted poisoning in VISS hospital admissions were diazepam, temazepam and dothiepin.

### *Accidental poisoning*

Ninety per cent of all accidental self-poisoning VIMD hospital admissions involved prescription drugs, mostly predominantly benzodiazepine-based tranquillisers (21.0%), anti-depressants (19.3%) and paracetamol-based analgesics (16.2%). Heroin, methadone and other opiates were reportedly involved in only 3.0% of the accidental poisoning hospitalisations.

### **Prevention and control of self poisoning**

Efforts to reduce prescription drug-related deaths and hospital admissions should concentrate on primary and secondary prevention in the community including measures to:

- reduce community access to the drugs that are most involved in self-poisoning;
- ban drugs that have little therapeutic value and are implicated in self poisoning deaths (such as chloral hydrate and colchicine); and
- restrict the availability of drugs that are over-represented in deaths and admissions in proportion to prescription frequency

### **Recommendations**

- Establish a national poisoning prevention and control advisory committee comprised of clinicians researchers, industry representatives and other interested parties to:
  - monitor trends in mortality and morbidity related to toxic substances (both prescription and non-prescription), along with changing prescribing habits; and
  - make recommendations on reducing the availability and scheduling of identified hazardous substances (Coleridge et al 1992, Buckley et al 1995b, Cantor et al 1996).
- Support regulations to further restrict the availability of barbiturates (particularly pentobarbitone) and dextropoxyphene or have them withdrawn from the market (Myers et al 1981, Cantor et al 1989, Buckley et al 1995b, Cantor et al 1996).
- Limit the prescription size of anticonvulsants available on the PBS for epileptics with co-existent psychiatric problems (Buckley et al 1995b).
- Monitor the involvement in self poisoning deaths of the 'newer' and reportedly less toxic antidepressants such as fluoxetine and mianserin and, if they prove less toxic than 'older tricyclics' (and as efficacious), promote their preferred use in the treatment of depression (Rettersol 1993; Gunnell and Frankel 1994; Malmvick et al 1994; Henry et al 1995, Buckley et al, 1995a, Cantor et al 1996).

- Negotiate guidelines with the media to get them to avoid drawing attention to specific methods when they report suicides to prevent imitative suicides among young people (Cantor et al 1996).
- Support current negotiations being conducted by a coalition of key stakeholders and convened by the Federal Office of Road Safety and the Australian Medical Association to ensure the implementation of measures to reduce motor vehicle exhaust gassing suicides including engineering solutions or performance requirements which limit carbon monoxide (CO) emissions in car exhaust systems or prevent access to lethal doses of CO (Gunnell & Frankel 1994, Cantor et al 1996, Routley 1997; Routley 1998).
- Initiate or promote programs which enable the community to safely and conveniently dispose of unwanted or expired medication based on the successful program in the Hunter Valley region of NSW (Cantor et al 1996).
- Educate prescribers to consider the toxicity of drugs in overdose when making decisions on treatment and to more actively monitor compliance with treatment especially for patients with depression or experiencing traumatic life events, for example, the death of a family member or marital separation.
- Educate treatment agencies and general practitioners about the need for caution and careful monitoring when prescribing methadone and benzodiazepines to drug addicts (Coleridge et al 1992).
- Consider the findings and recommendations from research into factors contributing to the rise in suicides by hanging in Australia, currently being undertaken by the Australian Institute for Suicide Research and Prevention

### **Surveillance, research and investigations**

- Support the establishment of a national coronial database to better identify trends in suicide, the methods used and contributory factors, including specialised modules that focus on suicide and limit illicit drugs.
- Routinely link toxicological data to the National Coronial Information System.
- Standardise definitions to guide the classification of self-poisoning cases by intent, ie., self inflicted, accidental and undetermined, in all databases.
- Standardise methods of determining cause of death from poisoning and methods for attribution of aetiological fractions (Buckley et al 1995b).
- Improve the recording of place of occurrence (location) of self-inflicted injury on surveillance systems, particularly VIMD hospitalisations.
- Develop simple guidelines to standardise information in one-line case narratives in surveillance systems to increase their usefulness.
- Standardise ICD classification for heroin-related deaths and hospitalisations (self-inflicted and accidental) and re-classify heroin-overdose deaths that are apparently wrongly classified under 'adverse effects of drugs in therapeutic use' in the CFS.

- Support research to determine the mortality and morbidity caused by paracetamol overdose in Victoria including a closer examination of the trend of its use in self poisoning over time, and on the cost-benefit of potential countermeasures, for example, limiting availability and inclusion of an antidote (Hawton et al 1996; Gunnell & Frankel 1994; Gazzard 1976, Cantor et al 1996).

### **3. Poisoning (accidental)**

Non-intentional (accidental) poisoning is a major cause of more serious home injuries—fatalities and hospital admissions.

#### *Pharmaceutical drug overdoses*

Pharmaceutical drug overdoses are largely responsible for the fatal and serious non-fatal accidental poisoning. Although data are limited, the most frequently used classes of drugs involved in accidental poisoning appear to be: psycholeptic benzodiazepine-derived anxiolytics, sedatives and hypnotics; antidepressants; and analgesics.

#### *Alcohol*

- Alcohol (taken by itself) is the most prominent of the other accidental poisoning agents. It was reported as the primary cause of 16.7% of accidental poisoning fatalities and 10.1% of accidental poisoning VISS emergency department presentations.
- Additional information was only given in one-third of the case narratives on fatalities and in all of these cases the victim was described as an alcoholic or a person with a history of alcohol abuse. Information in the VISS narratives is also limited. The circumstances reported in one-half of the cases involving alcohol are: binge drinking at parties; drinking in response to domestic problems and feelings of depression; and a history of alcohol abuse.

#### *Foodstuffs and plants*

A range of foodstuffs and poisonous plants (most frequently mushrooms and other fungi) are implicated in a small proportion of VIMD hospital admissions (3.0%) and VISS emergency department presentations (5%) for accidental poisoning.

#### *Other agents*

Cleansing and polishing agents contribute to a significant proportion of less serious injuries (8.1% of VISS emergency department presentations). In a small number of VISS cases the victims mistook chemical cleaning substances for beverages (Kemdex solution for milk, lemon scented bleach for lemon drink, carpet cleaner for lime soda, industrial window cleaner stored in a lemonade bottle for lemonade, oleander fluid for wine).

#### *Age factors*

Women aged 40 years or older appear at higher risk of accidental poisoning death whereas younger women appear to be at higher risk of hospital admission and emergency department presentation for accidental poisoning. The same pattern is evident for suicide and self inflicted injury and requires further investigation.

### ***Other contributory factors***

Contributory factors to accidental poisoning are not well or consistently reported in the one-line narratives in the Coroners' Facilitation System but a history of drug abuse or chronic mental or physical illnesses appeared to be predisposing factors. Just over one-half of the accidental poisoning cases on the VISS databases appeared to be deliberate self poisoning with drugs and alcohol and highlight the difficulty of assigning self poisoning cases to intentional or accidental injury classifications.

### **Recommendations**

The recommendations relating to accidental poisoning by pharmaceutical drug overdose are in the suicide and self-inflicted injury summary above.

### **Strategies and countermeasures**

- Discourage manufacturers of cleaning products from adding perfumes and colours to cleaning agents that increase the risk of users (especially elderly people) confusing cleaning products with beverages.
- Educate householders to avoid decanting cleaning agents into drink bottles and to store all cleaning agents securely, away from sinks and separate from areas used to store bottles of drink.

### **Surveillance, research and investigations**

- Develop definitions (and guidelines for their application) for accidental and self-inflicted poisoning to assist the consistent classification of cases in surveillance databases.
- Improve the content of one-line narratives in injury surveillance systems so that the specific poisoning agents (including BAC reading for alcohol-related deaths), circumstances, predisposing and contributory factors are consistently reported.
- Investigate the different age-related pattern for self-poisoning deaths (intentional and accidental) compared to hospitalisations and emergency department presentations for self poisoning.

## **4. Cutting and piercing injury**

Cutting and piercing injuries caused only two deaths in the five years covered by the CFS database. However, cutting and piercing injuries are the third-highest ranked cause of hospital admissions, and the second-highest ranked cause of both hospital emergency department presentations and GP presentations.

- The specific products most involved in cutting and piercing injuries at all levels of severity, except deaths, are: knives, 'other (non-powered) hand tools and implements' and glass.
- Lawn mowers cause a significant proportion of the cutting and piercing injuries that required hospital admission.

## **Knife cuts**

- Knives are involved in approximately one-quarter of VIMD hospital admissions for cutting and piercing injury and ELVIS GP presentations (25.4% and 27.3% respectively) and three-tenths (30.8%) of VISS emergency department presentations.
- The analysis of VISS emergency department and ELVIS GP presentations data revealed that 70%-80% of knife cuts occur during food preparation and a comparatively smaller proportion (6%-11%) occur when knives were being washed or dried.
- The most common classes of foods being cut at the time of injury are fruit and vegetables and meat. The specific foods most reported as involved in knife cutting incidents are: meat (not specified), vegetables (not specified), cake, pumpkin, potatoes, carrots, leg of lamb and opening oysters.
- Details of the circumstances of the injury and food being cut at the time of injury are inconsistently reported in VISS emergency department and ELVIS GP case narratives.

## **Recommendations**

### **Strategies/countermeasures**

- Upgrade education about knife use and safety in post-primary Home Economics curriculum especially at the junior secondary school level.
- Develop and conduct an injury prevention campaign consisting of radio messages about the selection, safe use and storage of kitchen knives (linked by a 008 telephone number to a mailout of a brochure on knife use and safety).

*Guidelines on the selection, safe use and storage of knives are included in the report proper.*

### **Research/investigations**

- Conduct a follow-up research study of knife cut cases presenting to hospital emergency departments to more precisely determine:
  - the circumstances of knife cuts; the relative contribution of causal factors (for example, design of knife, sharpness of blade, incorrect use, poor cutting technique, sight and hand/finger disabilities);
  - the nature of the injury (including which hand was injured);
  - the food or item being cut at the time of injury; and
  - consumer acceptance of potential countermeasures (including protective gloves).
- Investigate the suitability (including hygiene issues) and acceptability to consumers of wearing a protective gloves (or one glove on the non-dominant hand) when cutting food.

- Investigate the feasibility and practicability of introducing an Australian and New Zealand Standard for Hand-held knives *for use in home food preparation* based on Standard AS 2336-1992 Meat industry-Hand-held knives.

### **Sewing needles and pins**

‘Other hand tools and implements’ account for 9.9% of hospital admissions for cutting and piercing injury in the VIMD database and a similar proportion of VISS emergency department and ELVIS GP presentations (8.7% and 11.7% respectively).

No finer breakdown codes are available to identify the specific hand tools and implements involved in hospital admissions. However, the analysis of VISS emergency department data (for both admitted and non-admitted cases) revealed that needles and pins were the most frequent cause of injuries in this classification and the injuries mostly occurred when sewing needles and pins, predominantly the former, were trodden on. These are serious injuries; 90% of the ‘trodden on’ piercing cases required hospital admission, presumably to remove the needle or pin. Needle and pin pierces were a less prominent cause of GP presentations, ranking behind scissor cuts.

### **Recommendations**

#### **Strategies and countermeasures**

- Train students learning garment construction, tailoring and hobby crafts and people practising these crafts to routinely ‘sweep’ the activity area with a magnet after each session involving pins and needles.
- Encourage manufacturers to include magnets in hand sewing and sewing machine accessory kits.
- Advocate for the inclusion of safety tips/hazard warnings about needle and pin injuries in sewing machine instruction booklets and on needle and pin packets.

### **Broken glass**

Information on the frequency of broken glass-related VIMD hospital admissions are not available because these injuries are classified with other causes in the ICD9 system under ‘other specified cutting and piercing instruments’. However, VISS hospital admissions data give some indication of their frequency.

Broken glass injuries accounted for two deaths, just over one-quarter (26.1%) of all VISS hospital admissions for cutting and piercing injuries, 21.1% of all VISS cutting and piercing non-admissions and approximately one-tenth (9.8%) of cutting and piercing injuries recorded on the ELVIS GP database.

- One of the two deaths and between one-quarter and one-third of the glass-related cutting and piercing injuries resulting in VISS emergency department and ELVIS GP presentation are caused by broken glass from windows and doors. The most common scenarios reported in VISS and ELVIS case narratives were ‘tripped fell through glass door/window’, ‘put hand through door/window’, ‘knocking on door/window, glass broke’.
- Other prominent causes of glass cuts are: ‘broke glass when washing dishes’, ‘broke glass during cleaning tasks/handling’, ‘stepped on broken glass’.

In September 1991 Victoria incorporated the 1989 revision of the Australian Standard (AS1288-1989 *Glass in Buildings - Selection and Installation*) into Victoria's Building Code. This mandated the use of safety glazing materials (toughened, laminated or organic) in some residential 'high risk' situations in new housing or houses undergoing renovations that require a permit. Hazardous glass in existing housing stock is still a problem. There is no onus on householders to replace broken annealed glass with safety glass.

## **Recommendations**

### **Strategies and countermeasures**

- Educate suppliers, glaziers and insurance companies to recommend the replacement of annealed glass with safety glass whenever broken glass is replaced in the doors and windows of homes.
- Promote the advantages of safety glass to consumers.
- Reduce the price difference between safety and annealed glass.
- Educate householders to:
  - apply special plastic film, bars, rails, warning stickers or decals on hazardous glass in the home; and
  - select safety glass when broken glass is being replaced in windows and doors.

### **Surveillance, investigations and research**

- Investigate whether the incorporation of the 1989 revision of the Australian Standard (AS1288-1989 *Glass in Buildings - Selection and Installation*) into Victoria's Building Code regulations has been effective in reducing architectural glass injuries in the home and other high risk settings.

### **Lawn mower cuts**

- Lawn mower injuries accounted for 8.0% of hospital admissions for cutting and piercing home injuries on the VIMD database and a lesser proportion (3.7%) of VISS hospital emergency department presentations (but were over-represented in VISS admissions compared to other causes of cutting and piercing injuries).
- Lawn mower injury accounted for only a small proportion (1.9%) of the cutting and piercing injuries on the ELVIS General Practitioner database.
- The analysis of the case narratives of a sample of VISS emergency department presentations revealed that most injuries occurred when the user's hand or foot came into contact with the blade of the mower.
- The hand injuries were caused when the user put her hand too close to the blades when taking the grass catcher off, adjusting the blades (with motor running) and removing blocked grass. These injuries usually required hospitalisation.
- The foot injuries occurred when the user's foot slipped under the mower while it was operating.

Note that injuries to the eye caused by objects thrown up by mowers are classified under a different ICD9 E-code: 'Accidents caused by submersion, suffocation and foreign bodies'.

## **Recommendations**

### **Strategies and countermeasures**

- Review the design of powered hand-held motor mowers to provide a discharge chute that deflects struck objects in a downward direction.
- Revise the voluntary standard *AS/NZS 2657-1985 Powered Rotary Lawnmowers* to require:
  - a prominent label (visible from operating position) that warns of the danger of hand and feet injuries (including time of blade run-on); and
  - an operator presence control (OPC) design feature that shuts off the blades if the operator leaves the normal operating position.
- If research findings support regulatory action mandate that all powered mowers sold in Australia meet the appropriate (revised) AS/NZS standard for lawnmowers (AS/NZS 3792-1992; AS/NZS 2657-1985).
- Raise consumer awareness of the hazards of lawn mower use and the need to:
  - use the safety features provided consistently and wear protective clothing (eye protection, boots, gloves and ear muffs);
  - keep hands clear of blades whenever the engine is running and/or the blades are moving;
  - shut down mower engine and wait for blades to stop circling before adjusting the mower or its parts in any way, unclogging the blades or blade area or carrying it;
  - remove stones and other debris from the area before commencing mowing and keep bystanders clear from possible flying objects;
  - refuel mower out-of-doors and well away from open fires and cigarettes; and
  - use a portable safety switch when using an electric mower and to take special care never to use an electric mower near water or when it is raining and never to pull it backwards.

### **Surveillance, research and investigations**

- Conduct a telephone follow-up survey of cases presenting to emergency departments of VEMD hospitals with hand, foot, eye and other injuries associated with lawn mowers to more precisely determine the causes of these injuries, in particular the relative contribution of design factors and unsafe user behaviour. Use the findings to revise the Australian and New Zealand Standards for lawnmowers with a view to mandating the Standard if the survey shows this step to be warranted.

## **5. Hit, struck and crushed injury**

Hit/struck/crushed injuries are rarely fatal, only two deaths are recorded on the CFS over the five-year covered by the database. Although these injuries are a middle-ranked cause of VIMD hospital admissions and VISS emergency department presentations, they account for only a small proportion of home injuries at each of these levels (2.4% and 5.5% respectively). They are a more prominent cause of minor injuries, accounting for 16.2% of ELVIS GP presentations.

- At all levels of severity, except fatalities, the most frequent cause of hit/struck/crushed injuries is victims striking against or being struck by objects or persons.
- Objects falling on the victim caused the two fatalities. Falling objects were also prominently involved in VISS emergency department presentations, causing approximately one-third of injuries at that level of severity.

It is estimated from available data that 190 women are admitted to hospital each year in Victoria for hit/struck/crushed injuries that occurred in the home. The annual frequency of emergency department and GP presentations cannot be estimated from the available data, as they are not complete. Older women (women aged 60 years and older) appear to be more at risk of hit/struck/crush injuries at all levels of severity

### **Hit by or struck against injuries**

- Overall, most hit/struck/crushed injuries occurred when the victim is hit by or struck against an object when doing chores around the house and in the yard and garden.
- Detailed information on injury events is not available for VIMD hospitalisations. The analyses of the CFS, VISS and ELVIS case narratives revealed that a large number of objects are implicated. For example, there were 26 different objects involved in the 56 ‘striking against/struck by’ injury cases on the VISS emergency department database (excluding cases involving persons and animals).
- Doors (hitting victims), motor mowers or whipper snippers (kicking up debris onto users and bystanders) and hammers (mainly hitting the user’s finger or hand) were the objects most frequently involved in VISS injury cases (although the number of reports in each grouping was small). Items of furniture (stools, chairs, coffee tables, beds, couches, cupboards and benches) and doors were the objects most frequently involved in ‘striking against/struck by’ injury cases presenting to GPs.

### **Struck by falling objects**

- The two deaths recorded on the CFS were each caused by falling objects: a tree limb and a wardrobe.
- Household furniture items (beds, drawers, tables, wardrobes and cupboards and chairs and stools) are the most prominent of the ‘struck by falling object’ cases that presented to VISS hospital emergency departments and ELVIS General Practitioners. The heavier furniture items caused injury when they were being moved.

## Crushing injuries

- Door jam injuries (involving both swing and sliding doors) are the most frequent ‘caught between or in’ injuries. The analysis of VISS hospital emergency department narratives showed that a variety of doors were involved e.g. room, oven, cupboard, shower and car. In ELVIS GP narratives room and entry doors were most commonly implicated.
- The closing, not the hinge, side of household doors appears to be the problem for adults (in contrast to children’s door jam injuries).

## Type of injuries

Open wounds and fractures are the most frequent causes of hospital admissions. Bruising and cuts and lacerations (to the foot, toe, finger, hand and face) predominate in VISS emergency department and ELVIS General Practitioner presentations.

## Recommendations

### Strategies and countermeasures

*Educate householders to implement the following safety measures:*

- Install door stops and door closures on room and entry doors to prevent door-jam injuries.
- Fix heavy wardrobes, bookshelves and wall units to walls.
- Only move heavy items (wardrobes, wall units and shelving systems) if trained, and use special moving equipment as appropriate
- To prevent injuries from debris thrown up by lawnmowers:
  - clear area of all debris before commencing mowing
  - allow no bystanders or helpers (including people gardening) around the area during mowing
  - wear safety equipment (goggles, ear muffs, gloves, heavy clothing and boots).
  - *(see also recommendations to prevent lawnmower-related cutting and piercing injuries)*
- To prevent hammer-related injuries:
  - wear goggles and gloves
  - make sure hammer head is not chipped or burred
  - strike a hammer blow squarely, with the striking face of the hammer parallel to the surface being struck
  - use only the striking face of the hammer, never the side or flat of the hammer.

## 6. Fire, burns and scalds

Fire, burns and scald injury is a middle-ranked cause of adult female home injury at all levels of severity. On average, between 9 and 10 adult women die each year in Victoria from fire, burns and scalds that occur in the home (representing 6.0% of injury deaths recorded on the CFS). Projected from available data, an estimated 150 women are admitted to hospital with fire, burns and scald injuries each year (2.0% of VIMD hospital admissions for injury). Burns and scalds account for 4.3% of VISS emergency department presentations and 5.9% of GP presentations. The annual incidence of hospital emergency department and GP presentations cannot be estimated from the available data because they are not complete.

A different pattern of causes was evident for fatalities when compared with fire, burns and scald injuries at the other levels of severity.

- Over four-fifths of the deaths are caused by fire and flames.
- Scald injuries from hot liquids and vapours, including steam, predominate at the other levels of severity (hospitalisations, emergency department presentations and GP presentations), where they contribute approximately one-half of the fire, burns and scalds cases. However, fire and flame injuries are still a significant cause of hospitalisations, contributing one-third of VIMD hospital admissions.
- Burns from hot objects are less frequent overall, but contribute a significant proportion of hospitalisations and less severe injuries (14% and 29% respectively).

These major causes will be discussed separately because, in general, they require different preventive interventions.

### **Burns and smoke inhalation associated with fire and flames**

#### *Deaths*

- House and room fires and ignition of clothing and bedclothes cause most deaths due to burns and smoke inhalation.
- The predominant sources of ignition for fatal fires are smoking products (unextinguished cigarettes or matches) and faulty electricals either house wiring or household items, particularly electric blankets.
- The ignition sources of fatal fires are different for the older and younger age groups. Smoking-related products are the predominant ignition source for the fires involving the younger age group (women aged under 65 years), followed by faulty electrical products and wiring. By contrast, only one of the eleven fires started by smoking-related products occurred in the older age group (women aged over 65 years).
- The main sources of ignition for the fatal fires involving older women (who were the highest risk group for fire-related deaths) are:
  - heating sources (radiators, pot belly stove, open fire);

- cooking stoves (either fires from food left unattended, gas left on or clothing catching fire while - the victim was cooking); and
- faulty electric products or wiring.
- Electric blankets are the electrical product most implicated in fire-related deaths for both the younger and older age groups, although a possible alternative ignition source was reported for three of the five fatal fires attributed to electric blankets.
- Alcohol is mentioned as a factor in three fire-related deaths, but alcohol involvement is probably inconsistently reported.

### ***Hospital admissions***

- The main causes of VIMD hospital admissions for fire and flame burns are: house and outbuilding conflagrations; ignition of clothing; ignition of highly inflammable material (fuels, fat) with ignition of clothing; and burning by controlled fires (sources of heating).
- The VIMD does not give any more information on sources of ignition and other contributory factors, and the VISS one-line narratives were not useful in establishing causal patterns as there was only a small number of fire and flame hospitalisations on the VISS database. Data from fire authorities reveal that the type of material most frequently ignited in house fires (defined as fires in one- and two-family dwellings) is food fat, grease or oil.
- Women aged 60 years and older are most at risk of hospital admission for burns.

### **Scalds by hot liquids and vapours**

- Six of the seven scald injury deaths recorded on CFS were caused when the predominantly elderly victims were bathing or showering (the other was caused by a spilt pot of hot soup). Epilepsy or 'fitting' was reported as a factor in three of the six scald deaths that were associated with bathing.
- Over one-half of VIMD hospital admissions are for scalds from hot liquids and vapours but the E-coding does not differentiate between types of liquids and steam. VISS emergency department data for admissions suggest that hot water (predominantly contacted when bathing) and hot oil splashes and spills are the main causes of the more severe burns and scalds, although the number of cases in the VISS hospital admissions subset was small ( $n=31$ ).
- Hot water scalds are the primary cause of VISS emergency department non-admissions. These injuries are predominantly caused by boiling or hot water spills that occur when victims are making hot drinks or cooking (less than 1.0% occurred during bathing). This pattern was also evident in GP presentations. Oil and fat splashes and spills during cooking, hot drink spills and steam burns are the other major causes of less severe burn and scald injuries (VISS hospital emergency department non-admissions and G.P presentations).

### **Burns from hot objects**

- There were no deaths attributed to burning by hot objects on the CFS, although there was one case where a woman collapsed against a heater, which set her clothes on fire.

- The VIMD does not record specific details of the objects that caused the burns in the 14.3% of burns and scald hospitalisations that were attributed to hot objects. There were no cases of burns by hot objects in the VISS admissions data.
- VISS data on emergency department non-admissions and the GP data indicate that women were mostly burnt when handling hot cookware (pots, pans, dishes and trays), touching hotplates, stoves and ovens when cooking or, to a lesser extent, when they fell onto a heater or fell asleep in front of a heater.

## Recommendations

### Strategies and countermeasures

- Promote the availability and widespread installation of single purpose lithium smoke alarm batteries (which last ten years) and electric safety switches (power outlet, permanently installed switchboard units and portable units) in existing homes.
- The MFB and the CFA should trial and evaluate the effectiveness of a local doorstep purchase/free installation smoke alarm scheme in association with a local area survey on smoke alarm compliance in at least one defined area.
- Adapt and extend the current multidimensional Victorian child scalds prevention campaign, *Hot water burns like fire* to cover community living older people, and adults with disabilities, conditions and illnesses (particularly epilepsy) that put them at higher risk of burn and scald injuries.
- Implement outreach burn and scald prevention programs (which include installation of smoke detectors) for homebound older people and people with disabilities (see safety guidelines below).
- Implement general community education, to raise awareness among women of the hazards posed by boiling water, hot oil and steam and to re-enforce the cooking and handling techniques which reduce the risk of burns and scalds.
- Advocate the development and implementation of an Australian & New Zealand Standards that require cigarettes to be fire-safe (self-extinguishing) in collaboration with international developments.
- Upgrade fire and burn safety education in secondary school level courses, particularly in Home Economics, and develop or make available resources to assist students to identify burn hazards and solutions when designing their individual practical projects at the more senior levels of study.
- Identify industry or sponsorship support for the further development of a spill-resistant mug to reduce scalds from hot drink spills.
- Approach manufacturers of stoves and cooktops to seek design changes to reduce the risk of 'granny gown' and contact burns and investigate the incorporation of US developments to prevent cooker-top fires. .

- Develop and trial protective sleeves made of fire-resistant material with elasticised wrists to prevent clothing ignitions while cooking (to be promoted particularly to older people and to people with disabilities affecting their manual dexterity and reach).
- Encourage food manufacturers and distributors to place warning labels (including instructions on safe frying techniques and the correct response to fat and oil fires) on cooking oils and frozen products cooked by shallow and deep-frying.
- Encourage manufacturers, importers and consumer authorities to conduct a product safety review of stoves and cooktops.

### **Surveillance, research and investigations**

- Produce guidelines to improve one-line case narratives on data surveillance systems, for example CFS, so that the ignition source of the fire, premorbid conditions of victims and alcohol involvement are routinely reported.
- Improve quality and accessibility of data collection systems on fire-related injuries and institute systematic monitoring and routine sharing of information among agencies with responsibility for prevention and control measures.

## **7. Homicide and assaultive injury**

The fatal assaultive injury cases in the home are mostly the result of incidents of domestic violence, which is variously defined as ‘partner’, or ‘spousal (legal or defacto)’ violence or violence between ‘intimates’. Violence perpetrated by family members is sometimes included in the definition of domestic violence. In the analyses of CFS and VISS case narrative data boyfriends and ex-boyfriends were grouped with other ‘partners’, and violence perpetrated by other family members was grouped separately. The lack of an agreed definition of ‘domestic violence’ complicates the estimation of incidence in an area where data is necessarily drawn from a number of sources (e.g. health, police and crime statistics and community surveys).

- Homicide and assaultive injury is the third-highest ranked cause of female injury death in the home, accounting for 7.9% of home injury deaths.
- Assaultive injury is a low- to middle- ranked cause of VIMD hospital admissions and VISS emergency department presentations, accounting for 1.7% and 5.1% of home injuries respectively.
- According to ELVIS GP data, assaultive injury is a low-ranked cause of GP presentations, contributing 1.4% of home injuries. This is probably an underestimation because the ELVIS data are drawn from one rural region.

It was difficult to accurately estimate the proportion of domestic and family violence cases on the CFS and hospital-based databases because of inconsistent reporting in the one-line case narratives of information on the perpetrators of the assaults (including relationship to the victim). Under reporting is a well-documented feature of all data collections on domestic and family violence.

## **Deaths (fatal assaults)**

- Sixty-three adult female fatal home assaults were recorded on the CFS database over the 5-year period 1989-90 to 1993-94 (an average of 12-13 fatal assaults in the home per year). They are mainly shootings and stabbing.
- A substantial proportion of these fatal assaults are the result of ‘domestics’ but an accurate estimation of how many is not possible because the assailant’s relationship with the victim was only specified in just over one-half (54.0%) of the fatal assaults recorded on the CFS.
- In approximately 85.0% of cases where the assailant was reported as known to the victim, the assailant was identified as a partner (‘intimate’) of the victim ie. the former or current husband, de facto, ‘partner’ or boyfriend. In a further 6.0% of cases the assailant was a family member or related by marriage to the victim. In only one narrative was the assailant described as unknown to the victim.

## **Hospital admissions**

The poor reporting of the place of occurrence (location) of injury in VIMD hospital admissions database prevents an accurate estimation of the incidence of hospitalisations from violent episodes in the home.

There were 399 cases of assaultive home injury hospitalisations recorded on VIMD from 1987/88 to 1993/94 (annual average 57 cases). However, only about one-fifth of all female assaultive injury cases on VIMD in that period ( $n= 2,633$ ) were coded for place of occurrence of injury. Approximately 71.0% of the coded cases were for assaultive injury that occurred in the home. If the incidence is re-calculated on this basis it is likely that the annual number of hospitalisations from assaults in the home is in the vicinity of 270 cases. The accuracy of this estimation depends on whether the group of cases coded for location is representative of all cases of assaultive injury (and this could not be checked). This estimate does not take into account undetected cases of domestic violence that are admitted to hospitals.

## **Hospital emergency department presentations (including admissions)**

Assaultive injuries are a mid-ranked cause of female home injury presentations to VISS hospital emergency departments, accounting for 5.6% of home injury presentations.

- Unarmed fights (65.3%), assault by cutting and piercing (7.1%) and assault by blunt or thrown objects (10.3%) are the significant causes of injury.
- The assailant is most frequently a current or former partner (husband, defacto or boyfriend) of the victim (representing 56.1% of cases where information on the assailants’ relationship to the victim was given in the case narratives).
- A wide range of ‘first degree’ relatives (mostly sons and brothers) and relatives by marriage inflicted the assaultive injuries by family members other than partners (representing 16.3% of cases where information on the assailants’ relationship to the victim was given in the case narratives).

## **General Practitioner presentations**

Only a small proportion (1.4%) of ELVIS GP presentations were for assaultive injury. Compared to other reports this is a comparatively low figure. It may be explained, in part, by the rural nature of the ELVIS collection (which may result in under-reporting) and the unavailability of GPs in the evenings and at weekends in rural areas which is the peak time for assaultive injury presentations to emergency departments (as shown in VISS data). Also, for reasons of privacy, in rural areas women may choose to attend an emergency department with assaultive injury rather than present to their GPs.

### ***Methods of assault***

- The majority of homicides involved a weapon. Guns (31.7%, mostly shotguns) and cutting and piercing instruments (30.2%, presumably knives) were the most frequently used weapons.
- At the other levels of severity, injurious assaults are mostly unarmed hitting incidents. VISS emergency data suggest that a substantial proportion of these occur during domestic arguments.

### ***Age of injured women***

At all levels of injury severity women aged less than 40 years appear more at risk of assaultive injury than do older women. There was also a peak of homicides in women aged 65-74 years but this pattern was not evident at the other levels of severity. This could be a manifestation of under-detection. Older women may be less likely to report domestic assault as the cause of their injuries or may be less likely to be identified as victims of assault by hospital emergency department staff and general practitioners.

### ***Time of injury event***

VISS data on emergency department presentations shows that there is a higher frequency of assaultive injury presentations at weekends, starting from Friday at around 8pm, peaking on Saturday and Sunday nights from 7pm. There were also peaks in the evenings of weekdays. This pattern has implications for the provision of referral services.

## **Recommendations**

The tentative nature of these findings highlight the problems with available data on assaultive injury in the home, particularly in relation to domestic violence, and the need for systems-wide improvements in data collection on domestic violence.

### **Strategies and countermeasures**

- Train and support hospital emergency staff and GPs to identify, record and deal with domestic violence cases.
- Ensure that domestic violence referral services operate at night and on weekends.

### **Surveillance, research and investigations**

- Improve the compatibility of existing data systems that record cases of domestic and family violence

- Improve data collection and recording of domestic violence on CFS, VIMD and emergency department injury surveillance systems:
  - ensure that the assailant's relationship with the victim and other useful information on the circumstances of the injury event are systematically reported in CFS and VEMD case narratives;
  - improve the reporting of the place of occurrence (location) of injury in VIMD hospital admissions database and the new emergency department system (VEMD);
  - introduce a locally expanded ICD9 E-code classification to identify the perpetrator and record other circumstances of injury in cases of interpersonal injury and abuse presenting to hospitals; and
  - encourage GPs to systematically record cases of domestic violence.

The lower-ranked causes of home injury —natural and environmental injury; choking, suffocation and foreign bodies in orifice; and overexertion and strenuous exercise— are dealt with in the body of the report (chapters 15-17).



## **PART ONE**

# **Introduction and overview of women's injury in the home**

- **Introduction, data sources and limitations**
- **Place of occurrence of injury to males and females in Victoria**
- **Female home injury deaths**
- **Female home injury hospital admissions**
- **Female home injury hospital emergency department presentations**
- **Female home injury General Practitioner presentations**



# 1 INTRODUCTION, DATA SOURCES AND LIMITATIONS

## 1.1 INTRODUCTION

Home injury is a neglected area of research. This may be because there is a lack of appreciation of the size of the injury problem in the home and because the home is perceived to be a difficult setting to access for injury prevention purposes, particularly for adults, because it is part of the private domain. The Department of Human Services commissioned Monash University Accident Research Centre to investigate the size, nature and major causes of women's injury in the home in Victoria and to make recommendations on strategies and countermeasures to reduce the burden of home injury.

## 1.2 AIMS

The aims of this project are to:

- describe the size and nature of the problem of women's injuries in Victoria, in the context of all (male and female) injuries and all women's injuries;
- describe the epidemiology of women's injuries in the home at all levels of severity by means of the analyses of available databases;
- examine in depth the major causes of women's home injury to determine appropriate countermeasures for wider implementation;
- determine, by means of a randomised community survey, women's exposure to specific risk factors for injury (hazards) and protective factors in the home; and
- develop recommendations for the implementation of countermeasures to women's home injuries in Victoria and elsewhere

Two separate reports have been produced from this project. The major report covers the epidemiology of women's injury in the home in Victoria, using statewide data where available. The second report (published separately) covers a small area study of women's home injury in the Latrobe Valley Region (data is available on medically-treated injury at all levels of severity in the Latrobe Valley in 1995) and includes information from the community survey that was conducted in December 1995.

## 1.3 KEY DEFINITIONS

**Home injury:** For the purposes of this study a *home injury* is defined as an injury that occurred in a woman's own home or another person's private dwelling, including tents and caravans but excluding residential institutions and hospitals. The definition covers the living space, garage and yard of the private dwelling but excludes the driveway.

**Adult woman:** For the purposes of this study an adult woman is defined as a female aged 15 years or older.

## 1.4 METHODS

The size, nature and major causes of home injury among women were identified from an analysis of data (including case narratives where available) from:

- the Victorian Coroner's Database 1989-90 to 1994-95 (deaths);
- the Victorian Inpatient Minimum Database 1987-88 to 1994-95 (hospital admissions);
- the Victorian Injury Surveillance System (hospital emergency department presentations data collected from four hospitals for different periods from 1991-92 to 1994-95); and
- the Extended Latrobe Valley Injury Surveillance project 1994-95 (a regional collection of data on General Practice presentations).

Some injury exposure data were derived from a random telephone survey of 497 households which included a woman aged 18 years and older (who became the respondent) in the postcoded catchment area of the Latrobe Regional Hospital. Data on home injuries were gathered for all women aged  $\geq 15$  years living in the household of the respondent.

## 1.5 SOURCES OF DATA AND LIMITATIONS OF DATABASES

### 1.5.1 Mortality (death) data

The Victorian State Coroner's Office (VSCO) maintains a relational database on all deaths reportable to the Coroner (the Coroners' Facilitation System-CFS). Because a medical practitioner certifying death is required by law to refer most accidental deaths to the coroner, the CFS is a major source of detailed information on fatal injury in Victoria. Selected data from Coroners' investigations for the five years July 1, 1989 to June 30, 1994 have been coded, computerised and published and are supplied to MUARC in electronic form.

#### *Database fields*

- The Caseflow Analysis Section, Department of Justice supervises the coding of the Coroner's Finding using Standard Procedure Instructions and Coding Rules.
- External cause of injury (E-code) is coded according to the *International Classification of Diseases. Ninth Revision. Clinical Modification* (ICD9-CM) (1986)
- The codes for location, context, mechanism, intent, breakdown (precipitating event), location and factors are based on those developed for the National Injury Surveillance and Prevention Project (NISSP) with some modifications made by the Caseflow Analysis Section.

- Intent is coded as ‘accidental’ unless specifically stated otherwise in the inquest finding. Determination of intent is based on the scientific evidence presented at the inquest. The Coroner makes a finding of suicide only for cases where there is actual evidence of intent, such as a suicide note. A finding of undetermined intent will be made in cases where there is insufficient evidence to confirm intent. Consequently, intentional injury deaths may be underestimated in this database. Elderly home fall deaths are also underestimated because they are not all reportable to the Coroner.

### ***Output from CFS***

Cases of death due to natural causes are removed from the analysis subset. SPSS-X (1988) is used to analyse the data set to generate the frequency and distribution of injury deaths by major factors such as age, sex, external cause of death, intent and other relevant variables. The database has the capacity to record up to three activity or product factors associated with the fatal injury event. Frequencies are expressed as totals for the five years of data (1989-90 to 1993-4).

### ***Limitations of the database***

- Data are presented according to the year in which the Victorian Coroner completed the findings. If the findings are made too late for inclusion in the publication for the relevant year they are not represented in the data. Deaths that occurred in the years prior to 1989 are included if the findings were delivered from 1989 to 1994. Significant bias as a result is unlikely, because the time lag between death and finding is likely to be fairly constant from year to year.
- Some deaths of non-Victorian residents may be included, since the Coroner investigates a death if the body is in Victoria, or it appears to the Coroner that the death, or the cause of death, occurred in Victoria, or the deceased ordinarily resides in Victoria. The number of deaths that fall into this category is likely to be small.
- The CFS underestimates home fall deaths among elderly people because not all deaths caused by complications of fractured neck of femur are reportable to the Coroner. Notification of these deaths by the certifying doctor is generally regarded as unnecessary if the injury occurs as a result of a fall at home and osteoporosis or the frail condition of the patient may have contributed to the injury.

- As a result of these features, there may be some variation between findings based on CFS data and those based on a different data set for the same time period (for example, Australian Bureau of Statistics mortality data).

The coded data on CFS is necessarily abbreviated and cannot contain the in-depth case-specific information in the inquest records. It is useful for epidemiological purposes. More detailed information is accessible from the Coroner's computerised records of all cases from 1992 onwards. These records include initial, police and toxicology reports and the Coroner's Finding. The quality of the investigative procedures and of the information provided to the Coroner will impinge on the results of both epidemiological and case series analyses.

### **1.5.2 Hospital admissions data**

The Victorian Inpatient Minimum Database (VIMD) is a collection of data on admissions to Victorian hospitals and comprises a minimum data set including demographic, diagnostic and procedure details.

All Victorian public hospital admissions from July 1986 are covered by the VIMD and coverage has progressively been extended to all Victorian private hospitals. Monash University Accident Research Centre (MUARC) has been authorised to purchase data relating to injuries annually and holds a subset of VIMD records, selected by External-cause-of-injury-codes (E codes) from the International Classification of Diseases Ninth Revision Clinical Modification (ICD9-CM) (1986). This subset encompasses a range of variables relating to each injury hospitalisation for the period July 1987 to June 1996 (9 years). The 1986-87 data are incomplete and are usually excluded from analyses, as are data from private hospitals because the collection only began in 1992-93. Second or subsequent hospitalisations for the same injury are usually excluded if they occurred within 30 days of the initial admission. Seven years of the available data were included in this study (1987-88 to 1993-94).

The fields in the database include:

- hospital codes
- patient's date of birth, age at admission, birth country, marital status, postcode of residence
- date patient admitted and discharged, length of stay, departure status
- procedures/operations performed (main, second and third)
- external cause of injury to patients (ICD9 E-code group)
- medical injury conditions observed in the patient (N-codes)-diagnoses

### *Limitation of database*

- The ICD9-CM external-cause-of-injury codes used in VIMD, although useful, are limited in the amount of detail provided about the injury event.
- There are several quality control measures programmed in the data coding and entry software; however, there are no regular validation procedures.
- Because medical record clerks around the state code the data, there is some potential for different interpretation of coding schedules.
- The introduction of casemix funding and associated changes have affected hospitalised injury admission rates
- The major limitation in relation to this study is the poor recording of place of occurrence of injury; only 30.2% of female injury cases on the database were coded for location of injury.
- Other limitations relating to quality and completeness of data have been documented elsewhere (Watt 1992; Watt 1995).

### 1.5.3 Hospital emergency department presentations

#### *Victorian Injury Surveillance System*

The Victorian Injury Surveillance System (VISS) was established in 1988 to collect and analyse injury presentations data from hospital emergency departments and to disseminate information for the purposes of injury prevention. The presentations data include admissions and non-admissions. The VISS manual data collection operated until 1996 when it was replaced by the electronically collected Victorian Emergency Minimum Database (VEMD) which covers 25 public hospitals across Victoria.

VISS, which began as a paediatric collection, expanded to include data on adult injury presentation to the emergency departments of participating hospitals from January 1991. Four hospital campuses contributed adult injury data to the VISS database for varying periods over the duration of the study period 1991 to 1995: Western Hospital (Footscray), Latrobe Regional Hospital (Moe and Traralgon campuses), Preston and Northcote Community Hospital, and Royal Melbourne Hospital. The data collection period for each hospital is shown in the table below.

<b>Hospital</b>	<b>Principal age range of patients</b>	<b>Period of collection</b>
Western Hospital, Footscray	Adults	11.12.90 – 31.12.93
Preston and Northcote Community Hospital	Adult	1.3.92 – 28.2.93
Latrobe Regional Hospital, Traralgon and Moe	All ages	1.7.91 – 30.6.95
Royal Melbourne Hospital	Adults	1.3.92 – 28.2.94

The VISS database is a rich source of detailed information of utility to injury research and intervention. A standard instrument for injury surveillance has been used throughout Australia by emergency departments collecting injury data. It collects demographic data, in addition to information relating to the injury event such as the mechanism of injury and associated factors. The patient, carer and doctor filled in the form on a voluntary basis. The completion rate of data collection forms for the VISS hospitals ranges from 85 per cent (frequently more than 90 per cent) for presentations to 100 per cent for admissions.

Complete years of data from each VISS participating hospital are pooled to provide data for analysis, thereby minimising seasonal bias. The data are analysed using the Injury Surveillance Intelligence System (ISIS) to generate frequency distributions to compare the nature and extent of injury presentations (non-admissions and admissions).

### ***Limitations of VISS***

- VISS data are not coded using the ICD9E-code classification system and cannot be easily converted. To enable comparisons of causes of injury across the various levels of severity for this study, VISS ISIS coded data were electronically converted (by trial and error to get the closest possible fit) to the major ICD9E-code cause of injury groups. The cases were then manually classified to derive the finer E-code groupings using information in the one-line case narratives. This process was complex and resulted in some loss of capture and misclassification. It was necessary to estimate finer E-code breakdown frequencies from an analysis of a sample of cases for the major injury causes (falls, intentional self-inflicted injury and cutting and piercing injury).
- The VISS database of adult self-reported hospital emergency department presentations may not be representative of all emergency department in Victoria in that injury patterns could be influenced by the geographical location and nature of the four VISS participating hospitals. Nevertheless the detail in VISS is substantial, and can be used to supplement the lack of specific detail in VIMD.
- Injury rates cannot be generated from VISS data (except for the Latrobe Regional Hospital postcoded catchment area) because the population forming the denominator is difficult to define.

### **1.5.4 General Practice presentations**

The Extended Latrobe Valley Injury Surveillance (ELVIS) project collected injury data over a twelve-month period (7 November 1994 to 6 November 1995) from general practitioners participating in the Latrobe Valley Research Network within the Central West Division of General Practice. All new (defined as the first presentation) cases of acute unintentional and intentional injury (including poisoning) were collected manually on forms provided and sections were completed by the patient or the general practitioner as directed. Information collected included demographic data, activity and location at the time of injury, circumstances leading to the injury and diagnostic data.

A computerised data entry system was developed using Epi Info (version 6.0) and the coding system was based on the Information Surveillance and Information System (ISIS) used for emergency department injury surveillance throughout Australia. In addition, each case was assigned an external cause of injury code from the International Classification of Diseases Ninth Revision Clinical Modification (ICD9CM).

Nineteen out of 21 practices in the Latrobe Valley participated, resulting in a 90% practice participation rate and a 96.5% practitioner participation rate. The collection captured 77% of injury cases. Data quality was good. There was a high rate of completion for each of the data variables

ranging from 94.3% to 99.9% and the case narrative quality control scores were acceptable (Day et al 1997).

### ***Limitations***

The major limitation is that the data were collected from one region of country Victoria and therefore may not be representative of general practice injury presentations for the whole of Victoria. However, it is the only comprehensive collection undertaken to date in Victoria.

### **1.5.5 Other data**

**Injury rates:** Injury rates were calculated on adjusted population estimates derived from ABS 1986 and 1991 census data for Victoria by Watt (1994, unpublished).

## **1.6 STRUCTURE OF REPORT**

The remaining chapters in this section report on the broad analysis of data on women's injuries in the home in the major databases. Section two deals with the major causes of injuries from all databases and includes recommendations for strategies and countermeasures to prevent home injuries to adult women in Victoria.

The report on home injuries to women in the Latrobe Valley region including the Latrobe Valley Women's Home Injury Survey is published separately.

## 1.7 REFERENCES

- Day L., Valuri G., Ozanne-Smith J. General Practice injury surveillance in the Latrobe Valley. Monash University Accident Research Centre. Report No 113. Melbourne: Monash University Accident Research Centre, 1997.
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## 2. PLACE OF OCCURRENCE OF ALL ADULT INJURY

Injuries to Victorian adults are more likely to occur in the home (which includes the living space, garage and yard of a private dwelling, excluding the driveway) than in any other single location (table 2:1). The home is the most frequently reported place of occurrence of injury to adult men and women (aged  $\geq 15$  years) for hospital admissions, hospital emergency department presentations and general practitioner presentations.

According to death data used for this study (drawn from the Victorian Coroners' Facilitation System - CFS) transport areas outrank the home for fatal injury but the CFS under-records elderly fall deaths. If Australian Bureau of Statistics (ABS) data on elderly fall deaths are included then the home outranks transport areas as the foremost location of injury fatalities.

At all levels of severity, including fatalities, approximately two-fifths (ranging from 37.8% for emergency department presentations to 45.1% for hospital admissions) of women's injuries occur in the home. A similar proportion (39.5%) of men's fatal injuries occur in the home but a lesser proportion, approximately one-quarter (ranging from 23.7% for GP presentations to 26.3% for hospital admissions) of men's non-fatal injuries occur in the home.

By contrast, greater proportions of males are injured in production and outdoor areas. These differences between the sexes in location of injury are probably explained by differences in their exposure to particular locations and associated activities.

**Table 2:1 Place of occurrence of fatal & non-fatal injuries to adults (aged ≥ 15 years) by sex**

Location	Female			Male			All		
	n	%	Rank	n	%	Rank	n	%	Rank
<b>Deaths</b>	<b>Victorian Coroners' Facilitation System 1989-90 to 1993-94 (n=7,319)</b>								
Transport areas	836	44.1	1	2 146	39.6	1	2 983 <sup>a</sup>	40.8	1
<i>Home</i>	<i>795</i>	<i>41.9</i>	<i>2</i>	<i>2 142</i>	<i>39.5</i>	<i>2</i>	<i>2 937</i>	<i>40.1</i>	<i>2</i>
Recreational areas	93	4.9	4	554	10.2	3	647	8.8	3
Other residential <sup>c</sup>	131	6.9	3	228	4.2	4	359	4.9	4
All other specified locations	43	2.2		350	6.5				
Total	1 898	100.0		5 420	100.0		7 319	100.0	
<b>Hospital Admissions</b>	<b>Victorian Inpatient Minimum Database 1987-88 to 1993-94 (n=380,719)</b>								
<i>Home</i>	<i>23 029</i>	<i>13.6</i> <i>(45.1)</i>	<i>1</i>	<i>15 360</i>	<i>7.2</i> <i>(26.3)</i>	<i>1</i>	<i>38 389</i> <i>(35.1)</i>	<i>10.1</i>	<i>1</i>
Residential institution	17 698	10.5 (34.7)	2	14 181	6.7 (24.3)	2	31 879	8.4	2
Recreational areas	2 100	1.2 (4.1)	4	9 260	4.4 (15.9)	3	11 360	3.0	3
Transport areas	3 907	2.3 (7.7)	3	5 705	2.7 (9.8)	5	9 612	2.5	4
Other specified locations	4 277	2.6 (8.4)		13 836	6.5 (23.7)		18 113	4.7	
Unspecified/missing location	117 773	69.8		153 593	72.5		271 366	71.3	
Total	168 784	100.0		211 935	100.0		380 719	100.00	
<b>Emergency Department Presentations (admissions and non-admissions)</b>	<b>Victorian Injury Surveillance System 1991-95 (n=66,377)</b>								
<i>Home</i>	<i>8 392</i>	<i>37.8</i>	<i>1</i>	<i>11 748</i>	<i>25.1</i>	<i>1</i>	<i>20 140</i>	<i>30.3</i>	<i>1</i>
Transport areas	4 220	19.0	2	6 869	15.9	2	11 089	16.7	2
Production areas	363	1.6	3	5 736	13.3	3	6 099	9.2	3
Areas of organised sport	1 164	5.2	4	4 668	10.8	4	5 832	8.8	4
Other specified locations	4 202	19.0		7 223	15.6		11 425	17.2	
Other and unspecified	3 868	17.4		7 924	18.3		11 792	17.8	
Total	22 209	100.0		44 168	100.0		66 377	100.0	
<b>General Practitioner Presentations</b>	<b>Extended Latrobe Valley Injury Surveillance 1994-95 (n=4,035)</b>								
<i>Home</i>	<i>643</i>	<i>42.8</i>	<i>1</i>	<i>601</i>	<i>23.7</i>	<i>1</i>	<i>1 244</i>	<i>30.8</i>	<i>1</i>
Production areas	53	3.5	7	523	20.7	2	576	14.2	2
Transport areas	227	15.1	2	250	9.9	5	477	11.8	3
Commerce areas	155	10.3	3	291	11.5	4	447	11.1	4
Other specified location							893	22.0	
Unspecified/NEC	103	6.9		295	11.6		398	9.8	
Missing cases/unknown sex							9	0.2	
Total	1 503	100.0		2 531	100.0		4 043	100.0	

Note: Hospital admissions – the percentages shown in brackets represent the proportion of cases occurring in the specified locations if only cases coded for location are included.

### **3. ADULT FEMALE HOME INJURY DEATHS**

#### **3.1 THE HOME COMPARED TO OTHER LOCATIONS FOR FATAL INJURY**

As shown in Table 3:1, over the five years covered by the Coroners' Facilitation System (from July 1989 to June 1994) the home was the second-highest ranked location of injury fatalities for both adult females and males, ranking just behind transport areas.

It should be noted that elderly home fall deaths are under-recorded on the CFS, compared to the Australian Bureau of Statistics (ABS) death data. Elderly home fall deaths due to complications of fractured neck of femur, where osteoporosis or the overall frailty of the person contributed to the death, are not necessarily required by law to be referred to the coroner by the medical practitioner certifying death.

Data on female home fall deaths were only available for the period 1989-90 to 1991-92 from the ABS; data for males were not requested. Projecting from the available ABS data there were an estimated 595 adult female fall deaths in the five-year period 1989-1995 (an average of 119 deaths per year) compared to CFS data which recorded only 36 fall deaths in the same period (approximately 7 deaths per year). Although there are other recording discrepancies between the ABS and CFS systems, almost all of the additional female home fall deaths on the ABS system were deaths of elderly women. If the ABS fall deaths data are used in place of CFS data, then the home would outrank transport as the location of most injury deaths for females, and probably for males (Table 3:1).

The pattern of location of injury deaths for adult females and males was broadly similar, notwithstanding that 'other residential', commercial, organised sport and educational settings were higher ranked locations for females. The proportion of the identified injury deaths that occurred in the home was slightly greater for females than for males (41.9% versus 39.5%).

**Table 3:1 Comparative ranking of location of injury event leading to deaths for adults (aged ≥ 15 years) by sex**

Location	Female			Male			All		
	<i>n</i>	%	Rank	<i>n</i>	%	Rank	<i>n</i>	%	Rank
Transport	836	44.1	1	2 146	39.6	1	2 983 <sup>a</sup>	40.8	1
Residential-home <sup>b</sup>	795	41.9	2	2 142	39.5	2	2 937	40.1	2
Outdoor areas	93	4.9	4	554	10.2	3	647	8.8	3
Residential-other <sup>c</sup>	131	6.9	3	228	4.2	4	359	4.9	4
Production areas	10	0.5	6	159	2.9	5	169	2.3	5
Commerce areas	21	1.1	5	132	2.4	6	153	2.1	6
Organised sport	6	0.3	7	20	0.4	8	26	0.4	7
Playground/Amusement areas	2	0.1	9	21	0.4	7	23	0.3	8
Educational	4	0.2	8	17	0.3	9	21	0.3	9
Non-residential Institutions	-	-	10	1	0.1	10	1	0.0	10
<b>TOTAL</b>	<b>1 898</b>	<b>100.0</b>		<b>5 420</b>	<b>100.0</b>		<b>7 319<sup>a</sup></b>	<b>100.0</b>	

*Notes:*  
(a) includes one case of unknown sex  
(b) own home or other private home , including garage, garden and yard and other including tent and caravan  
(c) residential institution including hospital

*Source:* Victorian Coroners' Facilitation System, 1989-90 to 1993-1994

### 3.2 FEMALE HOME INJURY DEATHS: THE SIZE OF THE PROBLEM

There were 795 adult female home injury deaths recorded on the CFS in the 5-year period 1989-90 to 1993-94, an average of 159 deaths per year. There were an additional 559 female home fall deaths (mostly of elderly females) recorded on the ABS data file for this period.

### 3.3 INTENTIONAL AND UNINTENTIONAL DEATHS

Table 3:2 shows the intent of adult female home injury deaths recorded on the CFS and ABS. According to CFS data, over one-half (55.6%) of reported home injury adult female deaths were intentional (suicide and homicide). Unintentional injury accounted for more than a quarter (28.7%) of deaths. However, as previously explained, home fall deaths are under-recorded on the CFS. If ABS home falls death data is substituted for CFS data then unintentional injuries account for approximately three-fifths (58.1%) of home injury deaths.

**Table 3:2 Intent of adult female injury deaths in the home, 1989-90 to 1993-94**

<b>Intent</b>	<b>Frequency and proportion (%) If CFS data utilised</b>	<b>Frequency and proportion (%) if ABS falls death data substituted for CFS falls data</b>
Intentional-suicide	378 <sup>a</sup> ( 47.5)	378 (27.9)
Intentional-homicide	64 <sup>b</sup> ( 8.1)	64 ( 4.7)
Unintentional <sup>d</sup>	228 <sup>c</sup> ( 28.7)	787 (58.1)
Unknown intent	66 ( 8.3)	66 ( 4.8)
Missing data	59 ( 7.4)	59 ( 4.4)
<b>TOTAL</b>	<b>795 (100.0)</b>	<b>1 354 (100.0)</b>
<p><i>Note:</i> a, b, c some minor differences in case numbers compared to E-code cause of death data in table below caused by inconsistent coding.</p> <p>d Unintentional injury deaths of older people are under-recorded on the Coroners' Facilitation system</p> <p><i>Source:</i> Victorian Coroners' Facilitation System (CFS); Australian Bureau of Statistics for ABS home falls death data</p>		

### 3.4 CAUSES OF ADULT FEMALE HOME INJURY DEATHS

Although the analysis of causes of adult female injury deaths recorded on the CFS showed that suicide was by far the most frequent type of injury death in the home (accounting for just under one-half of all deaths), other evidence indicates that falls are the most common cause. Some deaths registered as being accidental and of undetermined intent may also be suicides. The other major causes of deaths are shown in table 3:3. Detailed analyses of these causes of death are included in Part Two of this report.

**Table 3:3 Frequency, mean annual rate (per 100 000 population) and rank of major causes of adult female injury deaths in the home, 1989-90 to 1993-94**

Rank	Cause of Death	Frequency <i>n</i>	Proportion %	Rate Per 100 000 <sup>d</sup>	Frequency and proportion (%) if ABS falls death data substituted for CFS data
1	Intentional self inflicted (suicide)	374	47.0	4.4	374 (27.6)
2	Poisoning (accidental) <sup>c</sup>	96	12.1	1.1	96 ( 7.1)
3	Intentional assaultive- (homicide)	63	7.9	0.7	63 ( 4.7)
4	Fires/burns/scalds	48	6.0	0.6	48 ( 3.6)
5	Falls <sup>b</sup>	36 (CFS)	4.5	0.4	595 (43.9) (ABS)
6	Choking/suffocation/ Foreign body in orifice	18	2.3	0.2	18 ( 1.3)
7	Drowning	12	1.5	0.1	12 ( 0.9)
8 eq.	Natural/environmental (excessive heat or cold)	5	0.6	0.1	5 ( 0.4)
8 eq.	Transport-related	5	0.6	0.1	5 ( 0.4)
9 eq.	Hit/struck/crushed	2	0.3	0.02	2 ( 0.1)
9 eq.	Cutting/piercing	2	0.3	0.02	2 ( 0.1)
	Medical injuries <sup>a,c</sup> , late effects, other and undetermined cause	134	16.9		134 ( 9.9)
	<b>TOTAL</b>	<b>795</b>	<b>100.0</b>	<b>9.3</b>	<b>1 354 (100)</b>

*Notes:* (a) Medical injuries were excluded from the ranking exercise.  
(b) Compared to available ABS data, home fall deaths are underestimated in the CFS as not all elderly home fall deaths due to fractured neck of femur are reportable to the Coroner.  
(c) 39 of the 46 medical injury cases are wrongly classified. They were accidental drug overdose deaths involving heroin/morphine and are classified in CFS under E-935.0 'Adverse effects of drugs, medicants and biological substances in therapeutic use-heroin'. Heroin cannot be legally prescribed for therapeutic use in Victoria.  
(d) Rate per 100,000 population calculated on mean annual population, Victorian adult females 1989-90 to 1993-94 (n=1,700,764)

*Source:* Victorian Coroners' Facilitation System (CFS); Australian Bureau of Statistics (for ABS home falls death data)

### 3.5 CHANGING RATES AT DIFFERENT AGES

Home injury death frequencies and rates for the five-year-age-groups based on CFS data are shown in Table 3:3 (ABS data on home fall deaths are also shown to highlight the discrepancy between the two databases)> Based on CFS data, the all-cause injury death rate for women aged 55 years and older was one-and-a-half times that for the younger age group (women aged 15-54 years old) (12.4/100 000 versus 8.2/100 000; rate ratio 1.5:1) and would be higher if ABS home falls deaths data were used. The higher all cause injury rate for older women is largely explained by the higher than average rates of: suicide among women aged 60-64 and 70-74 years; cases included as accidental poisoning deaths among women aged 55-74 years; burn deaths among women 70-74 years and women over 80 years old; and fall deaths among women aged 60 years and older, particularly the very old (aged 80 years and older) (Table 3:3)

The analyses of age patterns for the five most frequent causes of adult female home deaths are included in the discussion of major causes of home injury deaths in Section 2.

**Table 3:4 Comparison of crude mean annual mortality rates (per 100 000 population) and frequencies for the five major causes and all causes by age, 1989-90 to 1993-94.**

Cause	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+	All
	pop 160 731	pop 175 492	pop 172 910	pop 175 254	pop 164 056	pop 154 585	pop 127 583	pop 103 218	pop 91 665	pop 91 403	pop 88 230	pop 71 103	pop 56 581	pop 67 954	pop <sup>a</sup> 1 700 765
Falls (ABS) <sup>c</sup>	1	0	1	0	0	0	1	6	6	6	6	26	85	457	595
<i>Rate per 100 000</i>	<i>0.6</i>	<i>0</i>	<i>0.6</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0.8</i>	<i>5.8</i>	<i>6.5</i>	<i>6.6</i>	<i>6.8</i>	<i>36.6</i>	<i>150.2</i>	<i>672.5</i>	<i>35.0</i>
Falls (CFS)	0	0	1	0	1	1	2	0	1	3	3	2	5	17	36
<i>Rate per 100 000</i>	<i>0</i>	<i>0</i>	<i>0.1</i>	<i>0</i>	<i>0.1</i>	<i>0.1</i>	<i>0.3</i>	<i>0</i>	<i>0.2</i>	<i>0.7</i>	<i>0.7</i>	<i>0.6</i>	<i>1.8</i>	<i>5.0</i>	<i>0.4</i>
Suicide	34	30	40	37	37	32	32	24	17	27	17	18	13	16	374
<i>Rate per 100 000<sup>b</sup></i>	<i>3.4</i>	<i>3.4</i>	<i>4.6</i>	<i>4.2</i>	<i>4.5</i>	<i>4.1</i>	<i>5.0</i>	<i>4.7</i>	<i>3.7</i>	<i>5.9</i>	<i>3.9</i>	<i>5.1</i>	<i>4.6</i>	<i>4.4</i>	<i>4.4</i>
Poisoning (accid)	2	9	8	7	11	12	12	4	8	7	6	6	3	1	96
<i>Rate per 100 000</i>	<i>0.2</i>	<i>1.0</i>	<i>0.9</i>	<i>0.8</i>	<i>1.</i>	<i>1.6</i>	<i>1.9</i>	<i>0.8</i>	<i>1.7</i>	<i>1.5</i>	<i>1.4</i>	<i>1.7</i>	<i>1.1</i>	<i>0.3</i>	<i>1.1</i>
Assault	1	15	11	5	5	6	5	4	1	0	4	4	1	1	63
<i>Rate per 100 000</i>	<i>0.1</i>	<i>1.7</i>	<i>1.3</i>	<i>0.6</i>	<i>0.6</i>	<i>0.8</i>	<i>0.8</i>	<i>0.8</i>	<i>0.2</i>	<i>0</i>	<i>0.9</i>	<i>1.1</i>	<i>0.3</i>	<i>0.3</i>	<i>0.7</i>
Fires/burns	1	3	0	1	3	1	2	0	3	6	6	10	2	10	48
<i>Rate per 100 000</i>	<i>0.1</i>	<i>0.3</i>	<i>0</i>	<i>0.1</i>	<i>0.3</i>	<i>0.1</i>	<i>0.3</i>	<i>0</i>	<i>0.7</i>	<i>0.4</i>	<i>1.4</i>	<i>2.8</i>	<i>0.7</i>	<i>2.9</i>	<i>0.6</i>
All other causes/ Undetermined cause	10	13	17	17	17	12	12	8	16	13	8	14	7	14	178
<b>Total (CFS cases)</b>	<b>48</b>	<b>70</b>	<b>77</b>	<b>67</b>	<b>74</b>	<b>64</b>	<b>65</b>	<b>40</b>	<b>46</b>	<b>56</b>	<b>44</b>	<b>54</b>	<b>31</b>	<b>59</b>	<b>795</b>
<b><i>Rate per 100 000 (CFS)</i></b>	<b><i>6.0</i></b>	<b><i>8.0</i></b>	<b><i>8.9</i></b>	<b><i>7.6</i></b>	<b><i>9.0</i></b>	<b><i>8.3</i></b>	<b><i>10.2</i></b>	<b><i>7.8</i></b>	<b><i>10.0</i></b>	<b><i>12.3</i></b>	<b><i>10.0</i></b>	<b><i>15.2</i></b>	<b><i>11.0</i></b>	<b><i>17.4</i></b>	<b><i>9.3</i></b>

*Notes:*

(a) Population = mean annual age group population over five years 1989-90 to 1993-94

(b) Rate: mean annual rate per 100 000 age group population

(c) Both ABS and CFS death data are included to highlight the underestimation of elderly home fall deaths on CFS because they are not all reportable to the Coroner.

*Source:* Australian Bureau of Statistics (ABS) for falls death data; Victorian Coroners' Facilitation System (CFS) for death data on all other causes. Population data from ABS.

### 3.6 SUMMARY

- According to the Victorian Coroners' Facilitation System (CFS) data, the home is the second-highest ranked location of fatal injuries to adult women, ranking just behind transport locations. However, if Australian Bureau of Statistics (ABS) data on elderly fall deaths in Victoria are included, the home outranks transport as the location of most female injury deaths.
- More than two-fifths (41.9%) of adult female injury deaths occur in the home. Again, if ABS data on elderly fall deaths are included, then home injury deaths comprise over one-half (55.8%) of all injury deaths among adult females in Victoria.
- On average 271 women are fatally injured in the home each year, if ABS data on falls deaths are included (mainly fall-related deaths of elderly women).
- According to CFS data, over one-half (55.6%) of reported home injury adult female deaths were intentional (suicide and homicide). Unintentional injury accounted for more than a quarter (28.7%) of deaths. However, as previously explained, home fall deaths are under-recorded on the CFS. If ABS home falls death data is substituted for CFS data then unintentional injuries account for the approximately three-fifths (58.1%) of home injury deaths.
- Although the analysis of causes of adult female injury deaths recorded on the CFS showed that suicide was by far the most frequent type of injury death in the home (accounting for just under one-half of all deaths), other evidence indicates that falls are the most common cause.
- The all-cause home injury death rate for women aged 55 years and older was one-and-a-half times that for women aged 15-54 years. This differential would be much greater if ABS data on elderly fall deaths were included.

## **4. ADULT FEMALE HOME INJURY HOSPITAL ADMISSIONS**

### **4.1 THE PLACE OF OCCURRENCE OF INJURY**

The place of occurrence (location) of injury for hospital admissions was specified in only 28.7% of cases (30.2% for females; 27.5% for males) on the Victorian Inpatient Minimum Database (VIMD) for the study period 1987-88 to 1993-94 (7 years). Although the group of admissions with a location of injury code is a sizeable sample ( $n=109,353$ ), whether or not it is representative of all cases on the database could not be ascertained.

The location of injury for adult VIMD hospital admissions (to the extent that the data are available) is shown in Table 4:1.

- The home was the primary location for injuries that resulted in hospital admission for both females and males but the proportion of females admitted to hospital for injuries sustained in the home was higher than that for males. If the dataset is confined to only those cases with a location code, then the home is the location of 45.1% of injuries to women and 26.3% of injuries to men.
- Greater proportions of men, than women, were injured in industrial locations (13.0% vs 1.5%) and places of recreation (15.9% vs 4.1%).

### **4.2 FEMALE HOME INJURY HOSPITALISATIONS: THE SIZE OF THE PROBLEM**

The poor reporting of the location of injury on VIMD prevents the accurate estimation of the number of women hospitalised for home injury each year. The VIMD database recorded an average of 3, 284 female hospital admissions for home injury each year over the 7-year period from 1987-88 to 1993-94 but only 30.2% of all female injury cases recorded on the system are coded for location. If the sample of female hospital admissions with a location code is representative of all cases (and this could not be checked) then the annual frequency of admissions would be in the vicinity of 10,000-11,000 per annum.

**Table 4:1 Ranking of location of injury hospital admissions for adult persons (aged ≥ 15 years) by sex**

Location	Female			Male			Total n
	n	%	Rank	n	%	Rank	
<b>Location specified</b>							
Home	23 029	13.6 (45.1)	1	15 360	7.2 (26.3)	1	38 389
Residential institution	17 698	10.5 (34.7)	2	14 181	6.7 (24.3)	2	31 879
Street & highway	3 907	2.3 (7.7)	3	5 705	2.7 (9.8)	5	9 612
Recreational areas	2 100	1.2 (4.1)	4	9 260	4.4 (15.9)	3	11 360
Public building	1 897	1.1 (3.7)	5	2 572	1.2 (4.4)	6	4 469
Industrial	758	0.5 (1.5)	6	7 575	3.6 (13.0)	4	8 333
Farm	489	0.3 (0.9)	7	1 389	0.7 (2.4)	7	1 878
Mine and quarry	23	- (0.1)	8	89	- (0.1)	8	112
Other specified place	1 110	0.7 (2.2)		2 211	1.0 (3.8)		3 321
Sub total	51 011	30.2 (100)		58 342	27.5 (100)		109 353
<b>Location unspecified</b>							
Missing data	70 667	41.9		89 391	42.2		160 058
Unspecified place	47 106	27.9		64 202	30.3		111 308
Sub total	117 773	69.8		153 593	72.5		271 366
<b>TOTAL</b>	<b>168 784</b>	<b>100.0</b>		<b>211 935</b>	<b>100.0</b>		<b>380 719</b>
<p><i>Note:</i> In 1993-94 cases previously classified under 'missing' were classified under 'unspecified place'.  <i>Source:</i> Victorian Inpatient Minimum Database 1987-88 to 1993-94 (7 years).</p>							

### 4.3 MAJOR CAUSES OF ADULT FEMALE HOME INJURY HOSPITAL ADMISSIONS

Table 4:2 shows the major causes of home injury hospital admissions. Fall injury accounted for over two-thirds (68.7%) of injury hospitalisations. Self-harm, cutting and piercing and accidental poisoning were other significant causes of home injury hospitalisations.

**Table 4:2 Ranking of major causes of home injury hospital admissions among adult females (aged ≥ 15 years), VIMD 1987-88 to 1993-94**

Rank <sup>a</sup>	HOSPITAL ADMISSIONS Victorian Inpatient Minimum Database 1987-88 to 1993-94 (7 years) n=23,029 <sup>b</sup>		n	%
1	Falls		15 815	68.7
2	Intentional (self-harm)		1 637	7.1
3	Cutting/piercing (non-intentional)		1 078	4.7
4	Poisoning (non-intentional)		799	3.5
5	Hit/struck/crushed		546	2.4
6	Fire/burns/scalds		470	2.0
7	Intentional (inflicted by other-assault)		399	1.7
8	Overexertion/strenuous exercise		334	1.5
9	Choking/suffocation/foreign body in orifice		319	1.4
10	Natural/environmental (mostly animal-related)		286	1.2
	Other specified causes (including medical) and other and unspecified accidents		1 195	5.2
	Undetermined intent/late effects/location E-code		151	0.6
	<b>TOTAL</b>		<b>23 029</b>	<b>100.0</b>

*Note:*  
(a) Injury causes classified by ICD-9 E-codes, ranking excludes medical injuries (n=761)  
(b) Only 30.2% of adult female VIMD cases were coded for place of occurrence (location) of injury.

Because of the poor reporting of place of occurrence of injury on VIMD (which collects data from all public hospitals), data on the major causes of injury for VIMD cases were compared with data on the major causes of injury for 1996-97 on the new VEMD (table 4:3). This system records admissions through the emergency departments of 25 public hospitals across Victoria with close to 100% reporting of place of occurrence. The ranking of major causes was the same but there was a significant difference in the proportion of falls and intentional self-inflicted injuries reported (approximately 10.0% more falls and 10.0% fewer intentional self-harm cases were recorded on VIMD).

**Table 4:3 Causes of home injury among adult women (aged ≥ 15 years): comparison of available data for hospital admissions VIMD and VEMD**

Major causes	VIMD Admissions 1987-94 (annual average) <i>n</i> =3 289 <sup>a</sup>		VEMD Admissions 1996-97 <i>n</i> =3 898	
	<i>n</i>	%	<i>n</i>	%
Falls	2 259	68.7	2 252	57.7
Intentional (self-harm)	234	7.1	698	17.9
Cutting/piercing (non-intentional)	154	4.7	176	4.5
Poisoning (non-intentional)	114	3.5	85	2.2
Hit/struck/crushed	78	2.4	67	1.7
Fire/burns/scalds	67	2.0	51	1.3
Intentional (inflicted by other-assault)	57	1.7	70	1.8
Overexertion/strenuous exercise	48	1.5	n.a.	n.a.
Choking/suffocation/foreign body in orifice	45	1.4	11	0.3
Natural/environmental (mostly animal-related)	41	1.2	39	1.0
Other specified causes (including medical) and other and unspecified accidents	171	5.2	303	7.5
Undetermined intent/late effects	21	0.6	157	4.0
<b>TOTAL</b>	<b>3 289</b>	<b>100.0</b>	<b>3 898</b>	<b>100.0</b>

Notes (a) Only 30.2% of women's injuries on VIMD were coded for place of occurrence of injury

Source: Victorian Inpatient Minimum Database 1987-94  
Victorian Emergency Minimum Database 1996-97

The major causes of home injury hospitalisations are discussed in greater depth in Section 2 of this report.

#### 4.4 AGE OF FEMALES

Table 4:4 shows the age groups of women admitted to hospital for home injury. Rates could not be calculated because the population denominator for VIMD cases coded for location of injury was not known.

Using the age structure for Victoria over the VIMD data collection period as the basis for a broad comparison, it would appear that women aged 60 years or older were at a much higher risk of hospitalisation for home injury than younger adult women. They accounted for over two-thirds (67.9%) of identified hospital admissions for home injuries from 1987-1994 but comprised only approximately one-fifth (22.0%) of the population over that 7-year period. Risk of hospitalisation for home injury appeared to increase with age. Women aged 80 years and older comprised 3.9% of the population from 1987-88 to 1993-94 yet contributed 32.1% of hospitalisations for home injury in the same period.

**Table 4:4 Age of adult women (aged  $\geq 15$  years) admitted to hospital for home injury, VIMD 1987-88 to 93-94**

Age group	HOSPITAL ADMISSIONS Victorian Inpatient Minimum Database 1987-88 to 1993-94 (7 years) n=23,029 <sup>a</sup>	
	N	%
15-19	829	3.6
20-24	856	3.7
25-29	864	3.8
30-34	892	3.9
35-39	861	3.7
40-44	832	3.6
45-49	747	3.2
50-54	665	2.9
55-59	844	3.7
60-64	1 244	5.4
65-69	1 644	7.1
70-74	2 248	9.8
75-79	3 102	13.5
80+	7 401	32.1
<b>TOTAL</b>	<b>23 029</b>	<b>100.0</b>
<i>Note: (a) Only 30.2% of adult female injury VIMD cases were coded for location</i>		

#### 4.5 TYPE OF INJURY

- Fractures were the most frequent injury, accounting for nearly half (47.0%) of the home injuries to adult females ( $\geq 15$  years) admitted to hospital. Other major injury groupings were poisoning (12.4%), open wounds (10.9%), bruises/haematomas (5.8%) and burns (3.7%).
- Fractures predominated in the older age groups of women. Women aged 65 years and older, who comprised 16.5% of the Victorian adult female population over the data collection period, experienced 78.0% of all fractures.
- Poisoning (accidental and intentional) predominantly occurred in the younger age groups. The under 40 year-olds, who comprised 50.3% of the Victorian adult female population over the data collection period contributed 65.0% of poisoning.
- Open wounds and bruising/haematoma were particularly high for the oldest 5-year age groups (from age 70-75 years). These age groups together comprised 11.4% of the Victorian adult female population over the data collection period yet contributed 45.0% of open wound injuries and 64.8% of bruising/haematomas among admitted cases.
- Burns also predominated in the older age groups from age 60 years onwards (43.3% of burns occurred in this age group which comprised 22% of the Victorian adult female population in the data collection period).

## 4.6 SUMMARY

- For adult women, the home is the highest-ranked location of injury that requires hospitalisation.
- Home injury accounted for 45.1% of adult female injury hospital admissions (calculated on the subset of VIMD injury data with a location of injury code).
- Women aged 60 years and older account for over two-thirds (67.9%) of hospital admissions for home injury.
- Fall injuries caused over two-thirds (68.7%) of home injury hospital admissions. The other major cause of home injury hospitalisation is intentional self-inflicted injury.
- Fractures are the most frequently reported injury accounting for nearly one-half (47.0%) of the home injury hospitalisation.
- Older women were more at risk of hospitalisation for fractures, open wounds, bruises and burns, younger women were more at risk of hospitalisation for self-poisoning (intentional and accidental).

## **5 ADULT FEMALE HOME INJURY HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS**

### **5.1 INTRODUCTION**

The nine hospital-years of data on adult female hospital emergency department presentations (admissions and non-admissions) in the Victorian Injury Surveillance System (VISS) as at the 30 June 1995 were included in the analysis. Data were drawn from four hospitals on six campuses: Royal Melbourne Hospital (2 years-1992/93 and 1993/94); Western Hospital (two years of data from Footscray and Sunshine campuses-1991 and 1992); Preston and Northcote Community Hospital (1 year-1992/93); and Latrobe Regional Hospital (4 years of data from the Moe and Traralgon campuses-1991/92 to 1994/95).

### **5.2 THE HOME COMPARED TO OTHER LOCATIONS OF INJURY RESULTING IN ED PRESENTATIONS**

- For both adult males and females, the home was the location of most of the injuries that resulted in emergency department presentations (admissions and non-admissions) to VISS hospitals (table 5:1).
- Females were more likely than males to be injured in or around their home or another person's home (37.8% of females presenting to the emergency departments of VISS hospitals were injured in private homes v 25.1% of injured males). This is, most likely, a reflection of women's increased exposure to home hazards because of the higher number of hours they spend in the home environment. Adding weight to this proposition is the evidence that the situation is reversed for areas of production. When compared to females, a much greater proportion of injuries to males that present to VISS emergency departments occurred in areas of production (13.3% of male injuries v 1.6% of female injuries).

**Table 5:1 Location of injury to adults (aged ≥ 15 years) by sex, in rank order of frequency, VISS hospital emergency department presentations (admissions and non-admissions)**

Location of injury	Males (n =44,168)		Females (n=22,209)		All (n=66,377)		Rank
	n	%	n	%	n	%	
Residential-private home	11 748	25.07	8 392	37.77	20 140	30.34	1
Transport and areas used for transport	6 869	15.87	4 220	18.99	11 089	16.71	2
Areas of production	5 736	13.25	363	1.63	6 099	9.19	3
Areas for organised sport	4 668	10.78	1 164	5.23	5 832	8.79	4
Areas of commerce	3 294	7.61	1 367	6.19	4 661	7.02	5
Residential-institution (including hospital)	808	1.86	1 486	6.68	2 294	3.46	6
Area of outdoor land-based recreation	1 217	2.81	466	2.09	1 683	2.54	7
Educational	872	2.01	399	1.79	1 271	1.91	8
Public playground & amusement park	479	1.1	217	0.97	696	1.05	9
Outdoor water based recreation	420	0.23	139	0.62	559	0.84	10
Institutions (non residential/non commercial)	133	0.03%	128	0.57	261	0.39	11
Miscellaneous	7 924	18.31	3 868	17.40	11 792	17.76	
<b>TOTAL</b>	<b>44 168</b>	<b>98.93</b>	<b>22 209</b>	<b>99.93</b>	<b>66 377</b>	<b>100.0</b>	

*Source:* VISS participating hospitals : Western Hospital -2 years; Royal Melbourne Hospital -2 years; Preston and Northcote Community Hospital - 1 year; Latrobe Regional Hospital -4 years (1991-95)

### 5.3 PLACE OF OCCURRENCE OF VISS HOME INJURIES

Table 5:2 shows the specific place of occurrence (location) of the injury events that resulted in VISS emergency department presentations. The vast majority (89.0%) of home injuries to adult females occurred in the injured women's own home, the remainder occurred in another person's private dwelling. Data for private homes (own home plus other person's home) revealed the distribution shown in table 5:2.

**Table 5:2 Place of occurrence (location) of home injury to adult females (aged ≥ 15 years), VISS hospital emergency department presentations**

Location of home injury	VISS Emergency Department Presentations (n =8 302)	
	n	%
Living/sleeping area	4 248	51.2
Garden/garage/yard excluding driveway	2 240	27.0
Kitchen	1 281	15.4
Bathroom/laundry/toilet	533	6.4
<b>TOTAL</b>	<b>8 302</b>	<b>100.0</b>
<i>Source: VISS participating hospitals : WH-2 years; RMH-2 years; PANCH-1 year; LRH-4 years (91-95)</i>		

#### 5.4 INTENT OF HOME INJURIES TO WOMEN

In three of the four hospitals the VISS reports on intent are based on the treating doctor's opinion (who filled in this item on the report form). In one hospital this item was recorded from self-reports or case history, if the nature of the injury suggested self-infliction or assault. It is probable that self-inflicted injuries and assaults are underestimated.

The home is the location of nearly half of the cases of self-inflicted injuries to women on the VISS database and close to two-fifths of female assault cases (table 5:3).

- Over four-fifths (84.9%) of women's home injuries that resulted in hospital emergency department presentations were unintentional.
- Approximately one-tenth (9.9%) of women's home injuries were self-inflicted.
- Emergency department presentations for assaultive injury accounted for a little less than five per cent of women's home injuries.

**Table 5:3 Intent of home injuries to adult women (aged ≥ 15 years), VISS hospital emergency department presentations (admissions and non-admissions)**

Intent	VISS Emergency Department Presentations (n=8 302)	
	n	%
Unintentional	7 047	84.9
Self inflicted	820	9.9
Assaultive	388	4.7
Unknown	47	0.5
<b>Total</b>	<b>8 302</b>	<b>100.0</b>
<i>Source: VISS participating hospitals : WH-2 years; RMH-2 years; PANCH-1 year; LRH-4 years (1991-95)</i>		

## **5.5 ACTIVITIES AT THE TIME OF INJURY**

The five activity groupings that were most associated with female home injury E.D. presentations were (in rank order): leisure and recreation (excluding sports), miscellaneous household activities, "other" catastrophes (predominantly intended self-harm and fight/riot/quarrel), home maintenance (mostly gardening, other maintenance and DIY activities) and personal activities (Table 5:4).

The ten most hazardous individual activities were (in rank order): "other" leisure/recreation activities (used as the default code in the system), intended self-harm, fight/riot/quarrel, playing (general activity), cleaning, gardening, "other" household activity, food preparation (no heat), cooking and sleeping resting.

**Table 5:4 Activities being undertaken at time of home injury to adult women (aged ≥15 yrs), VISS hospital ED presentations (admissions & non-admissions)**

Activity grouping	Frequency ( <i>n</i> =8 302)		
	<i>n</i>	%	Rank
Leisure/recreation (exc. sports)			
Playing (general activity)	431	5.2	4
Recreation/hobby activity-indoor	25	0.3	
Recreation/hobby activity-outdoor on land	32	0.4	
Other leisure/recreation	3 245	39.1	1
Subtotal	3 733	45.0	1
Miscellaneous household activity			
Laundry	109	1.3	
Food preparation (no heat)	342	4.1	8
Cooking	291	3.5	9
Cleaning	429	5.2	5
Moving furniture	52	0.6	
Other household activity	374	4.5	7
Eating/drinking	184	2.2	
Walking/running	38	0.5	
Sitting	1	<0.1	
Shopping	1	<0.1	
Subtotal	1 821	21.9	2
Other catastrophes			
Structure, fire	9	0.1	
Structure, collapse	2	<0.1	
Fight/riot/quarrel	444	5.3	3
Intended self-harm	710	8.6	2
Other catastrophe	10	0.1	
Sub-total	1 175	14.2	3
Maintenance			
Gardening	376	4.5	6
Electrical	1	<0.1	
Do-it-yourself (not vehicle)	135	1.6	
Vehicle maintenance	17	0.2	
Other maintenance	217	2.6	
Sub-total	746	9.0	4
Personal activities			
Washing/showering/bathing	187	2.3	
Sleeping/resting	284	3.4	10
Dressing	48	0.6	
Sexual activity	5	<0.1	
Other personal hygiene	208	2.5	
Sub total	732	8.8	5
Transportation			
Pedestrian	15	0.2	
Bicycle	5	0.1	
Motorcycle/scooter	9	0.1	
Passenger car	8	0.1	
Other 4 or more wheeled vehicles	1	<0.1	
Sub-total	38	0.5	6
Occupational			
Injured while on duty at work	35	0.4	
Injured while on recess break	1	<0.1	
Sub total	36	0.4	7
Sports			
Sports informal	18	0.2	
Sports not specified	2	<0.1	
Sub-total	20	0.2	8

cont'd

Activity grouping	Frequency ( <i>n</i> =8 302)		
	<i>n</i>	%	Rank
Natural disasters			
Flood	1	<0.01	
Sub total	1	<0.01	9
<b>TOTAL</b>	<b>8 302</b>	<b>100.0</b>	
<i>Source:</i> VISS participating hospitals : WH-2 years; RMH-2 years; PANCH-1 year; LRH-4 years (1991-95)			

## 5.6 BREAKDOWN FACTORS FOR ADULT FEMALE HOME INJURIES: WHAT WENT WRONG?

Table 5:5 shows the ‘breakdown factors’ most associated with E.D. presentations. Up to three factors may be recorded per case.

The five environmental factor groupings that were most frequently reported as precipitating injuries to women in the home were : their own or another person's actions; structures (particularly stairs and steps and floors and flooring materials, mostly in relation to fall injuries); drugs and medications (particularly the sedative, tranquillisers and psychotropic grouping and alcohol related to deliberate self-harm and accidental overdoses); furniture (particularly chairs, beds, bathtubs and showers, mostly related to fall injuries); and kitchen ware (particularly knives and drinking glasses, mostly related to cuts).

The five individual environmental factors that were most frequently reported as precipitating injuries to women in the home were: action by self; action by another person (adult); stairs and steps; sedatives, tranquillisers, and psychotropics etc; and knives.

**Table 5:5 Reported breakdown factor groupings and individual factors which contributed to home injury to adult women (aged ≥ 15 years), VISS emergency department presentations (admissions and non-admissions)**

Factor grouping/individual factor	Frequency (n=9 824 reports)		
	n	%	Rank <sup>a</sup>
Persons			
- injured person	1 842	22.18	(1)
- adult other than victim	606	7.29	(2)
- child other than victim	125	1.50	
Sub-total	2 573	30.99	1
Structures and parts thereof			
- stairs or steps	540	6.50	(3)
- floors and flooring material	281	3.38	(6)
- concrete and other man-made surfaces	107	1.28	-
- doors not specified		(<1%)	-
- other factors	423	5.11	-
Sub-total	1 351	16.27	2
Drugs/medications and biological factors			
- barbiturates, sedatives, tranquillisers and psychotropics etc	409	4.92	(4)
- alcohol (beverage)	174	2.09	(8)
- aspirin substitutes	118	1.42	-
- tablet or capsule drug NEC.	96	1.15	-
- drugs or medications not specified		(<1%)	-
-other factors	158	1.92	-
Sub-total	955	11.50	3
Furniture and other fittings			
- chairs not specified	208	2.50	(7)
- beds not specified	139	1.67	(10)
- bathtubs/showers inc fixt & accessories	106	1.27	
- other factors	349	4.22	
Sub-total	802	9.66	4
Kitchenware			
- knives not elsewhere specified	360	4.33	(5)
- glass drinking glasses		(<1%)	
- other factors	285	3.43	
Sub-total	645	7.76	5
Food and drink			
- fruit and vegetables	107	1.28	-
- meat and poultry	84	1.01	-
-other factors	269	3.25	
Sub-total	460	5.54	6
Animals			
- dogs	168	2.02	(9)
- spiders (arachnid)		(<1%)	
- unspecified insect		(<1%)	
- other factors	288	3.47	
Sub-total	456	5.49	7
Naturally occurring environmental factors			
- water not hot	137	1.65	
- ground and other natural surfaces	94	1.13	
- other factors	167	2.01	
Sub-total	398	4.79	8
Yard and garden equipment			
- lawn mowers, not specified		(<1%)	
- other factors	287	3.45	
Sub-total	287	3.45	9
Personal use items (exc cosmetics)	215	2.58	10

cont'd

<b>Factor grouping/individual factor</b>	<b>Frequency (n=9 824 reports)</b>		
	<b>n</b>	<b>%</b>	<b>Rank<sup>a</sup></b>
Packaging materials and containers	156	1.87	
Sports and recreation	155	1.86	
Fabrics/drapery/soft furnishings (exc furniture)	135	1.62	
Miscellaneous cleaning/maintenance Consumables exc chemicals <i>- nails, screws, carpet tacks, thumb tacks</i> <i>- other factors</i>	<i>127</i>	<i>(&lt;1%)</i> <i>1.52</i>	
Sub-total	127	1.52	
Craft and hobby equipment	109	1.31	
Industrial or retail plant /equipment excl. business machines <i>wood items NEC</i> <i>- other factors</i>	<i>108</i>	<i>(&lt;1%)</i> <i>1.30</i>	
Sub-total	108	1.30	
Kitchen appliances	97	1.16	
Vehicles-registered air or land		(< 1%)	
General housewares		(< 1%)	-
Workshop tools and appliances		(< 1%)	-
Classified but factor groups contributed < 1% of reports	569	6.78	
Miscellaneous and otherwise unclassifiable Factors <i>- foreign bodies NEC</i> <i>- other factors</i>	<i>226</i>	<i>(&lt;1%)</i> <i>2.72</i>	
Sub-total	226	2.72	
<b>TOTAL</b>	<b>9 824</b>	<b>118.2<sup>b</sup></b>	
<i>Notes: (a) Ranking of the ten most reported groupings of factors shown in bold and the ten most reported individual factors in italics and brackets</i>			
<i>(b)Total in percentage columns are greater than 100 as more than one factor may be reported for each case</i>			
<i>Source: VISS participating hospitals : WH-2 years; RMH-2 years; PANCH-1 year; LRH-4 years (1991-95)</i>			

## 5.7 NATURE OF HOME INJURIES TO WOMEN

Both the nature of the injury and the body part injured were entered on the VISS report form by the treating doctor. More than one report may be given per case. As shown in Table 5:6 non-systemic injuries predominated, accounting for 88.7% of reports.

The five most common non-systemic injuries that together comprised 80.0% of nature of injury reports on the VISS database in rank order were:

- cuts/lacerations (21.0% of reports), predominantly to the finger (627 reports), face/cheek/forehead/scalp (282), hand (234) and forearm (109);
- fractures (18.4%), predominantly femur (243), wrist (194), hip (174), radius/ulna (152) and humerus (68);
- haematoma/bruising (10.3%);
- inflammation/swelling/oedema/pain (10.1%); and

- sprain/strain (9.9%), predominantly ankle (354), lower back (95), knee (81) and wrist(63).

By far the most common systemic injury was poisoning which contributed 8.4% of reports, followed by concussion (0.9%).

**Table 5:6 Nature of home injuries to adult females (aged ≥ 15 years), VISS hospital emergency department presentations (admissions and non-admissions)**

Nature of injury	Frequency (n=9,345 reports) <sup>a</sup>	
	n	%
Non-systemic		
Cuts/lacerations	1 965	21.0
Fracture	1 719	18.4
Haematoma/bruising	964	10.3
Inflammation/swelling/ oedema/pain	944	10.1
Sprain/strain	922	9.9
Burn partial thickness	369	4.0
Foreign body	348	3.7
Superficial abrasions	271	2.9
Bites	263	2.8
Punctures	163	1.7
Dislocation	154	1.7
Other soft tissue injuries (<1% of reports each)	203	2.2
<b>Sub total</b>	<b>8 285</b>	<b>88.7</b>
Systemic		
Poisoning	783	8.4
Concussion	83	0.9
Asphyxiation, respiratory difficulty	28	0.3
Other systemic injury	25	0.2
<b>Sub total</b>	<b>919</b>	<b>9.8</b>
Miscellaneous and unspecified	141	1.5
<b>TOTAL</b>	<b>9 345</b>	<b>100.0</b>
<i>Note:</i> (a) More than one report may be given per case.		
<i>Source:</i> VISS participating hospitals : WH-2 years; RMH-2 years; PANCH-1 year; LRH-4 years (1991-95)		

## 5.8 BODY PART INJURED

The treating doctor responded to this item on the VISS report form and could include up to three injured body parts. The body areas that accounted for approximately three-quarters (74.1%) of the home injuries reported from all women's VISS hospital emergency department presentations were:

- upper extremity injuries (33.4% of reports) predominantly finger, hand, forearm and wrist cuts and lacerations and wrist, radius/ulna and humerus fractures and partial thickness burns to the hand;

- lower extremity injuries (31.0%) predominantly ankle sprains and strains, femur, hip and ankle fractures and lower leg cuts and lacerations; and
- head injuries (15.2%) predominantly face/cheek/forehead/scalp cuts, lacerations and bruising and foreign bodies in eyes. (Table 5:7)

**Table 5:7 Body parts injured in home injuries to adult females (aged ≥ 15 years)  
VISS emergency department presentations**

Injured body part	VISS E.D. presentations (n=9,345 reports) <sup>a</sup>	
	n	%
<b>Non-systemic injury</b>		
Upper extremity injuries	3 125	33.4
Lower extremity injuries	2 895	31.0
Head injuries	1 423	15.2
Injuries to the trunk	698	7.5
Injuries to the internal organs and digestive tract	81	0.9
Injuries to the respiratory system	53	0.6
Injuries to the brain and nervous system	10	0.1
Sub total	8 285	88.7
<b>Systemic</b>		
Poisoning	783	8.4
Concussion	83	0.9
Asphyxiation, respiratory difficulty	28	0.3
Other	25	0.2
Sub total	919	9.8
Miscellaneous and unspecified	141	1.5
<b>TOTAL</b>	<b>9 345</b>	<b>100.0</b>
<i>Note:</i> (a) more than one report may be given per case.		
<i>Source:</i> VISS participating hospitals : WH-2 years; RMH-2 years; PANCH-1 year; LRH-4 years (1991-95)		

## 5.9 MAJOR CAUSES OF HOME INJURY

VISS data are coded according to the ISIS classification system and are not assigned an ICD 9 E-code to classify cause of injury. To determine the major causes of home injury presenting to VISS hospital emergency departments, the ISIS codes were electronically converted into mutually exclusive categories that were the closest match to the ICD9E-code cause of injury classifications. Although inexact (because some cases were not captured in the conversion and some were wrongly classified) this enabled the determination of the relative importance of specific causes of home injury presenting to hospital emergency departments. It also allowed comparisons to be made with death, hospitalisation and General Practitioner ICD9E-coded data reported in Section Two.

The major causes of home injury to adult women presenting to VISS hospital emergency departments (admissions and non-admission) were falls and cutting and piercing which together accounted for more than one-half (53.9%) of presentations (table 5:8). Each cause is discussed in more detail in Section Two of this report.

**Table 5:8 Causes of home injury to adult females (aged ≥ 15 years), VISS hospital emergency department presentations (admissions and non-admissions)**

<b>HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS</b>			
<b>Victorian Injury Surveillance System 1991-95</b>			
<b>(n=8,302)</b>			
<b>Rank</b>	<b>Cause<sup>a</sup></b>	<b>n</b>	<b>%</b>
1	Falls	3 117	37.5
2	Cutting/piercing	1 362	16.4
3	Intentional (self inflicted)	756	9.1
4	Overexertion/strenuous exercise	567	6.8
5	Hit/struck/crushed	498	6.0
6	Intentional/assaultive	467	5.6
7	Fire/burns/scalds	353	4.3
8	Natural/environmental	323	3.9
9	Choking/suffocation/foreign body in orifice	279	3.4
10	Poisoning (accidental)	99	1.2
	Other specified and unspecified causes, uncaptured cases in re-classification	481	5.8
	<b>TOTAL</b>	<b>8 302</b>	<b>100.0</b>

*Note:* (a) VISS data are not coded for cause of injury utilising the ICD 9 E-code classification system. For this table ISIS-codes (the coding system used by VISS) were grouped into mutually exclusive categories that were the closest match to the ICD9E-code cause of injury classifications and the data were electronically converted.

*Source:* VISS data includes nine hospital years of data from four hospitals: Latrobe Regional Hospital (4 years 1991-95), Western Hospital (2 years 1991 and 1992), Royal Melbourne Hospital (2 years 1992-94), Preston and Northcote Community Hospital (1 year 1992-93).

## 5.10 SUMMARY

- Over one-third (37.8%) of women presenting with injuries to the emergency departments of VISS hospitals are injured in the home.
- Unintentional injury accounts for over four-fifths (84.9%) of VISS presentations.
- The major causes of injury are falls (37.5%) and cutting and piercing (16.4%).
- Most injuries occur in the living and sleeping areas (51.2%) and the garden, garage and yard (27.0%).
- The five activity groupings most associated with VISS presentations are: leisure and recreation (excluding sports), miscellaneous household activities, "other" catastrophes, home maintenance and personal activities.
- The five most hazardous individual activities are: "other" leisure/recreation activities, intended self-harm, fight, riot or quarrel, playing (general activity) and cleaning.
- The five environmental factor groupings that are most frequently reported as precipitating injuries to women in the home are (in rank order):
  - their own or another person's actions;

- structures (particularly stairs and steps and floors and flooring materials, mostly in relation to fall injuries);
- drugs and medications (particularly the barbiturate/sedative/tranquillisers/psychotropic group and alcohol, related to deliberate self-harm and accidental overdoses);
- furniture (particularly chairs, beds, bathtubs and showers, mostly related to fall injuries); and
- kitchen-ware (particularly knives and drinking glasses, mostly related to cuts).

The five most common non-systemic injuries are: cuts and lacerations (21.0%), fractures (18.4%), bruising (10.3%), inflammation/swelling/pain (10%) and sprain or strain (9.9%).

## 6. GENERAL PRACTITIONER (GP) PRESENTATIONS

### 6.1 INTRODUCTION

The Extended Latrobe Valley Injury Surveillance (ELVIS) is a regional collection of injury data recorded over a twelve-month period from general practitioners participating in the Latrobe Valley Research Network within the Central West Division of General Practice. The Latrobe Valley is located 135 kilometres from Melbourne and has a population of 80,000. The majority of the population lives in the towns of Morwell, Moe, Traralgon and Churchill and Trafalgar. It is not known if the data are representative of GP presentations across Victoria, but it is the only available data on injuries presenting to General Practice. The practitioner participation rate was 96.5% and the injury capture rate was 77%.

### 6.2 PLACE OF OCCURRENCE (LOCATION) OF INJURY PRESENTING TO GENERAL PRACTITIONERS

For both females and males, the home was the primary place of occurrence for injuries presenting to general practitioners (GPs) (Table 6:1). However, the proportion of women who were injured in their homes was much larger than the proportion of males (42.8% v 23.7%). The comparatively larger proportion of males injured in the production area (20.7% v 3.5%) mostly accounts for the difference.

**Table 6:1 Location of injuries to adults (aged ≥ 15 years) by sex, in rank order of frequency: ELVIS General Practice presentations 1994-95**

Location	Female General Practice Presentations n=1,503			Male General Practice Presentations n=2,532			All n=4,035
	n	%	Rank	n	%	Rank	
Residential-home	643	42.8	1	601	23.7	1	1 244
Transport areas	227	15.1	2	250	9.9	5	477
Commerce	155	10.3	3	291	11.5	4	447
Organised sport	139	9.2	4	295	11.7	3	434
Residential-other	65	4.3	5	61	2.4	8	126
Educational	56	3.7	6	105	4.2	6	161
Production	53	3.5	7	523	20.7	2	576
Outdoor land-based	40	2.7	8	79	3.1	7	119
Outdoor water-based	15	1.0	9	27	1.1	9	42
Public playground	4	0.3	10	3	0.1	10	7
Institution	3	0.2		1			4
Unknown or NEC	103	6.9		295	11.6		398
<b>TOTAL</b>	<b>1 503</b>	<b>100.0</b>		<b>2 531</b>	<b>100.0</b>		<b>4 034<sup>a</sup></b>

Note: (a) Missing cases-(2 missing observations; 7 unknown sex)

Source: Extended Latrobe Valley Injury Surveillance, General Practice presentations 1994-95

### 6.3 INTENT OF FEMALE HOME INJURY PRESENTING TO GENERAL PRACTITIONERS

Almost all (97.7%) of the adult female home injury presentations to GPs were for unintentional injuries (table 6:2). There may be some unreported assaultive and self-inflicted injuries classified as unintentional because the data relied heavily on self-reports and cases may not have been detected by the General Practitioners.

**Table 6:2 Intent of adult female home injury presenting to ELVIS General Practitioners**

Intent	ELVIS GP presentations (n=643)	
	n	%
Unintentional	628	97.7
Self inflicted	3	0.4
Assaultive	9	1.4
Unknown/undetermined intent	3	0.5
<b>TOTAL</b>	<b>643</b>	<b>100.0</b>
<i>Source: Extended Latrobe Valley Injury Surveillance, General Practice presentations 1994-95</i>		

### 6.4 TIME OF INJURY

The peak times for home injury GP presentations were from Saturday to Wednesday (inclusive), and in the summer months (January to March).

### 6.5 CAUSES OF INJURY

Falls and cutting/piercing were the top ranking causes of GP presentation, each of these causes accounted for approximately one quarter of the injury attendances. The other major causes were injuries resulting from being hit, struck or crushed, insect and animal bites and stings (natural /environmental causes) and fire/burns/scalds. Data on each of the major causes of injury are analysed in Section Two of this report.

**Table 6:3 Ranked causes of adult female home injuries, ELVIS General Practice presentations**

<b>Rank</b>	<b>ELVIS General Practice presentations (n=643<sup>a</sup>)</b>	<b><i>n</i></b>	<b>%</b>
1	Falls	167	26.0
2	Cutting/piercing	154	23.9
3	Hit/struck/crush	104	16.2
4	Natural/environmental (mostly animal-related injuries)	78	12.1
5	Overexertion/strenuous exercise	56	8.7
6	Fire/burns/scalds	38	5.9
7	Choking/suffocating	18	2.8
8	Intentional (assault)	9	1.4
9	Transport	4	0.6
10	Intentional (self inflicted)	3	0.5
	Other specified causes/late effects/unspecified cause	12	1.9
	<b>TOTAL</b>	<b>643</b>	<b>100.0</b>

*Note:*(a) Injury causes classified by ICD-9 E-codes excluding medical injuries  
*Source:* Extended Latrobe Valley Injury Surveillance, General Practice presentations 1994-95

## 6.6 AGE OF WOMEN PRESENTING TO GENERAL PRACTITIONERS

Table 6:4 shows the proportion of women in different age groups presenting to ELVIS General Practitioners with home injury compared with the age structure of the population of adult women in the Latrobe Valley region. Injury rates could not be calculated because the population data are based on ABS estimates for the six major postcodes in the Latrobe Valley region and the injury data include cases from outside this area (63 cases; 9.8%). However, the available data suggests that women aged 60 years and older are at a higher risk of injury. Women in this age group comprised 19.5% of the population but contributed 29.4% of injury cases presenting to GPs in the 12-month period.

**Table 6:4 Age of adult female presentations for home injury, ELVIS General Practice presentations 1994-95**

Age group	Frequency	Proportion	Latrobe Valley population age structure <sup>a</sup>
	<i>n</i>	%	%
15-19	51	7.9	9.6
20-24	62	9.6	10.3
25-29	54	8.4	10.2
30-34	68	10.6	11.2
35-39	56	8.7	10.4
40-49	91	14.2	17.5
50-59	72	11.2	11.3
60-69	69	12.3	9.5
70-79	68	10.6	7.0
80+	42	6.5	3.0
	<b>643</b>	<b>100.0</b>	<b>100.0</b>

*Note:* (a) Population age structure for Latrobe Valley region is based on ABS population estimates at June 1995 for postcodes 3825 (Moe), 3840 (Morwell), 3842 (Churchill); 3844 (Traralgon), 3869 (Yinnar) and 3870 (Boolarra).

*Source:* Extended Latrobe Valley Injury Surveillance, General Practice presentations 1994-95 (12 months)

## 6.7 ACTIVITY AT TIME OF INJURY

Most home injuries occurred when women were participating in leisure and recreation activities (44.0% of cases, but this is an overestimate as this code is used as a default code in the system), miscellaneous household activities (26.0%, washing clothes, food preparation and cooking and cleaning) and home maintenance activities (18.0%, mostly gardening).

## 6.8 BREAKDOWN EVENT: WHAT WENT WRONG

The most frequently reported breakdown event was dangerous position (30% of cases), followed by over-exerted (26%), falls (21%) and loss of control (10.3%).

## 6.9 NATURE OF INJURY

The most frequently occurring injuries were lacerations (25.0%), sprain/strain (19.5%), bruising (14.9%), bites (10.0%) and burns (6.3%).

## 6.10 BODY PART INJURED

The most frequently injured body parts were: the upper limbs (42.0% of injuries), the lower limbs (39.0%), the head and face (9.0%) and the trunk (9.0%).

## **6.11 DISPOSAL AFTER GENERAL PRACTITIONER CONSULTATION**

Just over half (52.0%) of the home injury cases were treated by the GP with no referral onward for other treatment, ten per cent of the cases required re-appointments. A small proportion (4.8%) were referred to hospital emergency or outpatients departments or to other places for treatment and only a very few patients (0.5%) required admission to hospital. Thirteen per cent required no treatment.

## **6.12 SUMMARY**

- Over two-fifths (42.8%) of adult women presenting with injuries to ELVIS GPs are injured in the home.
- Almost all (97.7%) of the home injury presentations to GPs are for unintentional injuries (although intentional injuries may be under-reported and undetected).
- The peak times for home injuries are from Saturday to Wednesday (inclusive) and in the summer months, January to March.
- Falls and cutting/piercing are the highest-ranked causes of GP presentations each accounting for approximately one-quarter of the home injury presentations.
- Women aged 60 years and over appear more at risk of injury. They comprised 19.5% of the Latrobe Valley Region population in 1994-95 yet accounted for 39.4% of all injury presentations to GPs in that period.
- The most frequently occurring injuries were: lacerations (25.0%), sprain/strain (19.5%), bruising (14.9%), bites (10.0%) and burns (6.3%).
- The most frequently injured body parts were: the upper limbs (42.0% of injuries), the lower limbs (39.0%), the head and face (9.0%) and the trunk (9.0%).
- Eighty-seven per cent of cases presenting to GPs required treatment.



## **PART TWO**

# **Major causes of adult female home injury**

- **Overview**
- **Falls**
- **Suicide and self-inflicted injury**
- **Poisoning (accidental)**
- **Cutting/piercing**
- **Hit/truck/crushed**
- **Fire/burns/scalds**
- **Assaultive injury**
- **Natural and environmental**
- **Choking, suffocation, foreign body in orifice**
- **Overexertion and strenuous exercise**



## 7. OVERVIEW OF MAJOR CAUSES OF HOME INJURY TO WOMEN

The ranking of causes of adult women's home injury in Victoria are shown in Table 7:1 .

### **The higher-ranked causes of home injury to adult women are:**

- falls (at all levels of severity if the underestimation of fall deaths among elderly women due to fractured neck of femur on the Coroners' Facilitation System is taken into account)
- suicide and self inflicted injury (at all levels of severity except General Practitioner (GP) presentations)
- accidental poisoning (at the more serious levels of severity - deaths and hospital admissions)
- cutting and piercing injury (at all levels of severity except deaths)

### **Mid-ranked causes of home injury across most levels of severity in Victoria are:**

- hit, struck and crushing injuries
- fire, burns and scalds
- intentional injury - homicide and assaults

### **The lower-ranked causes are:**

- natural and environmental injury (mostly animal-related injury)
- choking, suffocation and foreign body in orifice
- over-exertion injury

The seven high- and mid- ranked causes of injury will be discussed in detail in this section of the report. The lower ranking causes are included but are dealt with in less detail.

The ranking was based on a comparative analysis of the causes of injury across all levels of severity (using ICD9E-codes for injury) utilising the available data in Victoria for the period 1987-88 to 1994-95. The limitations of each of the datasets should be considered when interpreting or using the findings from this study. The major limitations that are relevant to the analysis in this section are:

- **Deaths:** the Coroners' Facilitation System (CFS) underestimates elderly fall deaths because home fall deaths due to fractured neck of femur among the elderly are not required by law to be reported to the Coroner by the medical practitioner certifying cause of death, if osteoporosis or the general frailty of the patient contributed to the death.

- **Hospital admissions:** the location of injury is poorly reported on the Victorian Inpatient Minimum Database (VIMD), only 30.2% of female injury cases were coded for place of occurrence (location) in the period 1987-88 to 1993-94. It is not known if the cases coded for location form a representative sample.
- **Hospital emergency department presentations:** adult injury data in the Victorian Injury Surveillance System (VISS) were collected from only four hospitals in the period 1991-92 to 1994-95: Latrobe Regional Hospital (4 years 1991-95), Western Hospital (1 year 1991-92), Royal Melbourne Hospital (2 years 1992-94), Preston and Northcote Community Hospital (1 year 1992-93). VISS does not employ ICD 9E-codes to classify cause of injury so that the closest possible electronic conversion of the ISIS codes (used by VISS) to E-codes was made to enable patterns of injury to be compared across the four levels of injury severity.
- **General Practitioner presentations:** findings are based on data collected over one year by the Extended Latrobe Valley Injury Surveillance (ELVIS) project from General Practitioners in the catchment area of the Latrobe Regional Hospital whose population may not be representative of the whole of Victoria. It is the only systematic collection of GP data currently available in Victoria and Australia.

The parameters of the datasets and a more detailed discussion of their limitations are included in the introduction in Part One of this report.

**Table 7:1 Ranking of major causes of home injury to adult women**

Rank	Deaths CFS 1989-90 to 1993-94 <i>n</i> = 795	<i>n</i>	%	Mean Annual Rate Per 100 000	Hospital admissions VIMD 1987-88 to 1993-4 <i>n</i> =23 029	<i>n</i>	%	Mean Annual Rate Per 100 000
1	Intentional-suicide	374	47.0	4.4	Falls	15 815	68.7	n.a.
2	Poisoning (accidental)	96	12.1	1.1	Intentional-self inflicted	1 637	7.1	
3	Intentional-homicide	63	7.9	0.7	Cutting/piercing	1 078	4.7	
4	Fires/burns/scalds	48	6.0	0.6	Poisoning (accidental)	799	3.5	
5	Falls <sup>a</sup>	36	4.5	0.4	Hit/struck/crushed	546	2.4	
6	Choking/suffocation/ foreign body in orifice	18	2.3	0.2	Fire/burns/scalds	470	2.0	
7	Drowning	12	1.5	0.1	Intentional (assaultive)	399	1.7	
8	Natural/environmental	5	0.6	0.1	Overexertion/strenuous exercise	334	1.5	
9	Transport-related	5	0.6	0.1	Choking/suffocation/ foreign body in orifice	319	1.4	
9	Hit/struck/crushed	2	0.3	0.02				
10	Cutting/piercing	2	0.3	0.02				
10	-				Natural/environmental	286	1.2	
	Other specified causes (including medical) unspecified/undetermined causes/late effects	134	16.9		Other specified causes (including medical) unspecified/undetermined causes/late effects	1 346	5.8	
	<b>TOTAL</b>	<b>795</b>	<b>100.0</b>		<b>TOTAL</b>	<b>23 029</b>	<b>100.0</b>	
Rank	Hospital ED Presentations VISS 1991-95 <i>n</i> =8 302	<i>n</i>	%	Mean Annual Rate Per 100 000	General Practitioner Presentations ELVIS 1994-95 <i>n</i> =643	<i>n</i>	%	Mean Annual Rate Per 100 000
1	Falls	3117	37.6	n.a.	Falls	167	26.0	n.a.
2	Cutting/piercing	1 362	16.4		Cutting/piercing	154	23.9	
3	Intentional (self inflicted)	756	9.1		Hit/struck/crushed	104	16.2	
4	Overexertion/strenuous exercise	567	6.8		Natural/environmental	78	12.1	
5	Hit/struck/crushed	459	5.5		Overexertion/strenuous exercise	56	8.7	
6	Intentional/assaultive	427	5.1		Fires/burns/scalds	38	5.9	
7	Fire/burns/scalds	353	4.3		Choking/suffocation/ foreign body in orifice	18	2.8	
8	Natural/environmental	317	3.8		Intentional (assaultive)	9	1.4	
9	Choking/suffocation/ foreign body in orifice	279	3.4		Transport	4	0.6	
10	Poisoning (accidental)	99	1.2		Intentional (self inflicted)	3	0.5	
	Other specified and unspecified causes/ late effects/ uncaptured cases in re- classification/ wrongly coded cases	566	6.8		Other specified and unspecified causes/late effects	12	1.9	
	<b>TOTAL</b>	<b>8302</b>	<b>100.0</b>	<b>n/a</b>	<b>TOTAL</b>	<b>643</b>	<b>100.0</b>	

*Notes:*

(a) Deaths: Victorian Coroners Facilitation System (CFS), injury causes classified by ICD-9 E-codes, ranking excludes medical injuries; home fall deaths are underestimated in Coroners' Facilitation System as not all elderly home fall deaths caused by fractured neck of femur are reported to the Coroner. Ranking excludes medical injury.

(b) Hospital admissions: Victorian Inpatient Minimum Database (VIMD), injury causes classified by ICD-9 E-codes, ranking excludes medical injuries.

(c) Hospital emergency department presentations: Victorian Injury Surveillance System (VISS), data includes nine hospital years of data from four hospitals: Latrobe Regional Hospital (4 years 1991-95), Western Hospital (1 year 1991-92), Royal Melbourne Hospital (2 years 1992-94), Preston and Northcote Community Hospital (one year 1992-93). VISS does not use ICD 9E-codes to classify injury causes so that the closest possible electronic conversion of the ISIS codes (used by VISS) to E-codes has been made (4.3% of cases were uncaptured in re-classification). Rates could not be calculated because the population denominator is not known.

(d) General Practitioner presentations: Extended Latrobe Valley Injury Surveillance (ELVIS), based on one year of data collected from the catchment area of the Latrobe Regional Hospital whose population may not be representative of the whole of Victoria, injury causes classified by ICD-9 E-codes.

(e) Rates: mean annual rate per 100 000 population of females aged 15 years and over for the time period covered by the database. Injury rates could not be calculated for VIMD because only 27.8% of VIMD cases were coded for location and it is not known whether the group of home injury cases is a representative sample. Rates could be calculated for VISS data because the population denominators for catchment area of VISS hospitals are not able to be estimated.

(f) Natural/environmental injuries include excessive heat or cold, bites or stings and injury caused by animals

## 8. FALLS

Falls were the leading cause of injury to adult women in the home at all levels of severity (Table 7:1). Fall injuries accounted for:

- five per cent of all home injury deaths recorded on the CFS.

[Note: compared to ABS death data this is a gross underestimation, because elderly home fall deaths are under-reported on the CFS. If ABS home fall deaths data ( $n=595$ ) are substituted for CFS data then fall deaths account for 43.9% of all female injury fatalities that occur in the home].

- more than two-thirds (68.7%) of VIMD home injury hospital admissions;
- more than one-third (37.5%) of home injury VISS hospital emergency department presentations; and
- approximately one-quarter (26.0%) of ELVIS General Practitioner presentations for home injury.

Overall, fall injuries were mostly caused by slips, trips and stumbles on the same level; same-level falls caused between approximately one-half and three-quarters of fall injuries at every level of severity (Table 8:1).

Fatal falls recorded on the CFS were more likely to be caused by falling from one level to another than from falling on the same level. These data may be biased because elderly fractured neck of femur home fall deaths, generally identified as predominantly same-level falls in the research literature, are not recorded on the CFS.

Women aged 60 years and older appeared to be at higher risk of fall injuries at all levels of severity, including fatalities. Risk also appeared to increase with age, from age 60 years onwards.

**Table 8:1 Causes (mechanisms) of fall injuries among adult women (age ≥ 15 years) that occurred in the home, at all levels of severity**

Falls E-code breakdown (E880-888)	Deaths <i>n</i> =36 <sup>a</sup> Rate: 0.4/100 000 (underestimate) Rank: 5		Hospital admissions <i>n</i> =15 815 Rate: n/a Rank: 1		Hospital E.D. Presentations <i>n</i> =3 117 Rate: n/a Rank: 1		GP Presentations <i>n</i> =167 Rate: n/a Rank: 1	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Fall from one level to another								
-on or from stairs or steps	11	30.6	861	5.4	259	8.3	28	16.8
-from ladder	3	8.3	228	1.4	92	3.0	8	4.8
-from building/structure	1	2.8	70	0.4				
-into hole			12	0.1	12	0.4	5	3.0
-from playground equipment			11	0.1				
-from chair or bed	3	8.3	1 077	6.8	364	11.7	8	4.8
-other fall (from one level to another)	1	2.8	269	1.8	234	7.5	8	4.8
Sub total	19	52.8	2 528	16.0	961	30.9	57	34.2
Fall on the same level								
-slip, trip, stumble	17	47.2	7 444	47.1	2 087	66.9	109	65.2
-collisions in sport			7					
-other & unspecified			41	0.3				
Sub total	17	47.2	7 492	47.4	2 087	66.9	109	65.2
Fractures (not elsewhere classified)			230	1.4				
Other & unspecified fall			5 565	35.2			1	0.6
Wrongly classified/ misclassified in conversion					69	2.2		
<b>Total</b>	<b>36</b>	<b>100.0</b>	<b>15 815</b>	<b>100.0</b>	<b>3 117</b>	<b>100.0</b>	<b>167</b>	<b>100.0</b>
<p><i>Notes:</i> (a) Home fall deaths are underestimated in the CFS because elderly home fall deaths due to complications of fractured neck of femur, where osteoporosis or the overall frailty of the person contributed to the death, are not required by law to be referred to the coroner by the medical practitioner certifying death.</p> <p>(b) As VISS data are not E-coded, a combination of ISIS breakdown factor codes (slipped on, tripped on, fell from) and a text search on case narratives for 'fell' or 'fall', with some exclusions, were used to electronically select the falls cases from VISS. The finer E-code breakdown was estimated from re-coding a sample of the selected cases (<i>n</i>=502, 16.1%).</p> <p><i>Sources:</i> Death data: Victorian Coroners' Facilitation System (CFS), 1989-90 to 1993-94 (5 years)  Hospital admissions data: Victorian Inpatient Minimum Database (VIMD), 1987-94 (7 years), public hospitals  Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), four hospitals 1991-1995 (various periods)  General Practitioner presentations data:-Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-5 (1 year)</p>								

## 8.1 DEATHS

CFS fall deaths under-recorded on CFS (*n*=36, mean annual rate: 0.4/100 000 population (rank: 5)

ABS (*n*=595, adjusted rank 1)

### 8.1.1 The size of the problem

Falls were a middle ranking cause of adult female home injury deaths on the CFS but the highest ranking if ABS data on home fall deaths (n=595) are substituted for CFS data (n=36) (Table 7:1).

There were 36 deaths recorded on the CFS over the 5-year period (an average of seven deaths each year). There is a major discrepancy between the number of home fall deaths recorded on the CFS and the number included in Victorian ABS death data (Table 8:2). The ABS recorded an average of 119 adult female home fall deaths each year from 1989-90 to 1991-92 from information about cause of death on the death certificate. ABS data was not available for 1992-93 and 1993-94 because the location code to identify home fall deaths was not set so the data could not be extracted from the ABS database.

The reason for the discrepancy between recorded fall deaths on the ABS and CFS databases is that, unlike other unnatural deaths, the doctor certifying death is not necessarily required by law to notify the coroner of elderly fractured neck of femur home fall deaths, if osteoporosis or the general frailty of the patient contributed to the death. Consequently, this large group of home fall deaths is not included on the CFS.

An examination of the deaths on the CFS in 1989-90, classified from the Coroners' findings as due to natural causes, revealed 20 fracture-related fall death cases (for both sexes, location of injury not specified). This is the only year for which coroners' findings on deaths due to natural causes are published but these data suggest that any fracture-related deaths of older people that are reported to the Coroner are likely to be found to be 'natural' rather than unnatural (accidental) deaths.

**Table 8:2 Frequency of recorded deaths of adult females (aged ≥ 15 years) due to falls in the home in Victoria, 1989-90 to 1991-92, CFS data compared to ABS data**

Database	1989-90	1990-91	1991-92	Total	Mean (per annum)
CFS	3	10	9	22	7.3
ABS	132	121	104	357	119.0

### 8.1.2 Causes (mechanisms) of fall deaths

The causes (mechanisms) of CFS fall deaths are shown in Table 8:1. The fatal falls recorded on the CFS were more likely to be caused by falling from one level to another than from falls on the same level (52.8% versus 47.2%). If ABS data on elderly falls were substituted for CFS data then same-level falls would predominate.

Nearly three-fifths (57.9%) of the fatal falls from one level to another recorded on the CFS involved indoor and outdoor steps and stairs. The case narratives added little information on the circumstances of these falls. The three fall deaths from ladders occurred when the victims were picking apples, cleaning leaves from the roof and climbing a stepladder. Factors reported as contributing to fall deaths were: pre-morbid conditions (13.9% of cases - multiple sclerosis, Meniere's disease, blackout, liver condition and use of walking stick); alcohol (13.9% cases); long lie after fall (8.3%); and history of falls (2.7%). It is likely that contributory factors are inconsistently reported in case narratives.

### **8.1.3 Nature of injury**

Head trauma was reported as causing death in approximately three-fifths (61.1%) of the CFS case narratives on fall deaths. Fractured neck of femur and other fall-related fractures are likely to be the major cause of fall deaths recorded by the ABS.

### **8.1.4 Fall injury rates at different ages**

Women aged 75 years and older accounted for approximately three-fifths (61.1%) of all adult female home fall deaths recorded on the CFS. The mean fall death rates (per 100,000 population) in the older age groups (the five-year age groups from age 60-65 years) were generally much higher than the mean all age rate, and peaked in women aged 80 years and older. The mean fall death rate for women 75-79 years was four and a half times the adult fall fatality rate (rate ratio 4.5:1), the rate for women aged 80 years and older was twelve-and-a-half times the all age rate (rate ratio 12.5:1). These differentials would be far greater if all cases of elderly fractured neck of femur fall deaths were included on the CFS database.

## **8.2 HOSPITAL ADMISSIONS**

VIMD ( $n=15,815$  over 7 years, mean annual rate:  $n/a$ , rank 1)

### **8.2.1 The size of the problem**

Fall injuries were the highest ranked cause of hospital admissions for home injury accounting for over two-thirds (68.7%) of adult female home injury hospitalisations. The VIMD recorded 15,815 adult female home fall injury cases over the 7-year data collection period (an average of 2 260 each year). However, only one-half (50.0%) of the 53,217 adult female fall injury cases on VIMD were coded for location (the home was the place where the injury occurred in nearly three-fifths (59.5%) of these cases). If the coded cases are assumed to be a representative sample of all adult female fall injury hospitalisations (and this could not be checked from the available data) then the annual frequency of adult female home fall injury hospitalisations could be in the vicinity of 4,520 cases.

### **8.2.2 Causes (mechanisms) of hospitalised fall injury**

The finer breakdown of the E-code on falls cases on the database (Table 8:1) revealed that home fall injury cases that required hospital admission were mostly the result of slips/trips/stumbles on the same-level (47.4%) and 'other and unspecified falls' (35.2%). There is no finer E-code breakdown classification for either category. However, analysis of the case narratives of VISS emergency department hospital admissions (see below) indicated that hospitalised same-level fall injury cases involved dizziness/fits, joints 'giving way', loss of balance, slips on wet surfaces and trips over a variety of unfixed items in the home and yard.

The most frequently reported causes of falls from one level to another (which accounted for 16.0% of hospitalisations for home fall injuries) were falls from bed or chair (6.8%), stairs and steps (5.4%) and ladders (1.4%).

### **8.2.3 Age of hospitalised women**

Age-related fall injury rates could not be calculated because the Victorian female population for the time period of the study could not be used as the denominator, as home

fall injuries were inconsistently reported from public hospitals across the state. The vast majority (85.3%) of women identified as admitted to hospital for home fall injuries were aged 60 years and older. This age group comprised, on average, only 22.0% of the adult female population in the VIMD data collection period.

Women aged 60 years and older were over-represented in hospital admissions data for all types of falls, except for falls from buildings and structures. This older group of women experienced:

- 85.8% ( $n=6,395$ ) of falls from the same level;
- 89.7% ( $n=5,043$ ) of 'other falls';
- 81.3% ( $n=1,091$ ) of falls from one level to another
- 70.2% ( $n=604$ ) of falls involving stairs
- 86.5% ( $n=199$ ) of fractures (cause unspecified); and
- 58.8% ( $n=134$ ) of falls involving ladders.

The risk increased with age. Women aged 75 years and older accounted for 59.8% of VIMD home fall hospitalisations yet comprised only 7.2% of the Victorian population during the data collection period.

#### **8.2.4 Nature of injury**

Over two-thirds (68.3%) of the injury reports on home fall admissions were for fractures. Other major injury groups were open wounds (7.5%) and bruises/haematoma (7.0%). More than one injury per case can be recorded. The mean number of injuries per case was 1.2.

There were 51,402 fractures recorded on the database for adult female home fall injuries over the seven-year period from 1987/88 to 1993/94. The most frequently reported fractures were:

- lower limb fractures (58.7%) predominantly femur (41.8%) ankle (8.9%) and tibia and fibula (5.0%);
- upper limb fractures (22.6%) predominantly radius and ulna (12.6%) and humerus (8.6%); and
- spine and trunk fractures (15.8%) predominantly pelvis (6.7%) vertebral column (4.7%) and rib, sternum, larynx and trachea (4.3%, mostly rib).

### **8.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)**

VISS ( $n=3,117$ , rate: n/a, rank: 1)

### **8.3.1 The size of the problem**

Falls were the highest-ranking cause of hospital emergency department attendance by adult women for home injuries (Table 8:1). The annual incidence of fall injury presentations to emergency departments cannot be estimated from VISS data because the VISS collection is not necessarily representative.

### **8.3.2 Causes (mechanisms) of emergency department presentations for fall injuries**

VISS data is not E-coded for cause of injury. The closest available ISIS codes (the coding system used in VISS) to the ICD9 E-code classification for falls were used to electronically extract the falls subset ( $n=3,117$ ). A sample of one-line case narratives (random pages of narratives which represented 16.1% of cases,  $n=502$ ) were then manually classified into the finer E-code breakdown groups (Table 8:1).

The analysis showed that two-thirds (66.9%) of the fall injuries occurred in same-level falls and just under one-third (30.9%) occurred in falls from one level to another. Falls from beds and chairs (11.7%), steps and stairs (8.3%) and 'other causes' (7.5%, mainly from chairs and stools used as climbing apparatus) were the predominant causes of falls from one level to another. (Table 8:1).

#### ***Specific causes (mechanisms) of falls, trips and slips***

The case narratives on VISS emergency department presentations provide more information on the circumstances surrounding the injury, although pertinent details are not consistently reported. Pages of case narratives for home falls ( $n=502$ ) were extracted from the database (separating admissions and non-admissions) and manually categorised into three groupings: 'falls - loss of balance (261 cases), 'slips' (154 cases) and 'trips' (87 cases). These groupings were subjected to a more detailed analysis to elicit any further details on the circumstances of the fall event and to see if there was any differences between admitted and non-admitted fall injury cases (Table 8:3, 8:4 and 8:5).

#### ***'Falls - loss of balance'***

Just over one-half (52.0%) of the adult female home fall events were described simply as 'falls'. The breakdown of these fall events is shown in Table 8:3. They were more frequently on the same level (53.3%) than from one level to another (42.5%). The most frequently reported specific causes (mechanisms) of 'falls - loss of balance' were:

- from a bed or chair (14.6% of all 'falls', mostly falling out of bed while asleep or falling when getting in or out of bed or a chair);
- from stools/chair/other item used as climbing apparatus to do household chores (9.6%);  
and
- on steps and stairs (9.2%).

Falls from beds/chairs, from stools/chair/other item used as climbing apparatus and falls on the same level caused by dizziness/fits were disproportionately represented in admissions. (Table 8:2). Ladder injuries occurred in a variety of circumstances: missed step, loss of footing, overbalancing, over-reaching and falling off top level of ladder.

**Table 8:3 Causes (mechanisms) of ‘falls-loss of balance’ derived from an analysis of a sample of VISS adult female home falls case narratives**

Causes of ‘falls - loss of balance’	Admissions <i>n</i> =122		Non-admissions <i>n</i> =139		All selected cases <i>n</i> =261	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
‘Falls’ from one level to another						
-steps/stairs	6	4.9	18	12.9	24	9.2
-from ladder /stepladder	1	0.8	14	10.1	15	5.8
-fell in hole			2	1.4	2	0.8
Other:						
-from bed/chair	24	19.7	14	10.1	38	14.6
-from stool/chair/other item used as climbing apparatus	14	11.5	11	7.9	25	9.6
-other falls	2	1.6	5	3.6	7	2.7
Sub-total	47	38.5	64	46.0	111	42.5
‘Falls’ on same level						
-loss of balance	5	4.1	10	7.2	15	5.8
-dizziness/fit	9	7.4	5	3.6	14	5.4
-joint (hip/knee/ankle) gave way	4	3.3	2	1.4	6	2.3
-playing around		-	10	7.2	10	3.8
-other	9	7.4	14	10.1	23	8.8
-no other details	48	39.3	23	16.5	71	27.2
Sub total	75	61.5	64	46.0	139	53.3
Wrongly classified			11	8.0	11	4.2
<b>Total</b>	<b>122</b>	<b>100.0</b>	<b>139</b>	<b>100.0</b>	<b>261</b>	<b>100.0</b>
<i>Source:</i> Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), four hospitals 1991-1995 (various periods - nine hospital years of data in all)						

### ‘Slips’

Slips were responsible for 30.7% of the adult female home fall injuries. The breakdown of slips is shown in Table 8:4. Most ‘slips’ (57.2%) were on the same level and these slips accounted for a higher proportion of cases admitted to hospital (62.3% of admissions compared to 54.5% of non-admissions). A wet surface was involved in well over one-half (58.0%) of the ‘slips’ on the same level and approximately one-fifth (19.4%) of ‘slips’ from stairs and steps. These are minimum estimations as the state of the surface (whether wet or dry) at the time of the fall is not consistently reported in the narratives.

‘Slips’ from one level to another (24.0% of slips) were mostly on steps and stairs, approximately one-fifth (19.4%) of which were described as wet (again this is a minimum estimate). A small proportion of ‘slips’ (3.9%) involved the use of furniture and other items as climbing apparatus.

**Table 8:4 Causes (mechanisms) of ‘slips’, derived from an analysis of a sample of VISS adult female home falls case narratives**

Causes of ‘slips’	Admissions n=53		Non-admissions n=101		All selected n=154	
	n	%	n	%	n	%
‘Slips’ from one level to another <i>-steps/stairs</i>	7 (1 wet)	13.2	24 (5 wet)	23.7	31 (6 wet)	20.1
<i>-from stool/chair/other item used as climbing apparatus</i>	4	7.5	2	2.0	6	3.9
	11	20.7	26	25.7	37	24.0
‘Slips’ on same level	33 (17 wet)	62.3	55 (34 wet)	54.5	88 (51 wet)	57.2
No other details	9	17.0	20	19.8	29	18.8
Total ‘slips’	53 (18 wet)	100.0	101 (39 wet)	100.0	154 (57 wet)	100.0

Note: (a) whether or not the surface was wet is inconsistently reported in case narratives

Source: Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), four hospitals 1991-1995 (various periods - nine hospital years of data in all)

**‘Trips’**

Trips accounted for 17.3% of adult female home fall injury events. They were caused by a wide variety of items in and around the house and garden, the most prominent of which were: stairs and steps; furniture items; uneven concrete paths; and mats (Table 8:5). Over three-quarters (76.1%) of the specified items causing ‘trips’ were portable/moveable items in the house, yard and garden. There were no additional details in the case narratives of approximately one-quarter (27.5%) of trip events.

**Table 8:5 Causes (mechanisms) of ‘trips’, derived from an analysis of a sample of falls case narratives**

Causes of ‘trips’	Admissions n=47		Non-admissions n=40		All selected n=87	
	n	%	n	%	n	%
‘Trips’ from one level to another Stairs and steps	4	8.5	4	10.0	8	9.2
‘Trips’ on same level <i>Furniture-chair or bed or dressing table</i>	3	6.4	3	7.5	6	6.9
<i>Uneven concrete path</i>	3	6.4	2	5.0	5	5.8
<i>Mat</i>	1	2.1	4	10.0	5	5.8
<i>Hose</i>	1	2.1	2	5.0	3	3.4
<i>Log</i>	1	2.1	2	5.0	3	3.4
<i>Dog/cat</i>	3	6.4			3	3.4
<i>Garden surround</i>			2	5.0	2	2.3
<i>Cord</i>	1	2.1	1	2.5	2	2.3
<i>Other specified individual items</i>	18	38.3	8	20.0	26	29.9
<b>Sub total</b>	<b>31</b>	<b>65.9</b>	<b>24</b>	<b>60.0</b>	<b>55</b>	<b>63.2</b>
No other details	12	25.6	12	30.0	24	27.6
<b>Total ‘trips’</b>	<b>47</b>	<b>100.0</b>	<b>40</b>	<b>100.0</b>	<b>87</b>	<b>100.0</b>

Source Hospital ED presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods: 9 hospital yrs data in all)

The remainder of the analysis in this section utilises the routine data output from the VISS database, which are coded using the ISIS system. The dataset includes all cases of fall injury selected by the electronic conversion of ISIS to ICD9 E-code equivalents ( $n=3\ 117$ ) which includes a small proportion (estimated to be 4.2% of cases) which were wrongly classified in the conversion or wrongly coded. These cases could not be removed electronically from the dataset.

### **8.3.3 Age factors**

Women aged 60 years and over experienced nearly half (49.7%) of all the adult female home fall injuries presentations, yet comprised only 22.1% of the Victorian adult female population in the VISS data collection period. However, the age structure of the female population in the catchment areas of VISS hospitals is not specifically known. Certainly, older persons are over-represented in some municipalities in the VISS catchment area.

### **8.3.4 Time of injury**

Saturdays and Sundays were the peak days for presentations for fall injuries, accounting for 35.1% of emergency department attendances (the expected proportion if fall injuries were evenly distributed across the week is 28.3%).

### **8.3.5 Place of occurrence (location)**

Home fall injuries presenting to VISS hospital emergency departments occurred in:

- the living/sleeping areas (47.6%)
- the garden/garage/yard (33.6%)
- bathroom/laundry/toilet (9.8%)
- kitchen (9.0%)

### **8.3.6 Activity being undertaken at the time**

Women mostly incurred fall injuries when engaged in:

- leisure and recreation activities (68.2%, mostly classified under ‘other leisure and recreation’ which is used on the system as the default code);
- miscellaneous household activities (14.0%, mostly cleaning, ‘other’ household activities and laundry);
- personal activities (10.7%, mostly washing/showering/bathing, ‘other’ personal hygiene and sleeping/resting); and
- maintenance work (6.1%, mostly gardening, ‘other’ maintenance and do it yourself activities-not motor vehicle-related).

### **8.3.7 Nature of injury and body part injured**

The most common home fall injuries were:

- fractures (43.8% of cases, predominantly femur, wrist, hip, radius/ulna and ankle);
- sprain/strain (16.8% of cases, mostly ankle);
- cuts and lacerations (15.3% of cases, predominantly to the face/cheek/forehead/scalp, lower leg and finger);
- inflammation (13.6%, predominantly knee, hip, lower back ankle and shoulder); and
- haematoma/bruising (13.3%, predominantly face/forehead/cheek/scalp, knee, lower back, hip, lower leg and ankle).

### **8.3.8 Breakdown factors-what went wrong**

The most commonly reported breakdown factors for home fall injuries were:

- structures and parts thereof (31.8% of cases, predominantly stairs and steps, floors and flooring materials and concrete and other man-made outdoor surfaces);
- persons (31.4% of cases, mostly the injured person);
- furniture (15.2% of cases, predominantly chairs, beds, bathtubs/showers and stools);
- naturally occurring environmental factors (8.9% of cases, predominantly water (not hot) and ground and other natural surfaces);
- yard and garden (3.4% of cases, predominantly ladders, fences or fence posts and garden hoses/nozzles/sprinklers);
- fabrics, drapery and soft furnishings (3.1% of cases, predominantly runners/throw rugs/doormats and rugs/carpets); and
- personal use items (3.0% of cases, predominantly crutches/canes/walkers and footwear).

### **8.3.9 Disposal of patients from hospital emergency department**

Nearly all (97.0%) of falls patients required treatment, over one-quarter (29.5%) required hospital admission:

- treated, no referral (18.8%)
- treated, referred to O.P.D (14.5%)
- treated, referred to G.P (20.3%)
- treated other referral (2.0%)
- casualty review (10.4%)

- admitted to hospital 29.5
- transferred (1.3%)
- died or dead on arrival (0.1%)

## 8.4 GENERAL PRACTITIONER PRESENTATIONS

ELVIS ( $n=167$ , mean annual rate: n/a, rank: 1)

### 8.4.1 The size of the problem

Falls were the highest ranked cause of adult female home injury presentations to Latrobe Valley General Practitioners (GPs) accounting for just over one-quarter (26.0%) of all presentations (table 7:1). The annual incidence of home fall injury presentations for Victoria cannot be estimated from the available data which were gathered from only one region of Victoria (the Latrobe Valley).

### 8.4.2 Causes (mechanisms) of General Practitioner presentations for home fall injury

Table 8:1 shows the causes (mechanisms) of home fall injury GP presentations. Nearly two-thirds (65.2%) of the adult female home fall presentations were for falls on the same level. The remaining cases (34.2%) were caused by falls from one level to another, mainly falls on or from stairs or steps (16.8% of all falls presentations).

To obtain more information on the circumstances of falls, all adult female home fall injury one-line narratives ( $n=167$ , one case narrative was missing) were classified into three groupings: ‘falls-loss of balance’, ‘trips’ or ‘slips’. In the vast majority of cases the classification was based on the use of these words in the narrative to describe the event (in a small number of cases the information in the narrative was used to override this keyword). Where none of these keywords appeared, other information in the narratives was used to classify the event.

#### Specific causes (mechanisms) of falls, trips and slips

##### *‘Falls - loss of balance’*

There were 77 ‘falls’ (46.4% of falls/slips/trips cases with narratives), three-quarters of which contained further details of the event:

- 19 (24.7% ) of the ‘falls’ involved climbing - on climbing apparatus [ladder (5) and step ladder (3)] and furniture or household items misused for climbing [stool (4), chair (3), box (1), bench (1), freezer(1) and tin (1)];
- 10 (13.0%) of the ‘falls’ involved steps and stairs [missed step (3), ankle gave way (2) and running (1), no other details were given in four cases]; and
- 48 (62.3%) of the ‘falls’ were on the same level. These same level ‘falls’ involved 13 different factors, the most prominent of which were loss of balance (7), dizziness/faintness/epilepsy (7), ankle/knee/leg ‘giving way’ (4) and fell in hole in ground (4). No other details were given in 15 case narratives.

### ***‘Slips’***

There were 48 ‘slips’ (28.9% of falls/slips/trips cases with narratives), 46 (95.8%) of these narratives contained further details of the event:

- 20 (41.7% of ‘slips’) involved a range of nine level surfaces, the most prominent of which were: concrete, not specified as wet (4); tiles, not specified as wet (2); and ‘bathroom’, not specified as wet (2), no other details were given in six cases.
- 14 (29.1% of ‘slips’) were on level surfaces specified as wet or icy: floors [10 cases - bathroom (5), unspecified (5)], paths (3) and grass (2).
- 14 (29.2% of ‘slips’) were on steps: icy/wet steps (6); stairs (1); broken pool ladder (1); no other details were given in six cases.

In all, the surface was specified as wet in 41.6% of cases ( $n=20$ ) but this is most likely an underestimation as the quality of the narratives was variable and the slip hazard was inconsistently reported.

### ***‘Trips’***

There were 41 ‘trips’ (24.7% of falls/slips/trips cases with narratives), 29 (70.7%) of these narratives contained further details of the event. Sixteen different factors were involved in trips, the most prominent of which were: carpet/mats (4 cases); animals (3); steps/stairs (3); and uneven concrete paths (3)

## **8.4.3 Nature of injury and body part injured**

The most common injuries were sprain/strain (35.3% of cases), bruising (26.9%), fracture (16.2%) and lacerations (8.4%)

The body parts injured in falls cases were:

- lower limb (46.1% of cases, mostly ankle, knee, lower leg and foot);
- upper limb (25.7%, mostly radius/ulna and wrist);
- trunk (16.2%, mostly rib, chest and lower back); and
- head and face (9.0%, mostly to the face/cheek/forehead/scalp).

## **8.4.4 Disposal of patients**

Three quarters (75.4%) of falls patients required treatment:

- treated, no referral (32.9%)
- treated, referred to specialist (2.4%)
- treated, referred to emergency department (1.8%)
- treated, other referral (3.6%)
- admitted to hospital (0.6%)

- re-appointment (10.2%)
- reappointment/investigation (23.9%)

## 8.5 DISCUSSION AND RECOMMENDATIONS

Falls are the leading cause of home injury deaths, hospitalisations, emergency department and GP presentations for adult females. Fall injuries accounted for over two-thirds of VIMD hospital admissions for adult female home injury, over one-third of VISS emergency department presentations and one-quarter of ELVIS General Practice presentations. It is estimated (projected from available data) that there are approximately 4,520 adult female home fall injury cases admitted to public hospitals each year in Victoria. The annual incidence of cases presenting to Victorian hospital emergency departments and general practitioners could not be estimated directly from the available data which were collected, respectively, from four public hospitals for varying periods (VISS) and from GPs in one region of Victoria over twelve months (ELVIS).

THE CFS underestimates the annual incidence of home fall deaths. There was an average of only seven adult female home fall deaths per year recorded on the CFS, yet it is estimated from available ABS death data that an average of 119 adult females die each year in Victoria from fall-related injuries that are sustained in the home. The CFS under-records home fall deaths because they are not all reportable to the Coroner. The doctor certifying death is not necessarily required to report to the Coroner a fall-related death of an elderly person that occurs at home if it is due to complications from a fractured neck of femur (hip) and the certifying doctor is of the opinion that osteoporosis or the general frailty of the patient contributed to the fall death. There were no cases of elderly home fall deaths involving fractured neck of femur (or any fracture) recorded on the CFS in the period 1989-90 to 1993-94.

In order to facilitate surveillance, research and the evaluation of preventive interventions, an annual reconciliation of the non-intentional fall death cases recorded on the CFS and on the ABS deaths database needs to occur and the discrepancy (and an explanation) annotated on the CFS system on relevant tables. Data on ABS home fall deaths are not available from the beginning of calendar year 1993 because the flag, which specifies the location code for fall deaths in the ABS data system for deaths, is no longer set. This needs to be rectified to enable easy retrieval and reconciliation with CFS data. Action also needs to be taken to continuously improve the recording of place of occurrence of injury in the VIMD system because only one-half of hospital admissions for fall injuries were coded for location of injury. It is anticipated that the location codes in ICD10 AM may be better utilised than the place codes in ICD9 CM.

It is outside the scope of this project to provide a full review of the extensive research literature on the prevention of falls and fall injury. This discussion includes references to research that may provide guidance to preventive measures and is particularly focussed on slips, which are a neglected area in falls research and on falls among older people because of the elevated risk of fall injury within the older age groups.

### *Same-level falls*

At all levels of severity, except CFS-recorded fatalities, slips, trips and stumbles on the same level most frequently caused home fall injuries. It is known from ABS fall death data that same-level home fall deaths are underreported on the CFS database. Same-level falls

accounted for nearly one-half of home fall deaths (recorded on the CFS) and hospital admissions, and approximately two-thirds of VISS emergency department and ELVIS (Latrobe Valley) GP presentations.

The one-line case narratives for fall deaths on the CFS revealed that just over one-half of the victims of same-level falls died from head injuries, though these data are known not to be representative of all home fall deaths. There are no narratives for VIMD hospital admissions, so information on these fall injury cases is limited. The analysis of a sample of VISS case narratives on hospital emergency department presentations (admissions and non-admissions) and all ELVIS GP case narratives revealed a similar pattern of causes. The prominent causes of same-level falls were: loss of balance, dizziness or fits, joint 'giving way' (hip, knee or ankle); slips on wet or icy surfaces (indoor and outdoor); and trips involving a broad range of items. The most frequently reported tripping hazards were: furniture (chairs and beds), steps and stairs, mats, uneven concrete paths, garden surrounds, hoses, cords and animals. These are mostly portable/moveable items which highlights the importance of educating householders to keep indoor and outdoor pathways (especially to the clothesline and car) free of clutter and protruding furniture. The prevention of slips is dealt with in more detail below.

### ***Falls from one level to another***

Falls from one level to another accounted for just over one-half of CFS fatalities (though these data are known not to be representative of all adult female home fall deaths), one-third of VISS hospital emergency department and ELVIS GP presentations and a significant proportion of hospital admissions (15.8%). At all levels of severity, except hospital admissions, the majority of these falls were on indoor and outdoor stairs and steps and from chairs or beds. Steps and stairs were involved in one-third of hospital admissions for different level falls. Pauls (1998) concluded in a recent review article that if relative exposure is taken into account, stairs and steps are clearly more hazardous than floors (based on U.S. injury data).

Steps and stairway falls have received little research attention despite their prominence as a major cause of fall death and serious injury. Nevitt et al (1991) reported that the risk of major injury per fall is far greater for falls from stairs than from same-level falls. Hemenway et al (1994) describe stairway injurious falls as a 'hidden epidemic' because the size of the problem is not fully appreciated and the nature and potential risk factors for stairway injury have been under-researched. The authors reported from their analysis of data from a microcensus survey of 55,000 Austrian residents that the stereotypical stairway injury victim was an elderly, less educated, unmarried woman who lived on her own.

In work conducted in the 1970s, Templer et al (cited in Connell, 1996) undertook a series of stair fall studies using videotapes of naturally occurring falls on stairs and physical measures of stair characteristics. This research showed that the interplay of environment-behaviour interactions is related to successful and unsuccessful stair negotiation. High-risk stairs included those with fewer steps, low risers, treads less than twelve inches deep, abrupt changes of conditions and distracting surrounding vistas. Poor lighting and distracting patterned carpet were particular problems for the elderly. Successful stair use behaviour involved looking at the first tread to estimate where the foot should be placed and correctly adjusting that estimate prior to taking the next step and, subsequently, using the test/adjust process when there was a change in stair conditions.

Pauls (1998) identified three major priorities for improving the safety of home stairways in a recent thorough literature review: enforcing appropriate step geometry, improving visibility of the steps and provision of functional handrails. He cites a number of epidemiological studies that have identified dimensional non-conformities as a potent contributory factor in stairway-related falls. Pauls recommends that builders and building inspectors are educated about the critical importance of close tolerances (5 mm) between adjacent treads and adjacent risers with no more than twice this tolerance within a stair flight. He recommends that home stairways should be required to have a maximum tread depth of 279 mm and riser height of 178 mm (based on the US national standard for usable buildings and facilities). He also draws attention to the effect of carpeting on stairway dimensions and recommends that inspection measurements should take place with carpet (or other covering) in place.

Pauls (1998) also assesses that improvement in lighting (to a level of 20 footcandles, 214lx) is a promising and potentially cost-effective countermeasure to stairway fall injury. He recommends that regulations/conventions establishing light levels should take into account that older people need far more light on stairways than younger people and are also more susceptible to glare. Lastly, he is critical of the many design aspects of modern handrails and emphasises that renewed attention needs to be given to applying research findings on the configuration, continuity, height, terminations, graspability, clearing and fixing of handrails. He makes a number of practical recommendations on ways to improve the safety of existing stairways.

Recommendations on the design and construction of steps and stairs and their surrounds are included in the Australian and New Zealand Standard AS/NZS 4226-1994 *Guidelines for Safe Housing Design* and are summarised in the 'Guidelines to prevent falls' in the recommendations section below. To reduce exposure to stairs and steps, unnecessary changes in floor and yard levels should be avoided in home and garden designs.

Falls from ladders were also a prominent cause of death and injury. The analysis of VISS narratives revealed that using stools and chairs as climbing apparatus when doing household chores was hazardous and that this type of fall was over-represented in VISS hospital admissions in proportion to emergency department presentations. Safety tips for ladder use are also included in the guidelines in the recommendation section below.

Data on factors contributing to fall injury in the case narratives in CFS and VISS were inconsistently reported. Simple guidelines need to be developed so that the fall, trip and slip hazards, falling and landing surfaces, and other circumstances/factors (for example, pre-morbid conditions, use of walking aids and involvement of alcohol) that may have contributed to the fall are consistently identified, to the extent possible.

The causes and contributory factors to same- and different- level fall injury reported here have been consistently reported in the falls research literature (Kellog International Work Group 1987, Tinetti et al 1988; Nevitt et al 1990; Hornbrook et al 1991, Sattin 1992; Hornbrook et al 1994).

### **Type of injury**

Head injury was the most frequently reported cause of fall deaths on the CFS database but these data do not include elderly fractured neck of femur-related deaths. Fractures accounted for over two-thirds (68.3%) of VIMD hospital admissions, nearly one-half (48.3%) of VISS emergency department attendances and 16.2% of ELVIS GP

presentations. Other frequently reported groupings of injuries were sprains and strains (for emergency department and GP presentations), cuts and lacerations and bruising.

### **Age of fallers**

At all levels of severity the analyses showed that older women (women aged 60 years and older) experienced one-half or more of fatal and non-fatal fall injuries and that the risk of fall-related injury increased rapidly with increasing age, especially from age 75 years onwards. At the more serious levels of severity (deaths and hospital admissions) women aged 75 years and older contributed approximately 60% of CFS fall-related fatalities and VIMD hospital admissions yet comprised approximately 7.2% of the adult Victorian female population (aged 15 years and older) over the data collection period for the CFS and the VIMD.

The preponderance of older women presenting with fall injuries was also apparent in emergency department and GP presentations data but was less pronounced. Women aged 60 years and older accounted for approximately one-half of cases of adult home fall injury on each of these databases. In this study age-related injury rates could not be calculated at most levels of severity because of the lack of population denominator data but the indications are that, at all levels of severity, older women are more at risk of fall injury and that the risk increases with age. This has been a consistent finding of Australian and overseas studies on fall injury among community dwelling adults (Nevitt 1990; Speechley & Tinetti 1991; Sattin 1992; Lord et al 1993)

### **The prevention of slips**

Slips are a neglected area of research on fall injuries. The analysis of case narratives of emergency department and GP presentations revealed that slips were responsible for approximately thirty per cent of all fall injuries. Slips cannot be disaggregated from other falls in the VIMD hospital admissions data but the analysis of VISS data on hospital admissions revealed that slips accounted for approximately one-quarter (23.9%) of fall injury cases that required admission.

The slipping surface was described as wet or icy in over one-third of the VISS and ELVIS case narratives but this is probably an underestimation as the quality of the narratives varied. In fact, it is generally accepted that slips typically occur on wet surfaces or a surfaces contaminated with oil or other spills (Vanderhave 1995; Kohr 1992; Stevenson 1992; Martin 1992). The Australia/New Zealand Standard Guidelines for Safe Housing Design (ANZS 4226-1994) rates most of the typical flooring materials currently used in homes as very poor to fair in terms of general slip-resistant characteristics when wet. This suggests that an effective strategy for preventing injurious slips could be to require the installation of slip-resistive flooring and surfaces in 'wet' indoor areas (including baths and shower bases) and pedestrian outdoor areas of new houses and renovations. There would also be a need for a strategy to encourage owners of existing homes to increase the slip resistance of existing *in situ* surfaces. Unfortunately, there is currently no Australian Standard or any detailed guidelines to advise consumers on suitable slip resistive surfaces (indoors and outdoors) for private dwellings.

### ***Development of an ANZ Standard for slip resistance***

The development and release of an Australian and New Zealand Standard for slip resistance of pedestrian surfaces has been a long process, hampered by the complex nature

of slip events and, for a time, the unavailability of portable and relatively inexpensive testing apparatus. Prevention of slipping requires the provision of adequate friction between shoe soles and floors. Given the difficulty of controlling the types of shoes people wear, the development of tests for floors is regarded as the more important of the two (Stevenson 1992). However, the development of a standard for shoe soles should not be discounted and progress is being made in this area, with a focus on work footwear. In the period leading to the development of an Australian and New Zealand Standard by Standards Australia, Stevenson (1992) recommended that there should be a coefficient of friction (ie., the friction force opposing sliding motion divided by the force normal to the surface) of at least 0.4 available between the shoe and the floor, where this value is measured under realistic floor conditions including the presence of unavoidable contaminants (Stevenson 1992).

A two-part voluntary Australia and New Zealand Standard was released in 1994: AS/NZS 3661.1-1994 set out the requirements for slip resistance of pedestrian surfaces under wet and dry conditions and AS/NZS 3661.2-1994 was a guide to the reduction of slip hazards. AS/NZS 3661.1 required slip resistant pedestrian surfaces to have a mean co-efficient of friction of not less than 0.4 when tested according to the specified wet pendulum and dry Floor Friction Tester (FFT) test methods. The testing methods specified in the standard were not regarded as ideal but were believed to give a reasonable measure of the coefficient of friction when surfaces were wet or contaminated (Stevenson 1992). The Standard applied to all walking surfaces, including outdoor areas and bathrooms of private dwellings. On release, there was widespread criticism of both the minimum coefficient of friction in the Standard and the test methods included.

The 1994 Standard was recalled for revision and superseded in 1999 by AS/NZS 4586:1999 *Slip resistance classification of new pedestrian surface material* (Standards Australia 1999). The new Standard is confined to the specification of the test methods for determining slip resistance of new surfaces and the categorisation of such materials. The test methods are expanded to include the wet pendulum test, dry floor friction test, the wet/barefoot ramp test and the oil-wet ramp test.

The new Standard rejects the concept of a universal minimum slip resistant threshold value because of the range of variables other than the surface (e.g. shoe materials and characteristics of individual gaits) that may contribute to the risk of slipping. However, there are tables in the companion guidelines developed by the CSIRO that give some minimum recommendations for pedestrian surfaces in some specific locations (CSIRO Interim Slip Resistance Guide 1999). These interim guidelines will be withdrawn when Standards Australia publishes a far more comprehensive Slip Resistance Handbook early in 2000. There may be some advice to householders in the proposed Handbook but the Standard and current guidelines apply only to pedestrian surfaces in public places (commercial, manufacturing and public buildings) and are aimed at architects, ergonomists, facility managers, manufacturers and the like. A second standard covering slip resistant measurement of existing surfaces should be published in 1999. It is expected that the Australian Building Codes Board will wait for at least twelve months after the Handbook is released before deciding which recommendations, if any, should be incorporated into the Building Codes of Australia (BCA).

According to the scoring system in AS 4226-1994 *Guidelines to safe housing design*, few of the common flooring materials used in Australian houses, particularly in wet areas, provide good slip-resistance. The complexity of slipping events and the increased difficulties in controlling contributory factors (e.g., footwear and poor floor maintenance)

in the home is acknowledged. However, there is a need for guidelines that advise householders on suitable indoor and outdoor surface materials that minimise the risk of slipping. There is also a need for independent testing (under wet conditions) of the effectiveness of 'slip-resistant' treatment products and flooring on the market, including their durability. Similarly, the effectiveness of the available slip-resistant baths and shower bases and treatments need to be investigated. Inspection of labels and point-of-sale literature on 'slip-resistant' products on hardware store shelves and bathroom salerooms revealed that there was little technical information to support claims of slip-resistance on any of the products on display.

A controlled trial to investigate whether slip-resistant flooring and floor treatments reduce falls and fall injuries in 'real-life' conditions is also warranted. Nursing homes or other aged care facilities would provide the most suitable settings for such a study. It would require extensive negotiation with nursing home managers, manufacturers and flooring and floor treatment services so that good quality data on falls and fall injuries could be collected pre- and post- installation of new slip-resistant flooring or prior to the treatment of existing floors to improve slip-resistance. A staged project (commencing with a feasibility study) is therefore recommended.

### **Preventing falls among older people**

The research literature on the epidemiology, risk factors and prevention of falls and fall injury among older community dwelling adults is extensive and it is outside of the scope of this report to cover it in-depth. This discussion concentrates on selected research pertinent to prevention strategies and countermeasures.

The frequency of falls is difficult to determine. Large community-based surveys are usually retrospective and rely on the subjects' recall that probably results in an under-estimation of the real prevalence of falls. A range of international studies indicate that approximately one-quarter to one-third of the people over 65 years living in the community fall each year (Perry 1982; Kellogg International Work Group 1987; Tinetti & Speechley 1989; Nevitt 1990; Myers and Sharp 1990). A lower proportion, approximately one-fifth, was reported by Lord et al (1993) from the Randwick (NSW) Falls and Fractures Study.

Most falls do not result in serious injury. King and Tinetti (1996) estimate that, in a given year, approximately 5%-15% of falls in older people cause serious injury, three-quarters of which are fractures. Hip fractures are reported to occur in 1-2% of falls in older people and have the gravest consequences in terms of mortality, morbidity and subsequent loss of independence. In Australia it is predicted that the number of hip fractures per year is projected to increase 36% from 1996 to 2006 (from 15,000 to 21,000) because of a substantial rise in the number of elderly aged 85 years and older. Hip fractures are expected to double by 2026 and increase fourfold by 2051 (Sanders et al 1999). However, even falls that result in less significant injury (ie. bruising and abrasions) or no physical trauma can lead to the fear of falling which may cause older people to restrict their daily activities.

### ***Risk and contributory factors***

In recent years much has been learned about the risk factors for falls and for injurious falls among older people. Falls do not have a single cause but are complex multifactorial events involving a range of intrinsic (characteristics of the faller) and extrinsic environmental and behavioural risk and contributory factors (King and Tinetti, 1996; Myers et al 1996, Fildes

1994). Devising and evaluating interventions to prevent falls and fall injury among older people is also complex. There is an emerging body of evidence which shows that multifactorial interventions that include exercise programs (general and balance) are effective in reducing falls and that padded hip garments protect against hip fractures.

### *Intrinsic factors*

King & Tinetti (1996) identified the intrinsic characteristics of fallers that have been shown in at least one prospective research study to be independently associated with major injury, including fractures. They include: older age, white race, female gender, fair to poor self-rated health, fall with fracture in previous year, alcohol intake, orthotic hypotension (dizziness due to fall in blood pressure on standing up), cognitive impairment, presence of chronic conditions such as diabetes or stroke, impairment of vision, decreased bone mineral density (and other risk factors for osteoporosis), inactivity, inability to walk independently, sedative medications, and anthropometric factors, such as greater height and low body-mass index (p747). . The authors caution that the evidence for most of these risk factors is inconclusive because findings have not been replicated in other studies or the factors were not examined. Protective factors against injury or fracture identified by King & Tinetti (1996) from the research literature included: oestrogen therapy, weight gain after 25 years of age, walking for exercise and adequate dietary calcium intake.

A South Australian epidemiological study of characteristics that predispose older community-dwelling residents to fall found that the independent risk factors for falling in their cohort were: age; having left school at an early age; worsening vision in recent years; and histories of Parkinson's disease, fractured hip, glaucoma, stroke, corns and bunions, or arthritis (Dolinis et al 1997).

Myers et al (1996) commented on the apparently contradictory finding in recent studies that the maintenance of a relatively high level of activity into older age is associated with increased risk of falls (and injurious falls) and decreased risk of falls. The authors suggest that a high level of physical activity confers a number of the benefits on postural balance that protect older people against falls yet has the disbenefit of increasing exposure to the opportunity to fall. An optimal balance needs to be determined and used to inform physical activity promotion programs, such as *Active Australia*.

### *Extrinsic factors*

A number of extrinsic environmental factors and behavioural factors have been recognised as playing a major role in one-third to one-half of all falls in the home by older people (Nevitt et al 1990; Hornbrook et al 1991, Sattin 1992; Hornbrook et al 1994). The modifiable factors that have been shown to be implicated in home falls and fall injury include unsafe stairways, obstacles in pathways, inadequate lighting, loose rugs and worn carpets, slippery, wet, uneven or hard surfaces, improperly fitting shoes/slippers and inaccessible storage space. Aids to mobility, grab rails, antislip baths and showers and raised toilet seats are most often mentioned in the research literature as home improvements which have the potential to prevent injurious falls.

Behavioural risk factors for falls include climbing on chairs to reach high shelves and hurrying or running while carrying bulky or heavy objects or in areas of poor lighting (Kellogg International Work Group 1987, Nevitt 1990). King & Tinetti (1996) conclude from their review of the literature that climbing stairs and landing on a hard surface are the

only two environmental and behavioural factors that are established as independent risk factors for minor and serious fall injuries.

Connell (1996) outlines a number of limitations of current research on the role of the environment in falls prevention which hinder the implementation of research-based interventions including:

- lack of clarity about how pervasive or dominant a role environmental factors play in falls among older people;
- deficiencies in conceptualisation of environmental risk factor (for example, the concentration on obvious hazards and the lack of attention to the complexities of the interaction between environmental hazards and physical functioning and risk-taking behaviours);
- lack of investigation into the mechanisms by which environmental conditions contribute to falls beyond vague descriptions such as ‘trip’ or ‘slip’; and
- failure to use objective and precise measures when collecting information on falls-relevant environmental conditions, such as height of toilet seats and lighting levels.

Nonetheless, the author concludes that modifying those environmental conditions that have been shown to play a role in falls is a comparatively attractive approach to falls prevention. The aspects of the approach that hold some appeal include:

- the comparative ease, cost and feasibility of implementation;
- the potential benefit to all individuals who use the space where the safety improvements have been made; and
- the enhancement effect environmental changes may have on reducing other risk factors for falls (in multidimensional falls prevention interventions).

However, Connell identifies a number of barriers that may prevent older people (who are accustomed to living with the existing environmental conditions in their own homes) making changes to the aspects of their home environment that may have become difficult or unsafe. The barriers include: lack of awareness among older people of their personal risk of falling; lack of motivation to make the desired environmental changes (and ideas on how to make changes); resistance to change because of the perceived stigma attached to features that are associated with disability and frailty (e.g., grab rails and ramps); the affordability of safety modifications; the perception that some modifications may have an adverse effect on the resale value of the home; and the difficulty finding knowledgeable and trustworthy tradespeople.

She recommends that peer counsellors and older paraprofessionals are the most suitable people to deliver falls prevention education to older people. She also favours the widespread adoption of the concept of universal design (that recommends the inclusion of design features such as at least one ground level entry, adjustable work surfaces and adequate clear floor space in bathrooms and toilets in all homes). Universal design principles seek to make the design of products and environments non-stigmatising and readily useable by people with a wide range of abilities.

## CURRENT AUSTRALIAN RESEARCH

There are three Australian randomised control trials in progress or recently completed which aim to investigate the effectiveness of home safety modifications as a falls prevention measure for community dwelling older people. The Western Australian project (*The Falls Project* – Margaret Stevens, WA Department of Health) trialed the effect of the introduction of safety aids, hazard removal and education on the incidence of falls in healthy older people (aged  $\geq 70$  years). The NSW study (Robert Cumming – Dept of Public Health, University of Sydney) also trialed the effect of home safety modifications on falls but among a high-risk group of fallers aged  $\geq 65$  years. The Victorian study (*The No Falls Program*), conducted by MUARC (Brian Fildes & Lesley Day) with the City of Whitehorse, is a multifactorial evaluation of three interventions: exercise to improve balance and gait, vision assessment and remediation and removal of fall hazards and the installation of safety features in the home.

The Western Australian and New South Wales trials are finished but findings have not yet been published. The findings from the Victorian study should be published towards the end of 1999. Based on current research, it is sensible to encourage older people to audit their homes for fall hazards and to provide advice and assistance to them so that any identified hazards are removed and aids (grab rails etc.) installed. Advice and financial assistance for home improvements are currently available in Victoria through Archicentre, the Department of Human Services (Office of Housing), the Department of Veteran Affairs and most local councils. Emergency Services (particularly fire brigades) are also providing comprehensive free home safety audits to older people, which may include falls hazard assessments. However, widespread implementation of costly home hazard remediation programs should be delayed until the results from the above studies are published. However, it should be noted that some home modifications have more than a falls prevention purpose and make activities of daily living easier for older people.

### *What interventions work to prevent falls among older people?*

Based on the available research evidence, general and balance exercise programs (including *Tai Chi*) appear to be the most promising of the primary prevention measures to reduce falls and, potentially, fall injuries among community dwelling older people. Hip protectors and the treatment of osteoporosis are the most promising of the secondary and tertiary interventions to prevent hip fractures.

#### *Exercise (general and balance)*

The small number of controlled trials of low intensity, multifaceted population-based interventions to reduce falls and fall injury in older community dwelling adults have generally shown only a small effect on the incidence of falls (King & Tinetti 1996). The trials that have targeted presenting or potential risk factors and included an exercise component have generally, but not always, reported a significant reduction in falls (Myers et al., 1996; King & Tinetti 1996). The non-exercise components ('treatment arms') of these trials included one or some combination of: home hazard identification and removal, attention to cognitive and medical conditions, treatment of postural hypotension, medication management, especially to reduce the use of sedatives and tranquillisers, education and nutritional supplementation.

The pre-planned meta-analysis of the seven *U.S. Frailty and Injuries: Co-operative Studies of Intervention Techniques* (FICSIT) trials (that involved between 100 and 1,323 older

people aged over 60 years per study) reported a significant reduction (by 10%) in the incidence of falls in the follow-up year for the treatment arms that included general exercise. There was a greater reduction in incidence of falls (by 17%) reported for those treatment arms where the exercise programs included balance training (Province et al 1995; King & Tinetti 1996).

The best reduction in falls (31%) was reported at the FICSIT site that implemented a multi-disciplinary risk abatement program. The program included physical therapy and most of the non-exercise components listed in the paragraph above, tailored to each older person who presented with at least one risk factor for falling (Province et al 1995). Because the treatment arms included other types of exercise and/or non-exercise interventions it cannot be concluded from the FICSIT interventions that exercise or balance training *per se* protects against falls. Also, advice cannot be given from the FICSIT studies about the effects of specific types of exercise or combinations of exercise on fall risk.

Two other randomised trials have shown a reduced fall risk among exercisers. Campbell et al (1997) reported from New Zealand that participants who performed home exercises prescribed by a physiotherapist had a lower rate of falls compared to those who received usual care and social visits. Wolf et al (1996) found a reduced risk of multiple falls among older people who participated in the Tai Chi intervention in a trial involving 200 community and hostel dwelling older people. The effects of the Tai Chi intervention did not appear to be associated with improvements in balance (Wolf et al 1997).

Hornbrook et al (1994) reported a small but significant reduction in falls from a large randomised controlled trial of a minimal intervention that included exercise, home hazard assessment and falls prevention education. This team has embarked on a further trial of a stronger intervention among higher-risk older people. The beneficial effects of exercise were also reported by Lord et al (1995) from a randomised controlled trial of a 12-month program of regular exercise for older women conducted in NSW. The regular exercisers showed improved performance in a number of test measures of strength, reaction time and body sway. The researchers concluded that, although there was no significant difference in the proportion of fallers between the exercise and control groups, the findings suggest that high compliance to an exercise program may reduce falls frequency because a trend toward reduced falls in the intervention group was evident.

In contrast, Reinsch et al (1992) and Vetter et al (1992) reported no effect on the incidence of falls and new fractures, respectively, from randomised trials of interventions that included exercise components.

None of the multifaceted intervention studies have been large enough (in terms of the number of enrolled subjects) to be able to show a significant effect on injurious falls, because of the low proportion of falls that result in serious injury.

### *Hip protectors*

Lauritzen et al (1993) trialed the use of hip protectors among male and female residents of a Danish nursing home over an 11 month period. There was a 53% reduction in the risk of hip fractures in the intervention (hip protector) group compared to the control group and an estimated nine hip fractures were avoided in the intervention group. However, the study revealed a large compliance problem. Only 24% of the residents in the intervention group wore the hip protector regularly (but these tended to be recurrent fallers). None of the eight members of the intervention group who suffered hip fractures were wearing their hip

protectors at the time of the fall. Also, none of the six members of the intervention group who fell while wearing hip protectors experienced a hip fracture. Lauritzen and his co-researchers have recently completed a similar study involving community-dwelling older people, their research report is in press.

Two randomised controlled trials investigating the effect of wearing of protective hip pads on hip fracture risk are currently underway in NSW (Cameron, Cumming & Currie), a large study in a high-risk group of community dwelling older people and a smaller study among residents of one nursing home. The findings from this research will be reported in the year 2000. If hip pads are found to be effective in reducing fractured hips in these trials, targeted promotion of hip pad wearing among older women at high risk of fractures should be implemented in Victoria. Nursing homes are the obvious setting for implementation, because of the high rate of fractures and the amount of encouragement and supervision that can be given by staff). However, high risk community dwelling groups (for example, women with a history of falls or who have osteoporosis) who receive home-based support from family or aged care services could also be suitable candidates for a program to introduce protective hip pads.

#### *Treatment of osteoporosis*

Osteoporosis is a common disorder defined as a decrease in bone mass and strength which increases fracture risk, especially among older people. Osteoporosis can affect both sexes but the incidence is much lower among men. One of the few studies on the epidemiology of osteoporosis in Australia, the Dubbo Osteoporosis Epidemiology Study, found that after the age of 60 years about 60% of women and 30% of men suffer an osteoporotic fracture. Hip fractures account for 10% of these fractures in people aged 60-79 years compared with 40% in those aged over 80 years. In 1994 there were 14,600 hip fractures in Australia. With the ageing of the Australian population it is estimated that in the year 2010 the number of hip fractures will have risen to 20,900 (*Consensus Statement on the Prevention and Management of Osteoporosis*, 1996).

A number of treatments for bone loss and osteoporosis in post-menopausal women have been shown to decrease fracture (Prestwood et al 1995). The Australian *Consensus Statement on the Prevention and Management of Osteoporosis* (1996) reviewed current therapies and concluded that long-term Hormone Replacement Therapy (HRT) or scheduled doses of biphosphonates are the most effective and safest of the available treatments for bone loss and osteoporosis. Both therapies have been shown to increase bone density and decrease fractures throughout the skeleton, but the evidence on fracture reduction and the effects of use beyond three years is currently limited in the case of biphosphonates (Prestwood et al 1995).

The *Consensus Statement* recommends HRT as the first-line therapy and biphosphonates only when HRT is not considered suitable. Both therapies must be taken over the long-term and have side effects. The risks and benefits need to be considered by individual women and their doctors. There is no evidence, yet, from randomised controlled trials that either therapy reduces the incidence of hip fractures. There are a number of improved and new therapeutic approaches under clinical trial (Prestwood et al 1995).

The *Consensus Statement* assessed that the increases in bone mass from calcium supplementation and exercise regimes are too small to alter fracture rates and therefore recommended drug therapy for optimal benefit. The Statement was ambivalent about the place of Active vitamin D metabolites (calcitriol) in the management of postmenopausal

osteoporosis but there was evidence to suggest that it may have a major role in the management of glucocorticoid-induced osteoporosis. If levels of regular exercise, calcium or Vitamin D are deficient then supplementation is recommended.

Exercise and dietary calcium supplementation in prepubertal children and avoidance of tobacco smoking and excessive alcohol intake in adolescence and young adulthood are generally recommended to optimise peak bone mass. However, it is not known whether the benefits on bone density of these healthy lifestyle habits are sustained into adulthood and reduce the risk of osteoporosis (Prestwood et al 1995).

### ***Recommended approach to falls prevention among older women***

Despite the absence of definitive research evidence from randomised controlled trials on the effectiveness of preventive measures, King & Tinetti (1996) conclude that there is sufficient evidence from observational and interventional studies to support the following protocol to prevent falls in older people:

#### *Primary prevention*

- Education and counselling of older women about exercise (for 30 minutes most days of the week), nutrition (adequate calorific intake and calcium and vitamin D supplementation if required) and the identification and remediation of home fall hazards (and the provision of supportive environments to enable these health-maintaining actions).
- Periodic review by General Practitioners of over-the-counter and prescription medications use to ensure older patients are on the minimum number of medications and the lowest effective dose.
- Counselling about the potential benefits and risks of Hormone Replacement Therapy (HRT) for the prevention of osteoporosis among post-menopausal women.

#### *Assessment and systematic intervention for at-risk older women*

- Complete assessment of risk factors for falling and injurious falls among older women who exhibit the following characteristics: history of osteoporotic fracture; impaired mobility (use of walker or cane); inability to get in or out of chair without use of arms; unsteady gait; and cognitive impairment.
- Institution of tailored remedial action on identified predisposing and behavioural risk factors in at-risk women which should include:
  - diagnosis and treatment of neurologic, rheumatologic, orthopaedic and podiatric diseases and conditions, cognitive impairment (avoiding sedating or centrally acting drugs) and depression;
  - treatment of osteoporosis with calcium, Vitamin D supplementation and drug therapy;
  - nutrition assessment and provision of dietary advice and nutritional supplements;
  - review of prescription and over-the-counter medications to eliminate unnecessary medications and to reduce medication to lowest effective dose;

- ophthalmologic examination and corrective lenses or surgery, provision of low vision aids if required;
- referral for balance and gait training, muscle strengthening and weight bearing exercises as required and provision of supervised exercise if needed;
- assessment for, and provision of, walking aids and other adaptive devices (for example raised toilet seats, grab rails in bathroom) and assistance with such activities as housework and shopping if needed;
- advice on appropriate footwear; and
- environmental assessment and attention to fall hazards particularly lighting levels and floor surfaces.

The implementation of treatment plans for older at-risk women requires a multi-disciplinary and co-ordinated team approach by General Practitioners, other community health practitioners (occupational and physical therapists) and community aged care workers. The Department of Human Services has funded a group of ten local ‘Foothold on Safety’ projects to undertake multifactorial interventions to reduce falls in older people using a range of strategies and measures (e.g., community education, exercise provision, home and community fall hazard audits and remediation and improved health and support service delivery to older people). Several of these projects are implementing and evaluating falls risk assessment and treatment plans for older at-risk women. Current projects are modestly funded for a relatively short period (2 years) but, hopefully, they will develop into a co-ordinated, intensive and well-resourced program of research and action as has happened in New South Wales and elsewhere.

## **Recommendations**

### **Countermeasures and strategies**

- Continue and expand the education of architects, draftsmen, designers, builders, manufacturers and suppliers on the safe design of homes using A/NZ 4226-1994 *Guidelines for safe housing design* and other relevant standards as a basis for this education.
- (In partnership with general practitioners, other health professionals and aged care agencies) systematically expand the implementation of primary and secondary prevention strategies and countermeasures to reduce falls among older women by providing:
  - education (promotion) and counselling about the importance of regular exercise and adequate nutrition and the identification and remediation of home fall hazards;
  - systematic periodic review of medication regimes to decrease fall risk;
  - education about the potential benefits and risks of HRT and other drugs for the prevention and treatment of osteoporosis;
  - periodic assessment of at-risk older women, and the institution of tailored remedial action on identified predisposing and behavioural risk factors for falls and fall injuries; and

- supportive environments that enable falls prevention and health maintaining actions to occur and be maintained.
- Promote the wearing of protective hip pads to community-dwelling women at high risk of fall injury and to women in aged care settings.
- Promote the use of proven slip-resistive surfaces in bathrooms (including bath and shower bases), kitchens and all outdoor pedestrian surfaces (including entries and steps).
- Widely promote a set of simple guidelines to prevent home fall injuries.

### **Surveillance, research and investigations**

- Improve the reporting of place of occurrence (location) of injury in surveillance systems (particularly VIMD).
- Develop simple guidelines to standardise information on the circumstances and contributory factors to falls in the one-line case narratives in surveillance systems to increase their usefulness.
- Undertake an annual reconciliation of the Victorian home fall deaths data recorded on the Coroners' Facilitation System (CFS) and Australian Bureau of Statistics database.
- Conduct follow-up telephone surveys on injury cases involving slips, trips and stairway/step falls reporting to hospital emergency departments (through VEMD) to provide more information on exposure and the intrinsic, behavioural and environmental factors contributing to injurious falls.
- Advocate for and support the independent testing (under wet conditions) of household pedestrian surface materials advertised as slip-resistant or products advertised as conferring slip resistance to existing indoor and outdoor surfaces (in partnership with CSIRO and the Australian Consumers' Association).
- Support research to underpin the development of guidelines (and ultimately an Australian Standard) on the use of slip-resistive pedestrian surfaces for private dwellings
- Conduct a controlled study in institutional settings for older people with good falls recording systems to evaluate the effectiveness of slip-resistant flooring and floor treatments as falls prevention measures.
- Conduct research to more precisely describe the role and contribution of environmental factors to falls among older women and to better describe the mechanisms by which environmental factors contribute to falls.
- Investigate the effectiveness of grab rails in bathrooms as a falls prevention measure.

## **Guidelines to prevent home fall injury**

### **General**

#### **Lighting**

- Install an adequate level of lighting inside and outside the house, especially at entries and any stairs and steps.
- Make sure light switches are near the entrance to a room.
- Install night lights and a touch-light at the bedside.

#### **Slips and trips**

##### *Inside the home*

- Keep walkways free of clutter and cords.
- Choose sturdy furniture with non-protruding legs.
- Remove or secure mats and rugs especially at edges and install underlays to prevent rucking up.
- Promptly repair physical damage to floors and remove torn or worn carpet and vinyl.
- Clean floors regularly to prevent build-up of dirt, oils, powders and other contaminants.
- Wash floors when pedestrian traffic is at a minimum and rinse off all detergents carefully after washing.
- Mop up spilt liquids immediately.
- Choose a bath or shower with a proven slip-resistant base when purchasing bathware or apply a slip-resistant surface wash, mat or surfacing tape to bath and shower base.
- Choose a stepless (hobless) shower base that fits flush to the bathroom floor.
- Bathroom and toilet doors should open outward or be able to be lifted off their hinges, in the event of a faller blocking the doorway.
- Ensure surface drainage around showers and baths is adequate and supply a slip resistant bathmat.
- Install grab rails and other aids if the bath or shower is used by elderly people or people with disabilities.

- All towel rails installed in the bathroom should be grab rails (ie. designed to resist a 1.5kN load applied to any point).
- Minimise the number of projections and obstructions in the bathroom. For example, soap holders should be recessed into the wall of shower stalls.
- Footwear should be checked for slip resistance in the home and on surfaces walked on during the day and should be selected according to its suitability for the activities planned for the day.
- Install surfaces with proven slip resistance in the ‘wet areas’ of new homes, particularly the bathroom and laundry, at all entries and on outdoor paving, decking and steps.
- Treat high risk ‘wet areas’ of established homes with one of the commercially available permanent or temporary techniques or products that confer proven slip-resistance or apply adhesive backed pressure sensitive surfacing tape where appropriate. To maintain slip resistance these finishes must be maintained and re-applied according to manufacturers’ instructions.

### *Outside the home*

- Avoid unnecessary changes of levels. Garden steps should only be installed if necessary and should be grouped in sets of three, at least.
- Routinely clear away garden tools, hoses and children’s toys.
- Shelter front and back steps from rain, treat to improve slip-resistance and mark nosing (the leading edge) with contrast edging.
- Place secured or large slip-resistant door mats at entrances.
- Keep paths, patios, pool surrounds and decks free of leaves, mud, clippings, paper and tripping hazards. Remove moss or slime with a chlorine-based solution.
- Immediately clean up grease and oil spills around bar-b-que area and on paths, driveways and the garage floor.
- Treat existing paths, pool/spa surrounds and decks to improve slip-resistance, using one of the proven commercially available permanent or temporary techniques or products.
- Repair broken concrete paths and uneven tiling and bricks.
- Wear spiked golf or other shoes when mowing lawn, especially if area is sloped.

### **Safe use of ladders and stepladders**

- Buy ladders and stepladders that conform to the Australian and New Zealand Standard (AS/NZS 1892.1 (metal) & 1892.2 (timber).
- Follow manufacturer's instructions on load limits and maintenance.
- Use a small stepladder for household jobs, as it is usually safer than a chair or table; stools should not be used for climbing.
- Older people (over 60 years of age) should seek assistance for household and outdoor tasks that are out of their comfortable reach from floor or ground level.
- Fully spread step and trestle ladders so that they are locked with all four legs resting on a secure, level base.
- Ensure the stability of a single extension ladder by positioning it at the correct angle (1/4 to 3/8 of the length of the ladder out from the wall or line of the upper resting point) and placing the head of the ladder against a firm, even support.
- Keep a short length of rope tied to the top rung, so the ladder top can be fixed to something secure. Peg and tie feet of ladder as well, if possible.
- Frequently re-position the ladder so that stretching beyond one-half a metre from the shoulder (a bent arm's length) is not required.
- For any job where the user's feet are two metres or higher from ground level get someone to hold the ladder steady.
- Discard any ladder that is wobbly and weak.
- Wear non-slip footwear.

### **Stairs and steps**

- Homes designed for older people and people with disabilities should be built on one level with no entry steps.
- Where steps are inevitable, they should be grouped, with a minimum of three steps in each group.
- The pitch of the stairs should be 30 degrees; the risers uniform and in the range of 150mm-180mm and preferably closed; the treads should be at least 300mm deep and level; and the minimum clear stair width should be 900mm.

- Treads should have a secure non-slip surface:
  - tiled treads and nosings should be textured or have carborundum inlaid strips;
  - carpet (which should be low piled and unpatterned) or vinyl stair coverings should be securely fixed at each step; and
  - nosings should be mechanically fixed (by nails or screws) rather than glued, rounded, slip-resistant and should contrast in colour or texture from the tread.
- Handrails should be easy to grip (32mm-50mm in diameter and at least 50mm from the wall) strong (able to resist a 1.5kN load applied at any point) and extend the full length of the stair unobstructed by fittings and fixtures.
- A solid upstand or balustrade (at least 1m high with balusters no more than 100mm apart) is essential where a stair or landing is not enclosed by walls.
- Visual cues to the existence of stairs should be provided (such as changes in colour or lighting intensity, changes in wall or floor finishes, or the handrail).
- Light sources should preferably be located below the handrail and the lighting level of a stair tread should be at least 100 lux and evenly distributed across the tread.
- All stairs should have two-way switching at top and bottom and light switches at the top should have neon locaters fitted.
- The leading edge of outside steps should be marked with textured safety paint or non-slip coloured adhesive strips which provide contrast.
- Doors should not open directly to stairways.

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## 9. SUICIDE AND SELF-INFLICTED INJURY

Intentional self-inflicted injury was a high-ranked cause of home injury among adult women for hospitalisations and emergency department presentations (Table 7:1).

Intentional self-inflicted injury accounted for:

- approximately one-half (47.0%) of injury deaths in the home, based on CFS data (adjusted to 27.6% if ABS falls death data are substituted for CFS falls death data); and
- a significant proportion of hospital admissions and emergency department presentations (7.1% and 9.1% respectively).

Poisoning by solid and liquid substances (mostly by prescription drug overdose) was the most common cause (method) of suicide and self-harm hospital admissions and emergency department presentations (Table 9:1).

Women aged 45 years and older were at higher risk of suicide. Women aged under 40 years appear to be the highest risk group for both hospital admissions and emergency department presentations for self-harm, accounting for approximately three-quarters of self-harm cases on both these databases.

**Table 9:1 Causes (mechanisms) of suicide and self inflicted injuries that occurred in the home among adult women (age >15 years) at all levels of severity**

Intentional (self inflicted) injury E-codes E950-959	Deaths <i>n</i> =374 Rate: 4.4/100 000 Rank: 1		Hospital admissions <i>n</i> =1,637 Rate: n/a Rank: 2		Hospital E.D. Presentations <sup>a</sup> <i>n</i> =756 Rate: n/a Rank: 3		GP presentations <i>n</i> =3 Rate: n/a Rank: 10	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Poisoning by solid or liquid substances	169	45.2	1 512	92.4	646	85.5		
Gases (domestic)	1	0.3			2	0.3		
Other gases and vapours	47	12.6			7	1.0		
Hanging/strangulation and suffocation	112	29.9			3			
Submersion (drowning)					1	0.2		
Firearms and explosives	17	4.5	4	0.2				
Cutting/piercing instrument			90	5.5	82	10.9		
Jumping from high place	7	1.9						
Other specified/unspecified means/late effects	21	5.6	31	1.9	15	2.1	3	100.0
<b>Total</b>	<b>374</b>	<b>100.0</b>	<b>1 637</b>	<b>100.0</b>	<b>756</b>	<b>100.0</b>	<b>3</b>	<b>100.0</b>

*Note:* (a) VISS data are not classified for cause of injury using the ICD9 External cause of injury coding system. The Injury Surveillance Injury System (ISIS) 'mechanism of injury' code was used to select intentional, self-inflicted injury from the VISS database. It is the closest code to the Intentional self inflicted E-code but may not capture all cases.

*Sources:* Death Data: Victorian Coroners' Facilitation System (CFS), 1989-90 to 1993-94 (5 years)  
Hospital admissions data: Victorian Inpatient Minimum Database, (VIMD) 1987-94 (7 years), public hospitals  
Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods)  
General Practitioner presentations data: Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-5

## **9.1 DEATHS - SUICIDES**

CFS ( $n=374$ , crude mean annual rate-4.4 per 100 000, rank:2)

### **9.1.1 The size of the problem**

Suicide is the highest-ranking cause of adult female home injury deaths recorded on the CFS (Table 7:1). However, home fall deaths are underestimated on the CFS database and suicides would rank behind fall-related deaths if ABS data on fall deaths were included. On average, 75 adult female home suicides are recorded on the CFS each year for the five-year period 1989-90 to 1993-94.

### **9.1.2 Causes (mechanisms) of suicides**

The methods used by women to suicide at home are shown in Table 9:2. The most frequently used methods are:

- poisoning by solid and liquid substances (45.2% of suicide cases) mostly by "other specified drugs and medicinal substances";
- hanging, strangulation and suffocation (29.9%) mostly by hanging or suffocation by plastic bag;
- other gases and vapours (12.6%) almost all by car exhaust gas; and
- firearms (4.5%) mostly by hunting rifle or shotgun.

**Table 9:2 Frequency and ranking of the methods (causes) of suicide among adult women age ≥ 15 years in the home.**

<b>Intentional injury deaths Breakdown of E-code 950-959</b>	<b>Frequency (n=374) n</b>	<b>Proportion %</b>	<b>Rank</b>
Poisoning by solid or liquid substances			
-other specified drugs and medicinal substances	159		
-unspecified drugs and medicinal substances	4		
-agricultural and horticultural chemicals	2		
-corrosive and caustic substances	1		
-other and unspecified solids and liquids	3		
Sub-total	169	45.2	1
Hanging/strangulation and suffocation			
-hanging	90		
-suffocation by plastic bag	20		
-other specified means	1		
-unspecified means	1		
Sub-total	112	29.9	2
Other gases and vapours			
-motor vehicle exhaust gas	45		
-other specified gases and vapours	2		
Sub-total	47	12.6	3
Firearms and explosives			
-handgun	2		
-shotgun	5		
-hunting rifle	8		
-other and unspecified means	2		
Sub-total	17	4.5	4
Jumping from high place			
-residential premises	7		
Sub-total	7	1.9	5
Poisoning by gases in domestic use			
-gas delivered by pipeline	1		
Sub-total	1	0.3	6
Other specified and unspecified means			
-jumping/lying before moving object	1		
-burns, fire	5		
-electrocution	1		
-other specified	13		
-unspecified	1		
Sub-total	21	5.6	
<b>TOTAL</b>	<b>374</b>	<b>100.0</b>	

Source: Victorian Coroners' Facilitation System 1989-90 to 1993-94.

### ***Pharmaceutical drugs used in suicides***

The CFS one-line narratives yielded little useful information on the pharmaceutical drugs implicated in suicides because the specific drugs were only reported in 17% of the case narratives for suicides by "other specified drugs and medicinal substances".

As shown in Table 9:3, there were 38 reported pharmaceutical drugs. The most frequently reported classes of drugs were: antidepressants (34.2% of reports), hypnotics and sedatives (23.7% of reports) and opioid analgesics - narcotics (21.1% of reports). The most frequently reported specific drugs were: morphine/heroin (8 reports), doxepin-*Dephran* and *Sinequan* (4 reports) and flunitrazepam-*Rohypnol* (3 reports)

**Table 9:3 Pharmaceutical drugs reported in CFS suicide case narratives, 1989-90 to 1993-94**

Pharmaceutical drugs	Frequency ( <i>n</i> =38) <i>n</i>	Proportion %
Antidepressants		
-Amitriptyline ( <i>Amitol &amp; Tryptanol</i> )	2	
-Dothiepin ( <i>Protheaden</i> )	1	
-Doxepin( <i>Dephran &amp; Sinequan</i> )	4	
-Trimipramine ( <i>Surmontil</i> )	1	
-Moclobemide ( <i>Aurorix</i> )	1	
-Nortriptyline	1	
-Lithium Carbonate	1	
- 'antidepressants', 'tricyclics'	2	
Sub total	13	34.2
Hypnotics and sedatives		
-Barbiturates ( <i>Butobarbitone</i> )	1	
-Flunitrazepam ( <i>Rohypnol</i> )	3	
-Nitrazepam ( <i>Mogadon</i> )	1	
-Temazepam ( <i>Normison &amp; Euhypnos</i> )	2	
-Chloral hydrate	1	
-Chloromethiazole	1	
Sub total	9	23.7
Analgesics-opioids (narcotics)		
-Morphine/heroin	8	
Sub total	8	21.1
Other analgesics		
-Codeine phosphate ( <i>Codeine</i> )	1	
-Paracetamol ( <i>Panamax, Panadol &amp; Tylenol</i> )	1	
-Dextropropoxyphene hydrate and paracetamol ( <i>Di-gesic, Capadex &amp; Paradex</i> )	2	
Sub total	4	10.5
Other drugs	4	10.5
<b>TOTAL DRUGS</b>	<b>38</b>	<b>100.0</b>
<i>Note:</i> (a) more than one drug may be reported for each case		
<i>Source</i> Victorian Coroners' Facilitation System 1989-90 to 1993-94		

### ***Involvement of alcohol***

The involvement of alcohol in suicides by drugs and medicinal substances was examined separately. The available data suggested that alcohol was involved in at least 14.5% (*n*=23) of these suicides but the reporting was obviously inconsistent. Alcohol was also mentioned in case narratives of suicides "by other means".

### 9.1.3 Motives (reasons) for suicide

The apparent motives were consistently reported in only the last two years of one-line narratives in the dataset, 1992-3 and 1993-4 ( $n=131$ cases). As Table 9:4 reveals, depression is strongly linked to suicide although it is not apparent from the data whether a report of depression in the case narrative was based on clinical evidence gathered during the coroner's investigation or surmised from details in the case record. In all, depression was reported as having some involvement in nearly one-half of the suicides (62 cases, 47.3% of all reported cases) over the two-year period.

Table 9:4 shows that the commonly reported contributory factors to suicide were:

- chronic or serious mental and/or physical illness, including all cases with mention of depression (76 cases, 58.0%);
- traumatic life events, predominantly family breakdowns and deaths, including cases with mention of depression (16 cases, 12.2%; 14 depressed, 2 not specified as depressed);
- previous suicide attempts (13 cases, 22.4%; 5 depressed, 8 not specified as depressed); and
- personal relationship difficulties (12 cases, 9.2%; 4 depressed, 8 not specified as depressed).

**Table 9:4 Reported motives for suicides in CFS case narratives 1992-3 to 1993-4**

<b>Motives (reasons) for suicide</b>	<b>Frequency (n=131 cases) n</b>	<b>Proportion %</b>
Depression		
-described as chronic, long-term depression	9	
-in association with other mental illness	9	
-in association with physical illness/injury	5	
-in association with history of drug or alcohol abuse	2	
-in association with traumatic life events (family breakdown, death/illness in family, rape)	14	
-relationship difficulties	4	
-other specified associations	6	
-‘depression’ - no other details	13	
Sub-total	62	47.3
Other specified reasons (not stated as associated with depression)		
-chronic or fatal illness/injury/pain	8	
-history of mental illness	6	
-relationship difficulties/breakdown	8	
-difficulty coping/loneliness	4	
-history of alcohol abuse	3	
-traumatic life events-death of family member/friend	2	
-suicide pact	1	
-history of previous attempts NOD	8	
Sub-total	40	30.5
Unspecified reason		
-unspecified ( NOD)	29	22.2
<b>TOTAL</b>	<b>131</b>	<b>100.0</b>
<i>Source: Victorian Coroners’ Facilitation System 1992-93 to 1993-4.</i>		

#### 9.1.4 Rates of suicide at different ages

The crude mean suicide rate for all adult women was 4.4 per 100,000 population. Although suicide rates fluctuated across the age groups, in general, women aged 45 years and older were more at risk of suicide (rate 4.7 per 100 000, rate ratio 1.1:1), the risk peaking in women aged 45-54 years, 69-64 years and 70-74 years. Younger women, aged 15-24 years, were less at risk (rate 3.4 per 100,000; rate ratio 0.8:1).

When methods of suicide were compared across age groups the 15-19 year-olds disproportionately committed suicide by hanging (this age group accounted for 9.0% of all suicides and 20% of suicides by hanging).

## 9.2 HOSPITAL ADMISSIONS

VIMD (1,637 cases, mean annual rate: n/a, rank: 2)

### 9.2.1 The size of the problem

Intentional self-inflicted injury (attempted suicides and self-harm) accounted for 7.1% of hospital admissions and was the second-highest ranked cause of admissions. The VIMD recorded 1,637 adult female home suicide cases over the 7-year data collection period (an average of 234 cases per year). However, only 15.8% of intentional self-inflicted injury cases on VIMD were coded for location of injury (the home was the place where the injury occurred in 88.3% of coded cases). If the coded cases are assumed to be a representative sample of all adult female injury hospitalisations for self-inflicted injury (and this could not be checked) then the annual frequency of adult female home injury hospitalisations for self-inflicted injury would be in the vicinity of 1,480 cases.

### 9.2.2 Causes (methods) of self inflicted injury

Poisoning by solid and liquid substances (mainly pharmaceutical drug overdoses) accounted for the vast majority (92.4%) of the hospital admissions for intentional self-inflicted injury. Other minor causes were cutting/piercing (5.5%) and firearms (0.3%).

Table 9:5 shows the finer breakdown of the intentional-self inflicted E-code grouping for poisoning by solid and liquid substances. Pharmaceutical drugs accounted for 97.6% of these poisoning. The drug groups most commonly involved were tranquillisers and other psychotropics, including antidepressants (56.6%), analgesics (18.1%, which may include narcotics such as heroin and methadone depending on coding practices of individual hospitals) and other sedatives and hypnotics (7.1%). There are no finer breakdown codes in the ICD9E-code system to identify the specific drugs involved.

**Table 9:5 Hospital admissions for self inflicted poisoning by solid or liquid substances**

<b>Self-inflicted poisoning by solid and liquid substances</b> <b>E-code 950.0-950.9</b>	<b>Frequency</b> <b>(n=1,512)</b> <b>n</b>	<b>Proportion</b> <b>%</b>
By drugs and medicinal substances		
<i>Analgesics, antiheuretics and antirheumatics</i> <i>(including opioid narcotics)</i>	274	18.1
<i>Barbiturates</i>	8	0.5
<i>Other sedatives and hypnotics</i>	107	7.1
<i>Tranquillisers and other psychotropic agents</i> <i>(including antidepressants)</i>	855	56.6
<i>Other specified drugs and medicinals</i>	223	14.8
<i>Unspecified drugs or medicinals</i>	8	0.5
Sub total	1 475	97.6
By agriculture and horticulture chemical and pharmaceutical preparations	5	0.3
By corrosive and caustic substances	6	0.4
Other specified and unspecified solid and liquid substances	26	1.7
<b>Total</b>	<b>1 512</b>	<b>100.0</b>
<i>Source: Victorian Inpatient Minimum Database (VIMD) - 1987-88 to 1993-94</i>		

### **9.2.3 Age of hospitalised women**

Age-related rates could not be calculated because of the poor reporting of place of occurrence of injury on VIMD. However, the available data suggest that women aged 15-39 years are at higher risk of hospital admission for self inflicted home injury. They accounted for 70.4% of hospital admissions where 'location of injury' was recorded but comprised one-half (50.3%) of the mean adult female population over the VIMD data collection period.

### **9.2.4 Nature of injury**

More than one injury can be reported per case. On average, there were 1.5 reports per poisoning case. The major injuries sustained by self-inflicted injury cases were poisoning (91.5% of injury reports) and open wounds (4.6%).

## **9.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)**

VISS ( $n=756$ , mean annual rate: n/a, rank: 3)

### **9.3.1 The size of the problem**

Intentional self-inflicted injury (suicide attempts and self-harm) accounted for 9.1% of VISS hospital emergency department presentations (admissions and non-admissions) for adult female home injury and was the third-highest ranked cause of emergency department presentations.

### **9.3.2 Causes (mechanisms) of self inflicted injury**

VISS data are not classified under the ICD9 External cause of injury coding system. The Injury Surveillance Injury System (ISIS) codes 'context-intended self-harm' and 'group classification-suicide and suicide attempt' were used to extract intentional, self inflicted injury from the VISS database ( $n=756$ ). It is the closest equivalent code to the intentional self-inflicted E-code but may not capture all cases. All case narratives for non-admissions and a sample of cases of admitted cases (randomly selected pages of narratives, 55.0% of admissions), were extracted from the dataset ( $n= 516$ ) and manually categorised into the finer ICD9E-code groupings.

Table 9:6 shows the major causes of self inflicted injury. Poisoning, mostly by pharmaceutical drug overdoses, accounted for over four-fifths (84.9%) of the VISS emergency department presentations for intentional self-inflicted injury. The other significant cause (method) was cutting/piercing (11.1%).

The one-line case narratives on VISS Emergency department presentations provide more information on the circumstances surrounding the injury event than VIMD data, although details in case narratives are not consistently reported. The narratives were subjected to a more detailed analysis to elicit further information on the cause of injury and to determine any differences between the circumstances of admitted and non-admitted cases. One item consistently reported in the VISS case narratives and not reported in other databases is the specific drugs used in self-inflicted poisoning cases. This information is based on details given by the patient or the person accompanying the patient to hospital and/or clinical observations.

The major causes (mechanisms) of self-inflicted injury for VISS hospital admissions and non-admissions, separately, are shown in table 9:6.

- Poisoning by solid or liquid substances (predominantly by prescription drug overdoses) was by far the major cause of emergency department presentations, accounting for 90.6% of admitted cases and 72.1% of non-admitted cases.
- Self-inflicted injury cases by cutting and piercing (the second highest ranked cause of emergency department presentations for self-harm) were less at-risk of hospital admission. They comprised 23.6% of non-hospitalised cases but only 5.6 % of hospitalised cases.
- The instrument used for cutting and piercing self-inflicted injury was specified in 70.5% of case narratives in the selected sample of admissions and non-admissions. The three instruments used were razor/razor blades (29.4% of all selected cutting/piercing cases), knives (26.5%) and glass (14.7%).

**Table 9:6 Causes (mechanisms) of intentional self- inflicted injury (suicide attempts and self-harm) from an analysis of selected VISS case narratives**

Causes of self inflicted injury <sup>a</sup>	Admissions (55.0% sample) <i>n</i> = 287		Non- admissions (all cases) <i>n</i> = 229		All selected cases <sup>b</sup> (68.3% sample) <i>n</i> = 516		All cases (scaled up) <i>n</i> = 756	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Poisoning by solid or liquid substances	260	90.6	165	72.1	425	82.3	642	84.9
Attempted hanging/ strangulation/suffocation	2	0.7			2	0.4	4	0.5
Cutting and piercing	16	5.6	54	23.6	70	13.6	84	11.1
Firearms and explosives	2	0.7			2	0.4	4	0.5
Other specified means	3	1.0	1	0.4	4	0.8	6	0.8
Unspecified means	4	1.4	8	3.5	12	2.3	15	2.0
Wrongly classified			1	0.4	1	0.2	1	0.1
<b>TOTAL</b>	<b>287</b>	<b>100.0</b>	<b>229</b>	<b>100.0</b>	<b>516</b>	<b>100.0</b>	<b>756</b>	<b>100.0</b>

*Notes:* (a) VISS data are not classified under the ICD9 External cause of injury coding system. The Injury Surveillance Injury System (ISIS) codes 'context-intended self-harm' and 'group classification-suicide and suicide attempt' were used to extract intentional, self inflicted injury from the VISS database (*n*=756).

(b) Non-admissions are over-represented in the selected sample.

*Source:* Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods – nine hospital years of data in all)

### ***Pharmaceutical drugs involved in VISS self-inflicted injury cases***

As shown in Table 9:7, pharmaceutical drugs (used alone or in combination with alcohol, other poisons and cutting) were involved in more than four-fifths (81.4%) of the selected sample of self-inflicted injury cases. Pharmaceuticals were more much likely to be involved in hospital admissions than non-admissions (73.5% of admitted cases involved pharmaceutical drugs compared with 57.2% of non-admitted cases). Only two cases reported involvement of illicit drugs (one heroin, one marijuana).

Over one-third (37.7%) of the 'drugs only' cases involved more than one drug (Table 9:7). However, admitted cases were only slightly more likely to involve two or more drugs than were non-admitted cases (38.4% versus 36.6%). The mean number of drugs taken by admitted cases was 1.6 per case compared to 1.5 per case for non-admitted cases.

**Table 9:7 Involvement of pharmaceutical drugs in selected VISS self-inflicted injury cases**

Causes (mechanisms)	VISS admissions (55.0% sample of cases) <i>n</i> =287		VISS non-admissions (all cases) <i>n</i> =229		Selected cases (68.3% sample of cases) <i>n</i> =516 <sup>a</sup>	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Cases involving pharmaceutical drugs						
Drug only cases						
-one drug	130		83		213	
-two drugs	43		29		72	
-three drugs	17		13		40	
-four drugs	13		5		18	
-five drugs	1				1	
-six drugs	2				2	
-not specified	5		1		6	
Drug only cases (all)	211	73.5	131	57.2	342	66.3
Drugs and alcohol	40	13.9	28	12.2	68	13.2
Drugs and cutting	2	0.7	3	1.3	5	0.9
Drugs, cutting and alcohol	2	0.7			2	0.4
Drugs and other poisons	3	1.1			3	0.6
Sub total	258	89.9	162	70.7	420	81.4
Cases with no drug involvement (except alcohol)						
Alcohol only	2	0.7	4	1.8	6	1.2
Cutting only	11	3.8	48	21.0	59	11.4
Alcohol and cutting	1	0.3	5	2.2	6	1.2
Other poisoning	9	3.2	3	1.3	12	2.3
Hanging/strangulation	2	0.7			2	0.4
No other details	4	1.4	6	2.6	10	1.9
Wrongly classified			1	0.4	1	0.2
Sub total	29	10.1	67	29.3	96	18.6
<b>TOTAL</b>	<b>287</b>	<b>100.0</b>	<b>229</b>	<b>100.0</b>	<b>516</b>	<b>100.0</b>
<i>Note:</i> (a) Non-admissions are over-represented in the selected sample.						
<i>Source:</i> Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods - nine hospital years of data in all)						

Table 9:8 classifies the 658 pharmaceutical drugs reported in the sample of VISS hospital presentations for self-inflicted injury cases (*n*=516).

Four groupings of drugs accounted for three-fifths (60.2%) of drug reports: hypnotics and sedatives (16.0%); analgesics including codeine, salicylic acid & analides (15.5%); anxiolytics (15.5%); and antidepressants (13.2%);

The most frequently reported specific drugs were: Paracetamol (*Panamax, Panadol & Tylenol*) - (6.4% of reported drugs); Diazepam (*Ducene & Valium*) - (4.5%); Temazepam (*Normison & Euhypnos* - (4.5%); and Dothiepin (*Protheaden*) - (3.0%).

**Table 9:8 Pharmaceutical drugs reported in selected VISS intentional self-inflicted injury case narratives, VISS hospital emergency department admissions and non-admissions**

Reported drugs <sup>a</sup>	Drugs reported in VISS Admissions (55% sample of cases) n=417 drugs		Drugs reported in VISS non-admissions (all cases) n=241 drugs		Drugs reported in all selected VISS cases (68.3% sample of cases) <sup>b</sup> n=658 drugs	
	n	%	n	%	n	%
<b>Anxiolytics</b>						
-Alprazolam ( <i>Xanax</i> )	4		2		6	
-Diazepam ( <i>Ducene &amp; Valium</i> )	30		33		63	
-Oxazepam ( <i>Serapax &amp; Murelax</i> )	15		13		28	
-Lorazepam ( <i>Ativan</i> )	1				1	
-Clorazepate ( <i>Tranxene</i> )	1				1	
-Clobazam ( <i>Frisium</i> )	1				1	
-Clomipramine ( <i>Anafranil</i> )	1				1	
-Bromazepam ( <i>Lexotan</i> )			1		1	
Sub total	53	12.7	49	20.3	102	15.5
<b>Antidepressants</b>						
-Amitriptyline ( <i>Amitrol &amp; Tryptanol</i> )	12		1		13	
-Dothiepin ( <i>Protheaden</i> )	20		3		23	
-Doxepin( <i>Dephran &amp; Sinequan</i> )	13				13	
-Imipramine ( <i>Tofranil</i> )	7		4		11	
-Trimipramine ( <i>Surmontil</i> )	2				2	
-Fluoxetine ( <i>Prozac</i> )	8		2		10	
-Moclobemide ( <i>Aurorix</i> )	1		2		3	
-Poroxetene ( <i>Aropax</i> )	1				1	
-Phenelzine ( <i>Nardil</i> )			1		1	
-Lithium Carbonate	1				1	
-‘antidepressants’, ‘tricyclics’	8		1		9	
Sub total	73	17.5	14	5.8	87	13.2
<b>Hypnotics and sedatives</b>						
-Flunitrazepam ( <i>Rohypnol</i> )	10		10		20	
-Nitrazepam ( <i>Mogadon</i> )	9		8		17	
-Temazepam ( <i>Normison &amp; Euhypnos</i> )	30		22		52	
-Triazolam ( <i>Halcion</i> )	1		1		2	
-Unspecified benzodiazepines	3		2		5	
-‘sleeping pills’	4		5		9	
Sub total	57	13.7	48	19.9	105	16.0
<b>Antipsychotics</b>						
-Thioridazine ( <i>Melliril</i> )	6		2		8	
-Chlorpromazine ( <i>Largactil</i> )	10		4		14	
-Pericyazine ( <i>Neulactil</i> )	1				1	

cont'd

Reported drugs <sup>a</sup>	Drugs reported in VISS Admissions (55% sample of cases) <i>n</i> =417 drugs		Drugs reported in VISS non-admissions (all cases) <i>n</i> =241 drugs		Drugs reported in all selected VISS cases (68.3% sample of cases) <sup>b</sup> <i>n</i> =658 drugs	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
-Trifluoperazine ( <i>Stelazine</i> )	3		3		6	
-Haloperidol ( <i>Serenace</i> )	2				2	
-Risperidone ( <i>Risperdal</i> )	1				1	
Sub total	23	5.5	9	3.7	32	4.9
<b>Antiepileptics</b>						
-Carbamazepine ( <i>Tegretol</i> )	9		1		10	
-Primidone ( <i>Mysoline</i> )	6				6	
-Clonazepam ( <i>Rivotril</i> )	6		5		11	
-Phenytoin ( <i>Dilantin</i> )	1		1		2	
-Sodium Valproate ( <i>Epilim</i> )	1		1		2	
Sub total	23	5.5	8	3.3	31	4.7
<b>Analgesics- opioids (narcotics)</b>						
-Morphine/Heroin	1				1	
Sub total	1	0.2			1	0.2
<b>Analgesics – other</b>						
-Codeine phosphate ( <i>Codeine</i> )	2				2	
-Aspirin ( <i>Aspro</i> )	3		1		4	
-Codeine with aspirin ( <i>Codral</i> )	1		2		3	
-Paracetamol ( <i>Panamax, Panadol &amp; Tylenol</i> )	42		21		63	
-Codeine phosphate with paracetamol ( <i>Panadeine, Fiorinal, Dymadon &amp; Mersyndol</i> )	14		13		27	
-Dextropropoxyphene hydrate and paracetamol ( <i>Di-gesic, Capadex &amp; Paradex</i> )	2		6		8	
Sub total	64	15.4	43	17.8	107	16.3
Other specified drugs	91	21.8	53	22.0	144	21.9
Unspecified drugs	32	7.7	17	7.1	49	7.4
<b>TOTAL</b>	<b>417</b>	<b>100.0</b>	<b>241</b>	<b>100.0</b>	<b>658</b>	<b>100.0</b>

Notes: (a) More than one drug may be reported for each case  
(b)Based on 68.3% of all E.D. attendances (*n*=516), non-admitted cases are over-represented in the selected sample.

Source: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods - nine hospital years of data in all)

The remainder of the analysis in this section is based on the routine VISS output utilising the ISIS coding system. The subset comprises all cases of self-inflicted injury selected by electronic conversion of ISIS codes to the ICD9E-code equivalent (*n*=756) and includes a small proportion of wrongly classified cases (estimated to be 0.1%) which could not be removed electronically from the dataset.

### **9.3.3 Age factors**

Younger women appear to be at higher risk of self-inflicted injury that occurred in the home, although the age distribution of the population in the catchment areas of VISS hospitals is not known. Women aged 15-39 years contributed just over three-quarters (76.3%) of intentional self-inflicted injuries presentations to VISS hospital emergency departments yet comprised only 50.2% of the Victorian population over the VISS surveillance period.

### **9.3.4 Time of injury**

Intentional self-inflicted injury presentations at VISS hospital emergency departments were raised on Saturdays (16.5% of weekly presentations) and Mondays (16.3% of weekly presentations). The expected daily distribution if cases were evenly distributed over the week is 14.3%.

### **9.3.5 Place of occurrence (location)**

Most (88.2%) of the self-inflicted injuries occurred in the living/sleeping areas of the home.

### **9.3.6 Nature of injury**

More than one injury could be reported per case. The most common intentional self-inflicted injuries were:

- Poisoning by ingestion (80.4% of reports); and
- cuts and lacerations (13.5% of reports), mainly to the wrist (6.7% of reports) and forearm NEC (3.7% of reports)

### **9.3.7 Breakdown factors**

The specific products most frequently reported as implicated in self-inflicted injury cases were:

- barbiturates/sedatives/psychotropics (37.1% of reports);
- aspirin/aspirin substitutes (11.5% of reports);
- alcohol (11.4% of reports);
- razors or shavers (2.3% of reports), and
- knives (1.9% of reports).

### **9.3.8 Disposal of patients from emergency departments**

Most patients (98.5%) required treatment and nearly two-thirds (63.1%) required hospital admission. This was by far the highest admission rate for any cause of injury presenting to VISS hospital emergency departments:

- treated, no referral (9.0%)

- treated, referred to O.P.D (2.1%)
- treated, referred to G.P (6.7%)
- treated other referral (8.2%)
- casualty review (2.8%)
- admitted to hospital [63.1%- short stay ward observation (18.8%), short stay ward or inpatient ward (44.3%)]
- transferred (6.6%)

#### **9.4 GENERAL PRACTICE PRESENTATIONS**

ELVIS ( $n=3$ , mean annual rate:  $n/a$ , rank: 10)

There were only three cases of intended self-inflicted injury recorded on the ELVIS database in the one-year period 1994-95. The causes of the three self-inflicted injury cases presenting to GPs were punching/hitting objects (2 cases) and self-laceration (1 case).

#### **9.5 DISCUSSION AND RECOMMENDATIONS**

Intentional self-inflicted injury was a high-ranked cause of home injury deaths, hospital admissions and emergency department presentations. Self-inflicted injury accounted for nearly one-half (47.0%) of home injury deaths (not taking into account the underestimation of home fall deaths on the CFS) and a significant proportion of home injury hospital admissions (7.1%) and hospital emergency department presentations (9.1%). Each year in Victoria, approximately 75 adult women commit suicide in their home (crude annual death rate 4.4/100 000). It is estimated that the annual incidence of home injury hospitalisation for self-inflicted injury could be as high as 1,480 cases (projected from available data). The place of occurrence of injury was only recorded in 15.8% of hospitalised self-inflicted injury cases and action is required to improve the coding of place of occurrence (location) of injury on VIMD.

Self-poisoning by pharmaceutical drug overdose was the foremost cause of suicides, hospital admissions and VISS emergency department presentations for self inflicted injury among women. Prescription drugs predominated. This pattern was also evident in accidental poisoning (see chapter 11). The categorisation of pharmaceutical poisoning injury cases as intentional or accidental involves some subjectivity where evidence of intent is equivocal or unavailable. Therefore, the discussion in this chapter will cover both intentional and accidental pharmaceutical drug overdose deaths and injuries and the recommendations will focus on measures that have good potential to reduce community access to drugs over-represented in intentional and accidental self-harm cases.

Suicide and self-inflicted injury are complex problems that demand a range and mix of solutions. It is outside the scope of this project to cover the research on these issues and the range of responses that have been implemented. Two comparatively recent publications, *Suicide explained: the Australian Experience* (Hassan, Melbourne University Press 1995) and *Youth Suicide in Australia: a background monograph* (Commonwealth Department of Health and Family Services 1997) provide good overviews of the problem of suicide in

Australia including information on incidence, patterns and trends, causes and risk factors and a critical review of approaches to prevention.

Gunnell & Frankel (1994) undertook an extensive review of the suicide prevention literature and reported that no single intervention has been shown, in a well-conducted randomised trial, to be effective in reducing suicides. The authors recommended that research and innovations in practice (including rigorous evaluations) should concentrate on:

- understanding and acting to prevent the rise in suicide among young men;
- strategies to reduce suicide in patients recently discharged from psychiatric care;
- improving recognition and treatment of depression (especially by general practitioners); and
- decreasing access to the means of suicide.

In relation to these recommendations it should be noted that there is some evidence that adolescent males and females attempt suicide at comparable rates and that the difference between the sexes in completed suicide rates is a reflection of the choice of less lethal means by females (Commonwealth Department of Health and Family Services 1997).

### ***Reducing access to the means of suicide***

The injury prevention field in Australia has consistently advocated that more consideration should be given to countermeasures to reduce the access to methods of suicide and self-harm (Commonwealth Department of Human Services and Health 1994). This position is based on research evidence that suggests that when community access to a common method of suicide is reduced (either deliberately or as a consequence of changes in the living environment) there is a subsequent fall in the rate of suicide by the restricted method. Contemporaneously, there is generally some reduction in the overall rate of suicide. For example, a number of Australian studies reported that self poisoning rates and overall suicide rates (especially for females) in Australia declined after restrictions on the availability of barbiturates were introduced in the late 1960s (Myers et al 1981; Hardwicke et al 1986; Cantor et al 1989, Coleridge et al 1992; Buckley et al 1995a). Kendall (1998) recently reported that the mandatory introduction of catalytic converters in new motor cars in 1992 in Britain appears to have been associated with a decrease in the number of suicides by CO exhaust gas emission (especially for males) without substitution of other methods.

Cantor et al (1996) undertook an evaluation of the research evidence supporting this approach (that included an assessment of the potential effectiveness of possible countermeasures) for the Youth Suicide Prevention Advisory Group to the Commonwealth Department of Health and Family Services. They concluded that restricting the availability of a particular method *'tends to result in a corresponding decline in suicide rates for this method...and often, but not invariably, reduces overall suicide rates* (p 31). However, the authors tempered this conclusion by warning against overzealous implementation of countermeasures that restrict access to less lethal means of suicide, because there was some evidence that substitution of means occurs. Gunnell & Frankel (1994) also concluded that

measures to restrict access to means (particularly pharmaceutical drugs and car exhaust gas) offer the greatest potential for reducing the incidence of suicide.

### *Self poisoning deaths (suicide and accidental)*

This study revealed that pharmaceuticals (mostly prescription drugs) were responsible for two-fifths (42.5%) of adult female suicides in the home (where most suicides occur) and were the most frequently used method of suicide. They also accounted for four-fifths (81.3%) of accidental poisoning deaths. The number of drug-related suicides is likely to be underestimated because it is probable that not all of these deaths are reported to the Coroner. They may not be recognised by GPs making the certification (especially in older and chronically ill patients) or there may be insufficient evidence of intent available to the Coroner for a finding of suicide to be made. Some of the deaths in the undetermined and adverse effects categories, and some classed as accidental poisoning, could also be suicides.

There were an additional 75 drug-related poisoning deaths classified in the CFS as of 'undetermined intent' (mostly with no information on the drugs involved). A further 39 heroin/morphine-related deaths classified in the database (wrongly) as 'adverse affects of drugs in therapeutic use' and three methadone deaths classified as medical misadventure where excessive dosages were prescribed. These drug-related deaths were not included in this analysis.

Toxicological investigations are undertaken by the Victorian Institute of Forensic Pathology for all cases reported to the Coroner where death is thought to be due to a drug or toxin or is 'unexplained'. Unfortunately, the toxicology reports are not linked to the CFS database and the primary and secondary drugs used to commit suicides and implicated in accidental poisoning deaths were inconsistently reported in the CFS one-line case narratives. These situations needs to be rectified as ease of monitoring of drugs would assist timely preventive action.

### *Drugs involved in deaths (suicide and accidental poisoning)*

Information on the drug agents implicated in deaths was only available for 17.0% of the drug-related suicides and 31.6% of drug-related cases reported as accidental poisoning on the CFS database. Therefore, the findings reported here are tentative as the sample may not be representative and the number of specific drugs in each grouping was small. When considered together, the pharmaceutical drugs most implicated in suicide and accidental poisoning deaths were: tricyclic antidepressants, particularly amitriptyline, doxepin (for suicides) and dotheipin (more prominently in accidental poisoning); opioid analgesics, particularly morphine/heroin (for suicides) and methadone (for accidental poisoning); benzodiazepine-based hypnotics and sedatives particularly flunitrazepam and temazepam; and anxiolytics (particularly diazepam) for accidental poisoning deaths.

The prescription analgesics associated with drug-related deaths (all taken in combination with other drugs) were codeine (3 deaths) dextropropoxyphene ± paracetamol (1 death) and oxycodone (2 deaths). In addition, there were two deaths reported for liver failure associated with paracetamol overdoses. Alcohol (taken in combination with pharmaceutical drugs) was involved in at least 14.5% of suicides by drugs and medicinals and was reported as the primary cause of death in 16.7% of all accidental poisoning cases.

### *Comparison with other Australian studies*

Despite the limitations of CFS data, the list of drug groups implicated in suicides are the same as those reported by Coleridge et al (1992) from their detailed examination of files (including forensic pathology, autopsy and police reports) on all drug-related deaths reported to the Coroner in Victoria for the 14-month period, July 1989 to August 1990. Also, the reported specific agents are broadly similar. The drugs reported in the Coleridge study as most commonly implicated as the *primary* cause of deaths were heroin (or morphine), tricyclic antidepressants (particularly amitriptyline and dothiepin) and, to a lesser extent, benzodiazepine-based hypnotic and sedatives (flunitrazepam, temazepam and oxazepam), methadone and alcohol.

The latest report from the Newcastle hospitals study (Buckley et al 1995a) also found that opioid analgesics (mostly heroin, to a lesser extent methadone) and tricyclic antidepressants (mostly dothiepin, amitriptyline and doxepin) were the drugs most frequently implicated as the primary cause of self-poisoning deaths.

When assessing which drugs are most dangerous in overdose, consideration has to be given to community prescription use. The Newcastle research team assessed the relative toxicity of prescription drugs in overdose by calculating the odds ratio for self poisoning deaths per prescription using Newcastle study data, the NSW Coroners' forensic data on prescription drug deaths (1987-92) and information on community prescription drug use from the Commonwealth Department of Health (Buckley et al 1995b). They found that that the short-acting barbiturates (pentobarbitone), chloral hydrate, colchicine (prescribed for gout), dextropropoxyphene (usually in combination with paracetamol such as Digesic, Capadex and Paradex), the 'older' tricyclic antidepressants (e.g. dothiepin, amitriptyline and desipramine) and anticonvulsants had the highest odds-ratios for self-poisoning death per prescription. The manufacturers have withdrawn chloral hydrate from the market (Buckley et al 1995a).

These drugs, except for colchicine, were all implicated in self-poisoning deaths in this study. Doxepin (another of the 'older' tricyclic anti-depressants) has not been shown to be over-represented in self-poisoning deaths in relation to prescription use (Henry et al 1995) but it was the prescription drug most frequently implicated in suicides in this study. Its prominence in suicides, ahead of dothiepin and amitriptyline, may be the result of reporting bias. The same pattern was not evident in accidental poisoning deaths involving antidepressants. Although the reporting of drugs was better for accidental poisoning cases, there is also a possibility that the data were biased.

### ***Self poisoning hospitalisations (intentional and accidental)***

In this study self-poisoning accounted for over nine-tenths of VIMD hospital admissions for self-inflicted injury. Pharmaceutical drugs were involved in 97.6% of self-poisoning cases. The E-code classifications available for drugs groups involved in self-inflicted injury hospitalisations are less detailed than that for accidental poisoning. Pharmaceutical drugs also predominated in reported accidental poisoning hospitalisations; they were involved in 88.9% of accidental poisoning admissions.

In general, hospital admissions and emergency department reports on the drugs involved in intentional and accidental overdoses rely on information given by the patients, the person accompanying the patient to hospital or clinical symptoms. Ray et al (1986) reported from a prospective study of drug overdose patients attending a Sydney hospital that

toxicological analysis showed that most patients cannot accurately identify the drugs they have taken and that a large number of ingested drugs are also missed in the clinical history and examination. Complete agreement between purported drug consumption and the toxicological results occurred in only 35% of cases. This lack of accurate information usually does not hamper effective treatment in hospital. However, studies to verify (by toxicological analysis) the drugs involved in overdose cases should be undertaken before decisions to withdraw or restrict access to any drugs are made (Ray et al 1986).

#### *Drug involved in hospitalisations (intentional and accidental)*

The drug groups most frequently involved in VIMD hospital admissions for intentional self-inflicted poisoning were: tranquillisers and other psychotropics including antidepressants (56.6%) and analgesics, which included heroin and other opiates (18.1%). The number of hospital admissions with heroin involvement cannot be disaggregated from analgesics in therapeutic use for self-inflicted injury cases. VISS hospital admissions data suggest that heroin-related admissions for self-inflicted injury are few and that the specific drug most involved in analgesic overdoses is paracetamol. The specific prescription drugs most implicated in self-inflicted poisoning in VISS hospital admissions were diazepam, temazepam and dothiepin.

Nine-tenths of all accidental self-poisoning VIMD hospital admissions involved prescription drugs, mostly predominantly benzodiazepine-based tranquillisers (21.0%), anti-depressants (19.3%) and paracetamol-based analgesics (16.2%). Heroin, methadone and other opiates were reported as involved in only 3.0% of the accidental poisoning hospitalisations.

#### *Drugs over-represented in self-poisoning hospitalisations*

Buckley et al (1995b) reported that the psychotropic drugs, sedatives and anti-convulsants were over-represented in self poisoning hospital admissions when data was adjusted for frequency of prescription. Benzodiazepines were over-represented in hospitalised cases but not in self-poisoning deaths. There is evidence that benzodiazepine usage has been falling in recent years, which may be related to new guidelines and greater community awareness of the risk of dependence (Mant et al 1993).

#### ***Recommended approach to prevention and control***

Researchers have generally recommended that efforts to reduce prescription drug-related deaths should concentrate on primary and secondary prevention in the community:

- reducing community access to the drugs that are most involved in self-poisoning;
- banning those that have little therapeutic value (such as chloral hydrate and colchicine); and
- restricting the availability of drugs that are over-represented in deaths in proportion to prescription frequency (Myers et al 1981; Hardwicke et al 1986; Coleridge et al 1992; Buckley et al 1995 a & b; Gunnell & Frankel 1994; Cantor et al 1996).

This approach is the preferred preventive option because most drug-related deaths (suicide and accidental poisoning) occur outside hospitals (or are inevitable on hospital admission). Also, most suicide cases have no previous psychiatric history and are not in contact with a

health care professional in the month before death (Gunnell & Frankel 1994). Also, the decision to suicide involves some degree of impulsiveness and the use of drugs 'at hand'.

Recommendations in research reports to reduce community access to drugs with high toxicity in overdose include:

- the establishment of a national poisoning prevention and control advisory committee to government drug regulatory bodies;
- improvements in surveillance and data collection (*note*: the establishment of a national coronial database is in progress);
- tightening controls on the availability of drugs over-represented in deaths and hospitalisation in relation to use, specifically tricyclic antidepressants;
- banning or voluntary withdrawal of lethal drugs with limited therapeutic value, for example, pentobarbitone and dextropropoxyphene;
- the inclusion of an antidote in paracetamol;
- prescription and packaging reforms, for example, limiting quantities in packets and requiring blister packaging for all drugs; and
- prescriber education, particularly in relation to the diagnosis and treatment of depression.

(Myers et al 1981; Hardwicke et al 1986; Coleridge et al 1992; Buckley et al 1995 a & b; Cantor et al 1996, Gunnell & Frankel 1994).

Two of these recommendations, the restriction of tricyclic antidepressants and the role of paracetamol in self-poisoning, warrant further discussion. The remainder are detailed, listed and referenced in the recommendations section.

#### *Tricyclic anti-depressants and self-poisoning*

In this study depression was mentioned as a factor in nearly one-half (47.3%) of suicides between 1992-94 and the 'older' tricyclic antidepressants were found to be most frequently associated with drug-related suicides and accidental self-poisoning deaths. These findings are tentative because of the shortcomings in the data.

The reports that some of the commonly prescribed 'older' tricyclic antidepressants (amitriptyline, dotheipin and desipramine) are disproportionately involved in drug-related deaths, in relation to frequency of prescription, has led to recommendations or suggestions that the prescription of these drugs, especially to depressed patients who are suicidal, should be discouraged (Rettersol 1993; Gunnell & Frankel 1994; Henry et al 1995; Buckley et al, 1995a; Cantor et al 1996; Kasper et al 1996). These research groups favour substitution of the older tricyclics with some of the 'newer' antidepressants that are less toxic in overdose, such as the selective serotonin reuptake inhibitors, for example, fluoxetine and mianserin. In a recent review article Kasper et al (1996) concluded that antidepressants with a predominantly serotonergic mechanism of action might be of particular benefit to patients with suicidal problems.

These recommendations have generated controversy in the literature. Opponents argue that the newer less toxic tricyclics are less efficacious (Roose et al 1994; Isacsson et al, 1994), too costly (House et al 1995) and, not necessarily, safer (Isacsson 1994). More research is needed to determine the optimal drug treatment for depression (which takes cognisance of the drugs over-involved in fatal overdoses) to assist the development of guidelines on the recognition, appropriate management and treatment of depression, especially in general practice (Gunnel & Frankel 1994).

Cantor et al (1996) conclude from their review of research literature (and the expert advice they received during their consultations for the Commonwealth Department of Health and Family Services) that there is sufficient evidence to support tightening Health Insurance Commission prescribing specifications for tricyclics to reduce the 'large supply' available on prescription in Australia. They suggest further limitation of the number of tablets per prescription and modifying availability by upgrading the specification for the authorisation for prescription of tricyclic anti-depressants (issued to prescribers from the Health Insurance Commission by telephone) from 'depression' to 'depression-suicide risk assessed'.

Research also shows that compliance with anti-depressant drug treatment both generally, and among suicides in the period immediately before death, is low because of adverse drug side effects (Johnson 1986; Isacsson et al 1994). These findings suggest that the treating doctor (generally a GP) could take a more active role in monitoring the use and stockpiling of tricyclics by requesting patients to bring their anti-depressants to all follow-up consultations. This increased vigilance may improve compliance with treatment (thus reducing the risk of suicide among depressed patients) and provide the opportunity for the retrieval of quantities of unused anti-depressants if the likelihood of future compliance appears minimal or treatment is changed.

### *Paracetamol and self-poisoning*

Paracetamol is a non-prescription useful minor analgesic and anti-fibrile agent that is freely available in chemists and supermarkets. The delayed serious toxic effects of paracetamol in overdose is causing concern, notably in Britain, although there is some dispute about whether its use in fatal overdoses is increasing (Hawton et al 1995, Spooner 1995). Unlike other drugs used in self-poisoning, consuming large quantities of paracetamol does not induce rapid loss of consciousness. After initial nausea and vomiting the patient can feel quite well until hepatic necrosis develops two to three days later. A British study reported that paracetamol overdose patients appear to be aware that paracetamol is potentially lethal (in contrast with findings from an earlier study) but are not aware of the delay of more than 24 hours in the onset of serious symptoms (Hawton et al 1996; Gazzard et al 1976).

As already explained data on the specific drugs involved in drug overdose deaths are poorly reported on the CFS database. The analysis of case narratives yielded only two deaths from liver failure associated with paracetamol overdoses (one suicide, one accidental) in females in the 7-year study period (1987-94). In response to a MUARC search request (separate to this study), the Victorian Institute of Forensic Pathology reported 'mentions' of paracetamol overdose in excess of 120mg/L in the toxicology/autopsy reports on 18 deaths (8 females, 10 males) in the 3-year period, 1994-96. Only one of these deaths (a male) was directly attributable to gastrointestinal bleeding/liver failure associated with paracetamol ingestion, the other deaths were by mixed drug toxicity. Coleridge et al reported that paracetamol caused two drug-related deaths (sex not reported) in their audit of Victorian Coroner's case records covering a 14

month period (1989-90). This also suggests that paracetamol is the primary causal agent in, at most, only one or two drug-related deaths each year in Victoria.

A different picture emerges when VIMD and VISS hospital admissions data for self-inflicted and accidental drug overdoses are considered. Analgesics, which in the ICD 9 classification includes heroin and other narcotics) were the second highest ranked group of drugs involved in self inflicted injury (behind psychotropics), accounting for 18.1% of VIMD hospitalisations for self-inflicted poisoning by drugs and medicinals. The analysis of VISS data for hospital admissions indicated that drugs containing paracetamol probably account for the bulk (almost nine-tenths) of the analgesics involved in these overdoses. Paracetamol (Panamax, Panadol and Tylenol) was the specific drug most frequently ingested in VISS self-inflicted cases (ahead of diazepam and temazepam). Analgesics (predominantly paracetamol) were also involved in just over one-fifth of VIMD hospitalisations for accidental poisoning by drugs and medicinals. However, most self-poisoning (self-inflicted and accidental) were mixed drug overdoses and it is impossible to confirm the involvement of a drug or estimate the relative contribution of each drug to the poisoning event without verification by toxicological analysis.

Antidotes to paracetamol, such as methionine, are available. However, a new paracetamol product introduced in Britain, which included methionine, was rejected by consumers and the inclusion of an antidote is not supported currently by the Australian Therapeutic Goods Committee (Cantor et al 1996). There is some research evidence to suggest that packaging controls could reduce paracetamol self-poisoning (Gazzard 1976) but restrictions would have to be applied to the other over-the-counter analgesics that are involved in self poisoning, such as aspirin and codeine. Such measures could include banning bottles or packets of loose tablets, requiring blister packaging, limiting the number of tablets in a packet to 25 and allowing only one preparation per purchase (Gazzard 1976; Gunnell & Frankel 1994; Hawton et al 1996). The fact that paracetamol is the agent most frequently involved in child poisoning should clearly also be a consideration. There is need for more research in Australia on the mortality and morbidity caused by paracetamol overdose including closer examination of the trends in use over time, and on the cost-benefit of potential countermeasures, before any precipitate action is taken to restrict availability of this useful minor analgesic.

### ***Targeting specific age-groups***

Women aged over 45 years were found to be over-represented, and women aged 15-24 years under-represented, in drug-related suicides (and in all female suicides in the home) and in accidental poisoning deaths. The reverse was true for hospital admissions and emergency department presentations where women aged 39 years and younger appear to be at higher risk. Coleridge et al (1992) reported similar findings and comment that the number of drug-related suicides in the younger age range was surprisingly small given the large number of hospital emergency department presentations for drug overdoses in the younger age group. These differences need to be taken into account when formulating and targeting interventions.

### ***Preventing suicide by other methods***

The other major methods of suicide used by women were hanging, suffocation (by plastic bag) and poisoning by car exhaust gas. There were relatively small numbers by firearms and jumping and no reported cases by cutting and piercing. Hanging was the method most commonly used by young women aged 15-24 years.

Cantor et al (1996) noted evidence of an increase in hanging suicides among young males and females in Australia, which may be related to an increase in cultural acceptability. Measures to limit access to hanging instruments (which were poorly reported in CFS data) and plastic bags are not feasible. There is some anecdotal evidence that media reports of hanging suicides have encouraged imitation among young people and it is recommended that guidelines are negotiated with the media to get them to avoid drawing attention to specific methods when suicides are reported (Cantor et al 1996). Cantor and co-researchers at the Australian Institute for Suicide Research and Prevention have been commissioned by the Commonwealth Department of Health and Family Services to investigate factors contributing to the rise in suicides by hanging in Australia.

A range of measures proposed by MUARC to reduce motor vehicle exhaust gassing suicides, including engineering solutions or performance requirements that limit carbon monoxide (CO) emissions in car exhaust systems or prevent access to lethal doses of CO, are currently under consideration (Routley 1998). The Australian Medical Association and the Federal Office of Road Safety have co-operated to convene a multi-sectoral committee which includes car manufacturers, motor vehicle design regulatory bodies and other interested parties to consider the feasibility of a number of options for preventing car exhaust suicides (Routley 1998).

## **Recommendations**

### **Strategies/countermeasures**

- Establish a national poisoning prevention and control advisory committee comprised of clinicians researchers, industry representatives and other interested parties to:
  - monitor trends in mortality and morbidity related to toxic substances (both prescription and non-prescription), along with changing prescribing habits; and
  - make recommendations on reducing the availability and scheduling of identified hazardous substances (Coleridge et al 1992, Buckley et al 1995b, Cantor et al 1996).
- Support regulations to further restrict the availability of barbiturates (particularly pentobarbitone) and dextropoxyphene or have them withdrawn from the market (Myers et al 1981, Buckley et al 1995b, Cantor et al 1989, Cantor et al 1996).
- Limit the prescription size of anticonvulsants available on the PBS for epileptics with co-existent psychiatric problems (Buckley et al 1995b).
- Monitor the involvement in self poisoning deaths of the 'newer' and reportedly less toxic antidepressants such as fluoxetine and mianserin and, if they prove less toxic than 'older tricyclics' (and as efficacious), promote their preferred use in the treatment of depression (Rettersol 1993; Gunnell and Frankel 1994; Malmvick et al 1994; Henry et al 1995, Buckley et al, 1995a, Cantor et al 1996).
- Negotiate guidelines with the media to get them to avoid drawing attention to specific methods when they report suicides to prevent imitative suicides among young people (Cantor et al 1996).

- Support current negotiations being conducted by a coalition of key stakeholders and convened by the Federal Office of Road Safety and the Australian Medical Association to ensure the implementation of measures to reduce motor vehicle exhaust gassing suicides including engineering solutions or performance requirements which limit carbon monoxide (CO) emissions in car exhaust systems or prevent access to lethal doses of CO (Gunnell & Frankel 1994, Cantor et al 1996; Routley 1998).
- Initiate or promote programs which enable the community to safely and conveniently dispose of unwanted or expired medication based on the successful program in the Hunter Valley region of NSW (Cantor et al 1996).
- Educate prescribers to consider the toxicity of drugs in overdose when making decisions on treatment and to more actively monitor compliance with treatment especially for patients with depression or experiencing traumatic life events, for example, the death of a family member or marital separation.
- Educate treatment agencies and general practitioners about the need for caution and careful monitoring when prescribing methadone and benzodiazepines to drug addicts (Coleridge et al 1992).
- Consider the findings and recommendations from research into factors contributing to the rise in suicides by hanging in Australia, currently being undertaken by the Australian Institute for Suicide Research and Prevention

### **Surveillance, research and investigations**

- Support the establishment of a national coronial database to better identify trends in suicide, the methods used and contributory factors, including specialised modules that focus on suicide and limit illicit drugs.
- Routinely link toxicological data to the National Coronial Information System.
- Standardise definitions to guide the classification of self-poisoning cases by intent, ie. self inflicted, accidental and undetermined, in all databases.
- Standardise methods of determining cause of death from poisoning and methods for attribution of aetiologic fractions (Buckley et al 1995b).
- Improve the recording of place of occurrence (location) of self-inflicted injury on surveillance systems, particularly VIMD hospitalisations.
- Develop simple guidelines to standardise information in one-line case narratives in surveillance systems to increase their usefulness.
- Standardise ICD classification for heroin-related deaths and hospitalisations (self-inflicted and accidental) and re-classify heroin-overdose deaths that are apparently wrongly classified under 'adverse effects of drugs in therapeutic use' in the CFS.
- Support research to determine the mortality and morbidity caused by paracetamol overdose in Victoria including a closer examination of the trend of its use in self poisoning over time, and on the cost-benefit of potential countermeasures, for example,

limiting availability and inclusion of an antidote (Hawton et al 1996; Gunnell & Frankel 1994; Gazzard 1976, Cantor et al 1996).

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## 10. CUTTING AND PIERCING INJURY

Cutting and piercing injuries were associated with only two deaths of adult females in the five years covered by the CFS database. However, they were the third-highest ranked cause of hospital admissions, and the second-highest ranked cause of both hospital emergency department presentations and General Practice presentations (Table 7:1).

The specific products most involved in cutting and piercing injuries at all levels of severity, except deaths, were knives, followed by 'other (non-powered) hand tools'. Lawn mowers caused a significant proportion of the cutting and piercing injuries that required hospital admission or emergency department attendance (Table 10:1).

**Table 10:1 Causes of cutting and piercing injury that occurred in the home among adult women (aged ≥ 15 years) at all levels of severity**

Cutting/piercing injury E-code breakdown (E920.1-920.9)	Deaths <i>n</i> =2 Rate: 0.02/100 000 Rank: 9		Hospital admissions <i>n</i> =1,078 Rate: n/a Rank: 3		Hospital E.D. Presentations <sup>a</sup> <i>n</i> =1,362 Rate: n/a Rank: 2		GP Presentations <i>n</i> =154 Rate: n/a Rank: 2	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Powered lawn mower			87	8.0	76	5.6	3	1.9
Other powered hand tools			3	0.4	4	0.3		
Powered household appliances and implements			25	2.3	26	1.9	1	0.6
Knives			274	25.4	413	30.3	42	27.3
Other hand tools and implements <sup>b</sup>			107	9.9	133	9.8	18	11.7
Other specified <sup>c</sup> and unspecified cutting instruments or objects	2	100.0	582	54.0	627	46.0	90	58.5
Misclassification/ wrongly coded cases					83	6.1		
<b>Total</b>	<b>2</b>	<b>100.0</b>	<b>1 078</b>	<b>100.0</b>	<b>1 362</b>	<b>100.0</b>	<b>154</b>	<b>100.0</b>

*Notes:* (a) Because VISS data are not coded for cause of injury using the ICD9E-coding system, the available ISIS classification which most closely conformed to the E-codes for cutting and piercing injury (ISIS code-'mechanism of injury causation – grazed/abraded/lacerated/punctured by' excluding intentional injury and 'foreign body in orifice') was used to electronically select the subset (*n* =, 362). The finer E-code breakdowns were estimated by manually classifying and analysing a sample of 27.6% (*n*=376) of the one-line VISS case narratives in the subset.

(b) This classification includes axe, chisel, needle, scissors, screwdriver and shovel.

(c) This classification includes arrow, broken glass, dart, edge of stiff paper, nail, plant thorn, splinter and tin can lid.

*Sources:* Death data: Victorian Coroners' Facilitation System (CFS), 1989-90 to 1993-94 (5 years)

Hospital admissions data: Victorian Inpatient Minimum Database, (VIMD) 1987-94 (7 years), public hospitals

Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), four hospitals 1991-1995 (various periods)

General Practitioner presentations data:-Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-5 (12 months)

## **10.1 DEATHS**

CFS ( $n=2$ , mean annual rate: 0.02 per 100,000, rank: 9)

There were only two cutting and piercing deaths recorded on the CFS. One was caused by the victim falling through a glass door, the other by a crossbow wound to the chest (self-inflicted but not with suicidal intent).

## **10.2 HOSPITAL ADMISSIONS**

VIMD ( $n=1\ 078$ , mean annual rate:  $n/a$ , rank: 2)

### **10.2.1 The size of the problem**

Cutting and piercing injury was the third-highest ranked cause of adult female home injury hospital admission, accounting for 4.7% of the admissions on the VIMD database (Table 7:1). The VIMD recorded 1,078 adult female home cutting piercing injury cases over the 7-year data collection period (annual average, 154 cases). However, only just over one-third (35.8%) of all cutting and piercing cases on VIMD ( $n=3,892$ ) were coded for location of injury (the home was the place where the injury occurred in 77.4% of coded cases). If the coded cases are assumed to be a representative sample of all adult female injury hospitalisations for cutting and piercing injury (and this could not be checked) then the annual incidence of adult female home cutting/piercing injury hospitalisations in Victoria could be about 430 cases.

### **10.2.2 Causes of hospitalisations**

The specific causes of cutting and piercing home injuries that required hospital admission were knives (25.4% of cases), other handtools and implements (9.9%) and powered lawn mowers (8.0%). The analysis of a sample of case narratives of VISS hospital admissions (see below) indicates that the most prominent of the 'other handtools and implements' involved in cutting and piercing injuries is the sewing needle.

Over one-half (54.0%) of the cutting piercing cases were classified under 'other specified and unspecified cutting/piercing'. This broad E-code classification includes cutting/piercing injuries caused by arrows, broken glass, darts, edge of stiff paper, nails, plant thorns, splinters and tin can lids but does not classify them separately. The analysis of a sample of VISS hospital admissions case narratives (see below) indicated that broken glass is probably the most prominent of these causes.

### **10.2.3 Age factors**

Age-related rates of cutting and piercing injury that occurred in the home could not be calculated because of the inconsistent reporting of location of injury for VIMD hospital admissions. However, the available evidence suggested that women aged 20-34 years and women over 75 years were slightly over-represented in cutting and piercing hospitalisations. Women aged 20-34 years comprised 30.8% of the Victorian adult female population during the period covered by VEMD but experienced 36.5% of all cutting/piercing injuries that required hospital admission; women aged 70 years and older comprised 7.2% of the population but contributed 8.7% of cutting and piercing injuries.

#### 10.2.4 Nature of injury

The most frequently reported injuries were: open wounds (66.1% of reports); injury to the nerves and spinal cord (18.6%); injury to the blood vessels (4.2%); and fractures (3.8%). There was an average of 1.4 injuries reported per case.

### 10.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)

VISS ( $n=1\ 362$ , rate: n/a, rank: 2)

#### 10.3.1 The size of the problem

Cutting and piercing injury accounted for 16.4% of VISS Hospital emergency department presentations (admissions and non-admissions) and was the second-highest ranked cause of emergency department presentations (Table 7:1).

#### 10.3.2 Causes (mechanisms) of Emergency Department presentations

Because VISS data are not classified for cause of injury under the ICD9E-coding system, the available ISIS classification that most closely conformed to the E-codes for cutting and piercing injury (ISIS code: 'mechanism of injury causation - grazed/abraded/lacerated/punctured by' excluding intentional injury and 'foreign body in orifice') was used to electronically select the subset ( $n = 1,362$ ). The finer E-code breakdown groupings were estimated by manually classifying a sample of VISS one-line case narratives in the subset of data ( $n=276$  cases, 27.6% sample) which included all case narratives for admissions and randomly selected pages of non-admitted cutting and piercing cases. The groupings of narratives were then subjected to a more detailed analysis to elicit further details on the cause of injury and identify any differences between the circumstances of admitted and non-admitted cases.

Table 10:2 shows the breakdown of causes of cutting and piercing VISS hospital emergency department presentations:

- Knife cuts and pierces (30.8% of all cases) and glass cuts and pierces which were classified under 'other specified cutting/piercing' (21.1% of all cases) were the major causes of ED presentations (including admissions), together accounting for just over one-half (51.9%) of all selected cases.
- Other hand tools and implements (predominantly needles and pins) and lawn mowers (powered and unpowered) were other major causes of injury, accounting for a further 8.7% and 3.7% of all cutting and piercing injuries respectively. Lawn mower injury cases were disproportionately represented in VISS hospital admissions for cutting/piercing injuries (23.5% of lawn mower injury cases were admitted compared to 6.1% for all other specified and unspecified causes).
- Cuts and pierces from lawnmowers, glass and pins and needles were over-represented in hospital admissions for cutting and piercing injuries.

**Table 10:2 Detailed causes (mechanisms) of cutting and piercing injuries presenting to VISS hospital emergency departments, from an analysis of case narratives.**

Detailed causes Cutting piercing injury E-code breakdown (E920) <sup>a</sup>	VISS admissions (all cases) n=88		VISS non-admissions (23.3% sample) n=288		Selected cases <sup>b</sup> (27.6% sample) n=376 <sup>a</sup>		All cases (scaled up) n =1 362	
	n	%	n	%	n	%	n	%
	Lawn mowers	12	13.7	9	3.1	21	5.6	51
Other powered hand tools	1	1.1			1	0.3	1	0.1
Powered household appliances and implements	2	2.3	5	1.7	7	1.9	24	1.8
Knives	25	28.4	89	30.9	114	30.3	419	30.8
Other hand tools and implements (mainly needles/pins)	13	14.7	24	8.3	37	9.8	119	8.7
Other specified causes (mainly glass, nail, tin, wire/metal)	31	35.2	138	48.0	169	44.9	643	47.2
Unspecified	2	2.3	2	0.7	4	1.1	10	0.7
Cases misclassified in electronic conversion and wrongly coded cases	2	2.3	21	7.3	23	6.1	95	7.0
<b>Total</b>	<b>88</b>	<b>100.0</b>	<b>288</b>	<b>100.0</b>	<b>376</b>	<b>100.0</b>	<b>1 362</b>	<b>100.0</b>

*Note:* (a) Because VISS data are not classified for cause of injury using the ICD9E-coding system, the available ISIS classification that most closely conformed to the E-codes for cutting and piercing injury (ISIS code-‘mechanism of injury causation – grazed/abraded/lacerated/punctured by’ excluding intentional injury and ‘foreign body in orifice’) was used to electronically select the subset (n =1,362) and the finer E-code breakdowns were estimated by manually classifying and analysing a sample of 27.6% (n=376) of the one-line VISS case narratives in the subset.  
(b) Hospital admissions are over-represented in the selected sample  
*Source:* Hospital emergency department presentations : Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods)

### ***Knife cuts and pierces***

The analysis of the sample of case narratives for VISS presentations (admissions and non-admissions) for knife cuts and pierces revealed:

- Over three-quarters of knife cuts (78.1% of selected cases) occurred during food preparation. A comparatively smaller proportion occurred when knives were being washed and dried (6.1%).
- The classes of food most frequently reported as being cut at the time of the injury were fruit and vegetables (25.4%) and meat (18.4%), although this detail was inconsistently reported in narratives.
- The specific foods most reported as involved in knife cutting incidents were: meat n.s. (10.5%), vegetables n.s. (7.9%), cake (5.3%) pumpkin (4.4%), potatoes (2.6%), carrots (2.6%), leg of lamb (2.6%) and opening oysters (2.6%).

- The brand/type of knife being used was reported in only 23 cases of knife cuts: 13 ‘Staysharp’ knives, 5 Stanley knives, 4 carving knives n.s and 1 surgical knife. (The ‘Staysharp’ knife may not necessarily be sharp, tests conducted by *Choice* magazine showed that this brand of knife became blunt very quickly and needed to be put through its self-sharpening device 10-20 times after each cutting task to maintain its sharp edge).
- The most frequently used description of the cause of the cutting incident in the case narratives was ‘knife slipped’ (47.4%); this detail was inconsistently reported.

#### ***‘Other hand tools and implements’***

The analysis of the sample of case narratives for VISS presentations (admissions and non-admissions) for cutting and piercing injury caused by ‘other hand tools and implements’ revealed:

- The implements most frequently involved in these injury cases (37 cases, 9.8% of the selected cutting and piercing cases) were machine or hand sewing needles and pins (20 cases, 5.3% of selected cutting and piercing cases). In 60% of cases involving sewing needles and pins, the needle or pin penetrated the foot when it was stood on (12 cases, 9 of which required hospital admission). In the remaining 40% of cases (8 cases) the needle or pin penetrated the finger mostly when the victim was engaged in machine or hand sewing.
- Secateurs (3 cases, 0.8% of selected cutting and piercing cases) and scissors (3 cases, 0.8%) were the most prominent of the wide range of other hand tools and implements that were implicated in cutting and piercing injury cases.

#### ***‘Other specified and unspecified cutting and piercing implements’***

The analysis of the sample of case narratives of VISS presentations (admissions and non-admissions) for cutting and piercing injury caused by ‘other specified and unspecified cutting and piercing implements’ revealed:

- Cuts by glass (83 cases, 22.1% of the selected cutting and piercing cases) were responsible for approximately one-half (49.1%) of the ‘other specified’ cutting and piercing injuries. Cases involving glass cuts were over-represented in hospital admissions, accounting for 26.1 % of cutting and piercing hospital admissions compared with 20.8% of non-admissions.
- The most frequently reported circumstances of injuries caused by broken glass were: cut by broken window or glass door (33.7% of selected glass cuts, mostly tripped and fell through door or window and put hand through door/window); cut while washing drinking glasses or glass dishes (13.3%); cut by glass during handling/cleaning tasks (12.0%); stepped on broken glass (9.6%); and cut by glass when cleaning up or disposing of broken glass (4.8%).
- Cuts and punctures by nails (16 cases, 4.3% of selected cutting and piercing cases), by tins or cans (15, cases, 4.0%) or by pieces of wire and metal (14 cases, 3.7%) were other prominent causes of cutting/piercing injury within this classification.

### ***Lawn mowers (powered and unpowered)***

The analysis of the sample of case narratives of VISS presentations (admissions and non-admissions) for cutting and piercing injuries caused by lawn mowers revealed:

- Cuts by lawn mowers (21 cases, 5.6% of all selected cutting and piercing cases) were frequently serious. Cases involving lawn mower cuts were over-represented in hospital admissions for cutting and piercing injuries. They accounted for 13.6% of hospital admissions for cutting and piercing injury compared with 3.1 % of non-admitted cases.
- The most frequently reported circumstances were: foot slipped under or mower ran over foot (19.0% of selected lawn mower cutting cases, none of which were admitted to hospital), cut by blades when adjusting blade height (14.3%, all cases were admitted to hospital), put hand/finger too close to blades (14.3%, all cases were admitted to hospital) and removing blocked grass (9.5%, all cases were admitted to hospital).

The remainder of the analysis is based on the routine output from VISS. The dataset includes all cases of cutting and piercing injury selected by the electronic conversion of the ISIS codes to the ICD9E-code for cutting and piercing injury ( $n=1,362$ ). Cases misclassified in the conversion and wrongly coded cases (which together account for an estimated 7.0% of cases in the dataset) are included in the analysis.

#### **10.3.3 Age of injured women**

Age-related rates of injury could not be calculated because the population of the catchment area of VISS hospitals is not known. However, women aged 20-34 years contributed 39.9% of cutting and piercing injury cases attending VISS hospital emergency departments and would appear to be at higher risk because they comprised 30.9% of the Victorian adult female population over the VISS surveillance period (1987-94)

#### **10.3.4 Time of injury**

Peak days for presentations for cutting/piercing injuries were Saturday (19.1%) and Sunday (19.1%). The expected proportion if injuries were evenly distributed over the week is 14.3% per day. Possible explanations could include increased exposure to cutting and piercing activities in the home on weekends or reduced access to General Practitioners.

#### **10.3.5 Place of occurrence (location) of injury**

Cutting and piercing injuries mostly occurred in the kitchen (40.1%), living/sleeping areas (31.6%) and garden/garage or yard (25.4%)

#### **10.3.6 Context of injury (activity being undertaken)**

Cutting and piercing injuries most frequently occurred when women were engaged in:

- household activities (49.9% of cases, mostly food preparation, cleaning and 'other' household activities)
- leisure or recreation (25.5% of cases, mostly 'other leisure and recreation' which is used as the default code in the system); and
- maintenance (18.5% of cases, mostly gardening and 'other' maintenance)

### **10.3.7 Breakdown factors (what went wrong)**

More than one factor can be reported for each injury case, the mean number of factors per case for cutting and piercing injuries was 1.25. The most frequently reported specific factors involved were:

- knives (19.9% of reports);
- glass and glass products (11.2%);
- injured person (5.6%);
- fruit and vegetables (5.4%);
- nails/screws/carpet tacks/thumb tacks (3.8%);
- metal containers (3.0%);
- meat and poultry (2.5%);
- pins and needles (2.5%);
- tableware and accessories (2.3%);
- wood items NEC (2.2%); and
- lawn mowers, powered and unpowered (2.1%)

### **10.3.8 Nature of injury and body part injured**

The cutting and piercing injuries were predominantly:

- cuts and lacerations (70.6% of injury reports, mostly to hand NEC)
- punctures (8.9%, mostly to foot NEC and finger)
- ‘foreign body in’ (6.9%, mostly finger and foot NEC)

### **10.3.9 Disposal of patients from emergency department**

Almost all (97.3%) of cutting/piercing VISS hospital emergency department attendees required treatment, 6.2% of cases were admitted to hospital:

- admitted to hospital (6.2%)
- treated, no referral (36.1%)
- treated, referred to O.P.D (7.3%)
- treated, referred to G.P (29.2%)
- treated other referral (1.5%)
- casualty review (16.8%)

- transferred (0.2%)
- no treatment, (2.7%)

## **10.4 GENERAL PRACTICE PRESENTATIONS**

ELVIS (*n*=154, mean annual rate: n/a; rank: 2)

### **10.4.1 The size of the problem**

Cutting and piercing injury accounted for approximately one-quarter (23.9%) of General Practitioner presentations for home injury among adult women and was the second-highest ranked cause of GP presentations

### **10.4.2 Causes (implements involved)**

Table 10.3 shows the causes of cutting and piercing home injuries presenting to GPs.

- Knives were involved in just over one-quarter (27.3%) of all cutting/piercing injuries.
- ‘Other hand tools and implements’ caused 11.7% of cutting and piercing injuries and scissors were responsible for more than one-third (39.0%) of these cases.
- Most cutting and piercing injuries (58.5%) were classified under ‘other and unspecified cutting instruments and objects’. The analysis of the one-line narratives for these cases revealed that these instruments or objects’ were predominantly glass (responsible for 17.4% of ‘other’ cuts/pierces), plants/wood (16.3%), nails (14.0%) and tin cans (8.0%).

### **10.4.3 Context of injury**

The most hazardous activities for knife cuts were meal preparation (69.0% of knife cuts, mostly while cutting meat and vegetables/fruit) and washing or drying dishes (11.9%).

### **10.4.4 Body parts injured**

The body parts most injured in cutting and piercing cases were upper limb (67.5% of cases, mostly hands) and lower limb (29.9%, mostly foot).

### **10.4.5 Nature of injuries**

The most common injuries were lacerations (72.7% of cases) and punctures (13.0%).

### **10.4.6 Disposal of patients**

Most (95.5%) patients presenting with cutting and piercing injuries required treatment:

- treated, no referral (70.1%)
- treated, referred to specialist (1.3%)
- other referral (0.7%)
- re-appointment (22.7%) & re-appointment/investigation (0.7%)

## 10.5 DISCUSSION AND RECOMMENDATIONS

The most common causes of cutting and piercing injuries were knives and broken glass. Lawn mowers and pins and needles were also prominent causes of injury. The analysis of VISS hospital emergency data showed that cuts from broken glass, lawn mowers and sewing needles and pins were more likely to require hospital admission than other cutting and piercing injury cases. These problems are dealt with separately because they generally require different preventive strategies and countermeasures.

### Knife cuts

Knives were involved in approximately one-quarter of VIMD hospital admissions for cutting and piercing injury and ELVIS GP presentations (25.4% and 27.3% respectively) and three-tenths (30.8%) of VISS emergency department presentations. The analysis of VISS emergency department and ELVIS GP presentations data revealed that 70%-80% of knife cuts occurred during food preparation and a comparatively smaller proportion (6%-11%) occurred when knives were being washed or dried. The most common classes of foods being cut at the time of injury were fruit and vegetables and meat. The specific foods most reported as involved in knife cutting incidents were: meat (not specified), vegetables (not specified), cake, pumpkin, potatoes, carrots, leg of lamb and opening oysters. Details of the circumstances of the injury and food being cut at the time of injury were inconsistently reported in VISS and ELVIS case narratives.

Knives are perhaps the most important and most-used hand tools in the kitchen. Cutting injury that involves knives has received sparse attention in the research literature. Comparatively recent studies on knife injuries (or hand injuries involving knives) include: two published epidemiological studies, one of work-related hand injuries in New Zealand which found that piercing and cutting instruments were the most common agent of work-related hand injuries that resulted in hospital admission (Burrige et al 1997) and the other of hand and wrist injuries reporting to five accident and emergency departments in Denmark; a recent report on a small case series of hand injuries caused when a knife is used to try to separate stacked frozen food items (Jigjinni et al 1997); and an earlier evaluation of knife handle guarding (Cochran & Riley 1986). Aspects of knife use and safety practices are also covered in a research project undertaken by consultants for the Australian Meat Research Corporation (David Caple and Associates 1992). This relative lack of research is surprising considering that 9.2% of occupational injuries in Australia (that result in five or more days off work) result from the use of hand tools, approximately one-quarter of which are caused by knives and cutlery (Coleman and Long 1995).

The only Australian Standard for knives used in food preparation is AS 2336-1992, *Meat Industry-Hand-held knives*, a voluntary standard which specifies the materials and design and construction of blades and handles, performance (including tests) in terms of soundness, corrosion resistance, security of handles and flexibility, and marking. The design and construction features incorporated in the standard are no more stringent than those generally recommended for knives that are used in home food preparation.

Although the Australian Standard specifies that the knife has a bottom tang guard (see sketch in guidelines below) which is 'designed to minimise the possibility of the user's hand slipping forward' it does not set down the height of the guard. Cochran & Riley (1986) found that a guard height of 1.524cm or more was needed to protect the user's hand from slipping when the knife hits a bone or the work surface, especially if the handle was greasy or wet and/or the worker fatigued (the research was done with meat workers).

The development of a Standard for hand-held knives for home food preparation may serve to protect users from the poor quality and unsafe knives currently on the Australian market. The Australian Consumers' Association commissioned laboratory and other tests on the most popular 8-inch cook's knives available in Australia. The report (*Choice* May 1996) concluded that, as a general rule, knives priced under \$35 did not perform as well as those that cost more. However, the cook's knife that was recommended as the best overall performer (in terms of performance, comfort, handling, ability to hold a sharp edge, strength and corrosion-resistance) was priced at \$39.95. A good set of knives may be expensive but is a lifetime investment. It is usually suggested that an 'average kitchen dabbler' can get by with three sharp knives - an 'all-purpose' cook's knife for larger jobs (blade length about 20 cm or 8 inches), a utility knife for larger fruits, tomatoes, onions and chopping herbs and a paring knife (blade length about 7.5 cm or 3 in) for paring, peeling, trimming and dicing smaller fruits and vegetables (*Choice* May 1996, Hooke 1996).

It is generally recommended that knives used in food preparation should be sharp because the exertion of too much pressure with a blunt knife increases the possibility of the knife slipping and causing injury to the non-dominant hand (the hand not wielding the knife). It is interesting to note that 'knife slipped' was the most common explanation given for cutting injuries in the one-line case narratives for home injury hospital emergency department presentations. A knife blade that can cut the skin of a tomato is at the right sharpness for all-purpose use.

A follow-up study is needed to determine the contribution of the degree of sharpness of knives and other factors (for example, misuse or hand impairments) to serious and less serious cutting injuries. This study should aim to more precisely determine the circumstances of knife cuts, the relative contribution of causal factors (for example, design of knife, sharpness of blade, incorrect use, poor cutting technique, sight and hand/finger disabilities), the nature of the injury (including which hand was injured), the food/item being cut at the time of injury and consumer acceptance of potential countermeasures (including protective glove/s). Most of this information could be collected by a follow-up telephone survey of admitted and non-admitted hospital emergency department presentations for cutting and piercing injuries. Given the lack of empirical evidence, current 'best practice' forms the basis for the recommendations in this chapter.

Sharp knives should be treated with the utmost respect and care. Basic knowledge of the various parts of the knife is necessary to aid the selection of a good quality and safe knife (see guidelines in recommendations section below). Training is also needed to improve the skills and safety practices of users. The obvious place for training in safe cutting techniques and supervised practice in the use of sharp knives (and for modelling of best practice on care and storage) is in Home Economics classes in schools, especially at the junior post-primary level where most students of both sexes take at least a semester of classes in food preparation. This may be the only opportunity to reach the broad student population because the subjects that include food preparation are elective at the middle and senior levels. In-service training for Home Economics teachers is required to encourage them to provide students with the necessary knowledge, training and practice in the selection, use, care and storage of sharp kitchen knives. There is also need to educate the broader community about knife safety. A co-ordinated campaign involving radio commercials, newspaper and magazine articles and the production and broad dissemination of a brochure on safety and knife use in the home should be considered.

The non-dominant hand (the hand holding the food not the knife) is the most frequently injured hand (personal communication, David Caple). Although some of these cuts may be prevented by measures to improve the quality of knives and the skill and practices of users, other more direct protective measures merit consideration. 'Old-fashioned' carving forks with a prong to prevent the knife slipping up the fork provide protection for users and should be routinely used when carving meat. A range of spiked holders and chopping boards fitted with prongs or clamps are available and information on these products, and on ergonomic knives, is available from the Independent Living Centre, Victoria. The Centre provides expert advice on safety products to people at higher risk of cutting injuries because of vision impairments and weaknesses and disabilities involving the hands, including rheumatism and arthritis (personal communication, Natalie Gourley). The availability of these products and the personal advisory service conducted by the Independent Living Centre should be publicised broadly, especially to older women and women with disabilities affecting their manual dexterity or vision.

The other protective measure for the non-dominant hand that is available and widely used in the food industry is the protective glove. Within the range of available gloves there are lightweight, flexible, cut-resistant gloves (such as the *Whizard* Handguard and Liner gloves and the *Kevlar* glove) that appear suitable for use in home food preparation and for other domestic tasks where there is a risk of cutting injury, for example, handling sharp-edged materials, opening cartons, cleaning slicing equipment and picking up broken glass.

The protective glove material is interwoven with stainless steel. They conform to the right or left hand and 'breathe' to reduce perspiration. The gloves are advertised as machine or hand washable but it was noted in research undertaken for the Meat Research Corporation that the brand of glove that was tested was hard to keep clean and presented a hygiene problem (Caple and Associates 1992). These problems might be overcome by wearing the protective glove under a latex glove. This is the usual practice in surgical use. Protective gloves appear to be a promising countermeasure but further investigation of their utility and acceptability to householders and the hygiene issue is required before their promotion for home use is recommended.

## **Recommendations**

### **Strategies/countermeasures**

- Upgrade education about knife use and safety in post-primary Home Economics curriculum especially at the junior secondary school level.
- Consider the development and conduct of an injury prevention campaign consisting of radio messages about the selection, safe use and storage of kitchen knives (as set out in the table below), linked by a 008 telephone number to a mailout of a brochure on knife use and safety (see safety guidelines below)

### **Research/investigations**

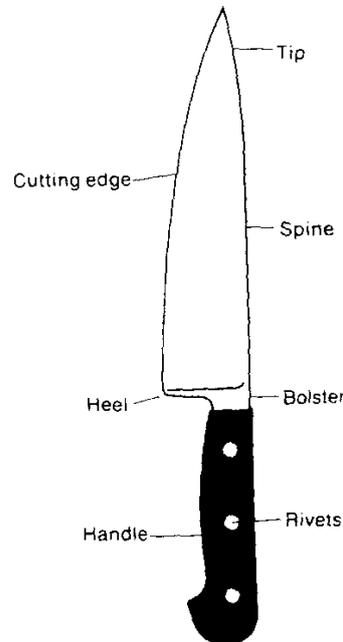
- Conduct a follow-up research study of cases presenting to hospital emergency departments to more precisely determine the circumstances of knife cuts, the relative contribution of causal factors (for example, design of knife, sharpness of blade, incorrect use, poor cutting technique, sight and hand/finger disabilities), the nature of the injury (including which hand was injured), the food being cut at the time of injury and consumer acceptance of potential countermeasures (including protective glove/s).

- Investigate the suitability (including hygiene issues) and consumer acceptability of the use of protective gloves (or a glove for the non-dominant hand) when cutting food.
- Investigate the feasibility and practicability of introducing an Australian and New Zealand Standard for Hand-held knives *for use in home food preparation* based on Standard AS 2336-1992 Meat industry-Hand-held knives.

## GUIDELINES

### KNIFE SAFETY IN THE HOME KITCHEN (1)

#### Selection of knives



Note that there is no Australian Standard for hand-held knives for use in the domestic kitchen. The Standard used as a guide to the selection of knives for this table is the *Australian Standard Meat industry - Hand-held knives (AS 2336-1992)*.

**Blades:** Blades should be high quality carbon or stainless steel, should taper from head to top and have a strong heel which protects the grip hand from the blade. Forged (mouldered and tempered) knives are generally accepted as the best quality but *Choice* testing found that the machine-stamped knives were usually cheaper and not necessarily inferior. The Australian Standard for hand-held knives in the meat industry (AS 2336-1992) prescribes 'that the blade and tang shall be manufactured in one piece from the selected steel and be free from welds and joints'. It also sets out standards for the metal alloys used in blades and for the shape and length, thickness, finish and hardness of blades.

**Tangs:** The tang is a continuation of the blade that extends into the knife's handle. A full tang that runs the length of the handle and is secured by three rivets is generally recommended because it is strong and safe. Partial tangs (that do not run the full length of the handle) or rat-tail tangs (which are thinner than the spine of the blade and encased in the handle) are generally regarded as less durable and safe as the blade can snap at the handle or separate through use. The Australian Standard for hand-held knives in the meat industry (AS 2336-1992) is not prescriptive on tang length (full tang, 3/4 tang and 1/2 tang knives are included in their classification of hand-held knives) but requires that 'the shape of the tang shall provide positive anchorage inside the handle (3.1.2), all handles shall be positively fixed to the tang (3.3) and that the [handle] moulding material shall totally enclose the tang (3.3)'.

## GUIDELINES

### KNIFE SAFETY IN THE HOME KITCHEN (1)

#### Selection of knives

**Handles:** Wooden handles were more common in the past but good quality handles made from moulded plastic or resin are now generally recommended as they are more durable and hygienic and provide a better grip. The handle should be contoured, comfortable to hold and the fingertips should clear the chopping board. The handle should be riveted or, as prescribed in the Australian Standard for hand-held knives in the meat industry (AS 2336-1992), be 'positively affixed' to the blade for strength. The knife should be balanced - the centre of gravity should be near the top of the handle when the knife is gripped.

- The purchaser should check that the knife feels comfortable to hold and is well balanced, the blade is straight and free from flaws or nicks and there are no gaps in the handle, which can collect bacteria.
- Three sharp knives, an 8 inch (20 cm) cook's knife and smaller utility and paring knives are sufficient for most home kitchen tasks
- People with arthritis or other weaknesses of hands or wrists or poor eyesight, should seek advice from the *Independent Living Centre* on the range of ergonomic knives, food holders and spiked or clamped chopping boards that are available.

*Sources: Australian Consumers' Association (Choice, May 1996), Magris & McCreery (1995), Standards Australia (1992), Conway (1991), Hooke (1996), WorkSafe Western Australia (1997), Caterer & Housekeeper (1994), Independent Living Centre-Victoria (1996), Cochran & Riley (1986).*

## GUIDELINES

### KNIFE SAFETY IN THE HOME KITCHEN (2)

#### Knife use

##### Correct use

- Use the correct sharp knife for the job, when in doubt opt for a larger knife.
- Always hold a knife by the handle.
- Make all cutting strokes away from your other hand and body, never towards you.
- Always let the knife do the work, never force the blade.
- The correct working height is important; the wrist should be in a neutral position when cutting. Adjustable cutting boards are available.
- Avoid holding vegetables in your hand to cut or remove the skin. Place on a chopping board and cut the skin off by cutting down onto the board.
- The thumb and forefinger should be kept behind the heel of the knife, not extended onto the blade.
- The food to be cut should be held with the fingers slightly bent back so the knuckles touch the flat blade of the knife to help guide the cutting. As the food is cut the thumb carefully pushes it forward under the action of the knife. This technique requires practice.
- The point of the knife should always remain on the board while chopping, always cut large or harder foods and bones with the heel (widest part) of the blade of a cook's knife. Pumpkin should be bought pre-cut, cooked with skin on or microwaved to soften skin before peeling. Frozen or partly thawed food should not be cut.
- A carving fork, which has a protrusion below the handle to prevent the knife slipping up the blade, should be used when carving meat.
- Use an appropriate cutting surface, wood or composite cutting boards are recommended. Cutting on metal, glass or marble surfaces dulls and damages the knife.
- Use a knife only for its intended purpose, do not use a knife to prise apart frozen food, open bottles, loosen drawers etc.
- When passing a knife to someone, lay it down on the work surface and let the other person pick it up.
- Do not allow the knife blade to extend over the edge of a table or cutting board
- Do not try to save a falling knife, allow the knife to fall to the floor, and then pick it up.
- Install good overhead lighting over benches used for cutting tasks

*Sources: Australian Consumer Association (Choice May 1996), Magris & McCreery (1995), Standards Australia (1992), Conway (1991), Hooke (1996), WorkSafe Western Australia (1997), Caterer & Housekeeper (1994), Independent Living Centre-Victoria (1996), Cochran & Riley (1986).*

## GUIDELINES

### KNIFE SAFETY IN THE HOME KITCHEN (3)

#### Care and Storage

##### Care

- **Keep knives sharp**, a sharp knife performs better but is safer as less pressure is required to cut through the food. When too much pressure is applied, there is the possibility of the knife slipping and causing injury.
- **Keep knives clean**, wash thoroughly between uses to prolong the life of the knife and between cutting tasks (e.g., between cutting meat and other foods) to de-grease blade and handle and prevent food cross contamination.
- **Always wash knives by dipping them in dishwater or under a running tap**, wipe the handle and blade with a soapy sponge or cloth and dry immediately with a soft towel to prevent corrosion. Never leave a knife soaking in the sink or on a draining board, the risk of someone cutting themselves in these circumstances is high.
- **Never put a sharp knife in the dishwasher**, it can damage the blade, shrink wooden handles and presents a hazard when loading and unloading dishes.
- **Wear covered shoes** when using a sharp knife (never thongs or bare feet).
- **Get knife professionally sharpened** unless trained in the use of sharpening tools.

##### Storage

Store all sharp knives safely out of reach of children:

- in a wooden knife block OR
- in a special knife drawer fitted with two parallel magnets (to hold knives securely) and a child-resistant drawer fastener OR
- in scabbards in a kitchen drawer or cupboard fitted with a child-resistant fastener OR
- in a knife fitted into a high cupboard (one with a child-resistant latch if there are children around the house) OR
- on a wall mounted magnetic holder out of the reach of children, provided the magnet is strong enough to hold the heaviest knife (two parallel magnets may be needed).

*Sources: Australian Consumers Association (Choice May 1996), Magris & McCreery (1995), Standards Australia (1992), Conway (1991), Hooke (1996), WorkSafe Western Australia (1997), Caterer & Housekeeper (1994), Independent Living Centre-Victoria (1996), Cochran & Riley (1986).*

## **Sewing needles and pins**

‘Other hand tools and implements’ were responsible for 9.9% of hospital admissions for cutting and piercing injury in the VIMD database and a similar proportion of VISS emergency department and ELVIS GP presentations (8.7% and 11.7% respectively). No breakdown was available on the hand tools and implements involved in hospital admissions. However, the analysis of VISS emergency department data revealed that needles and pins were the most frequent cause of injuries in this classification (for both admitted and non-admitted cases) and the injuries mostly occurred when sewing needles and pins, predominantly the former, were trodden on. These were moderately severe injuries; 90% of the ‘trodden on’ piercing cases required hospital admission, presumably to remove the needle or pin. Needle and pin pierces were a less prominent cause of GP presentations, ranking behind scissor cuts.

In the garment manufacturing industry, magnets are used to pick up spilt needles and pins and this low cost countermeasure is readily transferable to the school and home. In Textiles classes in schools and TAFE colleges students should be trained to ‘sweep’ the sewing area including the chair and floor with a magnet when a needle is lost or pins spilt and, routinely, after each Textiles session. A small magnet should be a compulsory ‘one-off’ purchase for Textiles students for their equipment kit. They should also be trained to routinely sweep the sewing area and floor with a brush (into a dustpan) at the end of each session to ensure that all needles and pins are picked up. Students should be encouraged to transfer these habits to the home environment. Sewing equipment manufacturers could include magnets in boxes of pins, sewing kits and baskets and sewing machine equipment to encourage widespread use of this measure. Safety tips/hazard warnings to prevent needle and pin injuries should be included in sewing machine instruction booklets and on needle and pin packets.

## **Recommendations**

### **Strategies and countermeasures**

- Train students learning garment construction, tailoring and hobby crafts and householders practising these crafts to routinely ‘sweep’ the activity area with a magnet after each session involving pins and needles.
- Encourage manufacturers to include magnets in hand sewing and sewing machine accessory kits.
- Advocate for the inclusion of safety tips/hazard warnings about needle and pin injuries in sewing machine instruction booklets and on needle and pin packets.

### **Broken glass cuts and pierces**

Information on the frequency of broken glass-related injuries can only be obtained from databases that include case narratives, as it is not an exclusive E-code classification. It is included with a range of other causes under ‘other specified cutting and piercing instruments’. Consequently, the frequency of glass-related cutting and piercing injury within VIMD hospital admissions data cannot be estimated. However, the analysis of VISS hospital emergency department data revealed that broken glass was responsible for

just over one-quarter (26.1%) of all VISS hospital admissions for cutting and piercing injuries and 21.1% of all VISS cutting and piercing injury cases (admissions and non-admissions). Broken glass was also responsible for a lesser proportion (9.8%) of cutting/piercing injuries recorded on the ELVIS General Practice database.

One of the two deaths, one-third of the glass cutting/piercing emergency department presentations and just over one-quarter of GP presentations for cutting/ piercing injuries involving glass were caused by broken glass from windows and doors. The most common scenarios reported in VISS and ELVIS case narratives were 'tripped fell through glass door/window', 'put hand through door/window', 'knocking on door/window, glass broke'.

Many of these injuries would be prevented if the safety glass on the market (such as toughened or tempered glass, laminated glass and wired glass) were used in place of ordinary annealed glass in areas where people may come into violent contact with glass (Leicester & Ridgway 1993). Safety glass breaks less readily than annealed glass either into small particles that have blunt rather than sharp edges or the pieces remain contained when it breaks.

In September 1991 Victoria incorporated the 1989 revision of the Australian Standard (AS1288-1989 *Glass in Buildings - Selection and Installation*) into Victoria's Building Code thus mandating the use of safety glazing materials (toughened, laminated or organic) in some residential 'high risk' situations in new homes and renovations. The situations included doors, side panels and glazing likely to be mistaken as an unimpeded path of travel and areas of glazing wholly or partially within 500mm of the floor, shower and bath enclosures (Leicester & Ridgway 1993). Eight years has elapsed since the application of this new regulation and it is timely to investigate whether the new regulation has been effective in reducing architectural glass injuries in the home and other high risk settings.

Hazardous glass in existing housing stock remains a problem. There is no onus on householders to replace broken annealed glass with safety glass. Just after the new Building Code regulation came into force *O'Brien Glass*, in a sponsorship arrangement with the Royal Children's Hospital, offered a 40% discount to householders to encourage them to replace existing annealed glass in windows and doors with safety glass or to apply safety film to existing glass located in high risk areas of the home. No records were kept of the public response to this offer but it may be worth repeating, with an extension of the offer to schools and childcare facilities.

Other prominent causes of glass cuts were: 'broke glass when washing dishes', 'broke glass during cleaning tasks/handling', 'stepped on broken glass'. As previously mentioned, industrial safety gloves suitable for home use are available.

## **Recommendations**

### **Strategies and countermeasures**

- Educate suppliers, glaziers and insurance companies to recommend the replacement of annealed glass with safety glass whenever broken glass is replaced in the doors and windows of existing homes.
- Promote the advantages of safety glass to consumers.
- Reduce the price difference between safety and annealed glass.

- Educate householders to:
  - apply special plastic film, bars, rails, warning stickers or decals on existing hazardous glass in the home
  - select safety glass when broken glass is being replaced in windows and doors.

### **Surveillance, investigations and research**

- Investigate whether the incorporation of the 1989 revision of the Australian Standard (AS1288-1989 *Glass in Buildings - Selection and Installation*) into Victoria's Building Code regulations has been effective in reducing architectural glass injuries in the home and other high risk settings.
- Investigate the feasibility and acceptability to consumers of the use of glass-cut resistant safety gloves for household tasks involving contact with glass (washing glasses, glassware and windows and cleaning up broken glass)

### **Lawn mower cuts**

Lawnmowers were responsible for 8.0% of hospital admissions for cutting and piercing home injury on the VIMD database and a lesser proportion (3.7%) of VISS hospital emergency department presentations. Lawn mower injuries were over-represented in VISS hospital admissions for cutting and piercing injury, nearly one-quarter of cases (23.5%) required admission. Lawn mower injury accounted for only a small proportion (1.9%) of the cutting and piercing injuries on the ELVIS General Practitioner database. Note that injuries to the eye caused by objects thrown up by mowers are classified under a different ICD9 E-code: 'Accidents caused by submersion, suffocation and foreign bodies'.

The analysis of the case narratives of a sample of VISS emergency department presentations revealed that most injuries occurred when the user's hand or foot came into contact with the blade of the mower. The hand injuries were caused when the user put her hand too close to the blades when taking the grass catcher off, adjusting the blades (with motor running) and removing blocked grass. These injuries usually required hospitalisation. The foot injuries occurred when the user's foot slipped under the mower while it was operating. The blade-tip velocity of a power mower has been estimated at 371 km per hour, so mower blades have the capacity to inflict serious wounds, including amputations (Love et al 1988).

There are two Australian/New Zealand Standards that cover petrol lawn mowers: AS/NZS 2657 - 1985 Powered Rotary Lawn Mowers; AS/NZS 3792 - 1992 Ride-on lawn mower. Both are voluntary and, currently, only three manufacturers (Sunbeam Victa, Rover and Masport) have AS quality assurance accreditation for powered rotary lawn mowers and one (Rover) for ride-on mowers (Standards Australia 1995). Other local and imported mowers may meet the Australian/New Zealand or international standards such as those set by the International Organisation for Standardisation (ISO) but have not submitted for accreditation. The Australian/New Zealand Standard is based on, but not identical to, the ISO standard. The high cost of accreditation (\$10 000 for each model) and the time involved (the process takes one year) apparently acts as a disincentive to applications for accreditation from local and overseas manufacturers (*Power Equipment Australasia*, December 1993).

The main tests in the standards that are designed to protect the safety of the operator are the foot probe test which limits the possibility of accidental contact with the blades and the thrown object test which controls the dangerous ejection of objects from the mower (Standards Australia, 1985). In 1993, the Australian Consumers' Association (*Choice* Nov. 1993) assessed that all the moderately priced (under \$500) petrol motor mowers on the market at that time had adequately guarded blades that passed the 'foot probe test'. However, the article did not indicate whether this performance test was the one adopted in the Australian/New Zealand Standard (AS/NZS 2657-1985 Powered Rotary Lawnmowers), but presumably this was so.

Older model mowers (that are often sold second-hand) or unsafe user behaviour may have caused the mower-inflicted foot injuries found in this study. A follow-up telephone survey of injured patients is needed to gain a greater understanding of the precise circumstances of mower-related injuries and the relative contribution of mower design factors including age of mower and user behaviour. The results of this survey should provide a guide as to whether upgrading and mandating the Australian/New Zealand Standards for lawn mowers is warranted.

Users should be warned of the danger of feet and hand cutting injuries and that the blades of a mower do not stop immediately the power is switched off (which is termed 'blade run-on'). An inspection of the lawnmowers on display at one hardware megastore and one large specialist lawnmower outlet revealed that all but one (made by a small Victorian manufacturer) had at least a hand hazard warning symbol affixed to the mower (the word 'danger' or 'caution' marked at or near the discharge opening is required under the voluntary Australian/New Zealand Standard) but only one had a warning about blade run-on.

There were a plethora of hazard warnings and symbols on the mowers on display depending on the make, model and whether it was imported or locally made. The most direct and highly visible was on the Honda HRU 173- *Mower blades can cut off hands and feet*. This warning label also gave further instructions on safe operation including the hazard posed to the user and bystanders by thrown objects. The multi-language written warnings and/or multi-hazard symbols on some imported European models were less effective, because the English language message was low impact and most of the nine hazard symbols would not be understood by users in Australia.

The Australian/New Zealand Standard should be revised to require a standardised hazard warning about the danger of hand and foot injuries, which includes information about blade run-on. This should be simply worded and prominently displayed on all mowers (legible from the operating position) because the current Standard allows a blade run-on of up to 7 seconds of actuating the switch to the off position or on disengaging the clutch. A warning about thrown objects and eye injury should also be included.

In 1986 the American National Standards Institute (ANSI) amended the voluntary standard for ride-on mowers (which are responsible for an estimated 26,800 treatments a year in US hospital emergency departments each year) by requiring the fitting of an operator presence control (OPC). This control (located variously in the seat or foot pedal) automatically stops the blades and/or engine when the driver gets up from the seat (Adler et al 1995). This design requirement was incorporated into the voluntary Australian Standard for electrically powered rotary lawnmowers in 1985 and ride-on mowers (AS 3792) in 1992.

US research, undertaken in 1994, estimated that about 200 injuries per year in the US were prevented by equipping mowers with an OPC, even though the standard allowed a 7 second run-on. Access time to blades by users (usually when clearing the discharge chute or changing the height of the mower deck) was typically 2-4 seconds faster than the time allowed for complete shutdown with the OPC (Adler et al 1995). Transfer of this safety feature to hand petrol powered mowers should be considered a high priority as should its inclusion in the Australian/New Zealand Standard. Imported models that incorporate an OPC on a hand power mower are now available in Australia. For example, the *Raser Castelgarden* mower (imported from Italy) features a double handle bar. Grasping the lower bar to the upper bar activates the blades. When the operator ungrips the double handle to leave the operating position the lower handlebar is released and automatically shuts off the blades (but they continue to run on for a few seconds).

Other technologies recommended for broader implementation by Hunter (1992) are: the reduction of the tip speed of mower blades (however, lower speeds may not cut through tough Australian grasses); the design of a discharge chute to deflect struck objects downwards; and the provision of a guard flap over the rear side of the mower deck.

All lawn mowing injuries on the VISS database were reviewed in the June 1995 edition of the VISS publication *Hazard* (Ashby 1995) and the recommendations relevant to adult female users are reproduced here, with additions.

## **Recommendations**

### **Strategies and countermeasures**

- Review the design of powered hand held motor mowers to provide a discharge chute which deflects struck objects in a downward direction
- Revise the voluntary standard AS/NZS 2657-1985 Powered Rotary Lawnmowers to require a prominent label (visible from operating position) that warns of the danger of hand and feet injuries (including time of blade run on) and an operator presence control (OPC) design feature which shuts off the blades if the operator leaves the normal operating position.
- (If research findings support regulatory action) mandate that all mowers sold in Australia meet the appropriate AS/NZS standard for lawnmowers (AS/NZS 3792-1992; AS/NZS 2657-1985).
- Raise consumer awareness of the hazards of lawn mower use and the need to:
  - consistently use the safety features provided and wear protective clothing (eye protection, boots, gloves and ear muffs);
  - keep hands clear of blades whenever the engine is running and/or the blades are moving;
  - shut down mower engine and wait for blades to stop circling before adjusting the mower or its parts in any way, unclogging the blades or blade area or carrying it;
  - remove stones and other debris from the area before commencing mowing and keep bystanders clear from possible flying objects;

- refuel mower out-of-doors and well away from open fires and cigarettes; and
- use a portable safety switch when using an electric mower and to take special care never to use an electric mower near water or when it is raining and never to pull it backwards.

### **Surveillance, research and investigations**

- Conduct a telephone follow-up survey of cases presenting to emergency departments of VEMD hospitals with hand, foot, eye and other injuries associated with lawn mowers to more precisely determine the causes of these injuries, in particular the relative contribution of design factors and unsafe user behaviour. Use the findings and the results of investigations of minimum achievable blade stopping time to revise the Australian and New Zealand Standards for lawnmowers with a view to mandation if warranted.

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## 11. ACCIDENTAL POISONING BY DRUGS, MEDICANTS AND BIOLOGICALS AND BY 'OTHER SUBSTANCES'

Accidental poisoning was a significant cause of more serious home injuries accounting for 12.1% of fatalities and 3.5% of hospital admissions (Table 7:1). Pharmaceutical drug overdoses were largely responsible for the fatal and serious non-fatal accidental poisoning cases (Table 11:1). The 'accidental' nature of these cases has not been validated. If indeed these overdose cases are accidental they may be more readily preventable than intentionally inflicted self-harm. Although data were limited, the most frequently used classes of drugs involved in accidental poisoning appear to be:

- psycholeptic benzodiazepine-derived anxiolytics, sedatives and hypnotics;
- antidepressants and analgesics.

**Table 11:1 Causes of accidental poisoning that occurred in the home among adult women (age ≥15 years and older) at all levels of severity**

Accidental poisoning E-code breakdown (E 850-E858)	Deaths <i>n</i> =96 Rate: 1.1/100 000 Rank: 2		Hospital admissions <i>n</i> =799 Rate: n/a Rank: 4		Hospital E.D. Presentations <sup>a</sup> <i>n</i> =99 Rate: n/a Rank: 10		GP Presentations <i>n</i> =0	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
By drugs, medicinal substances & biologicals	78	81.3	710	88.9	67	67.7	nil	
By other solid and liquid substances/gases/vapours								
<i>By alcohol</i>	16	16.7	23	2.9	10	10.1		
<i>By cleansing, polishing agents, disinfectants, paints, varnishes</i>			4	0.4	8	8.1		
<i>By petroleum products</i>			2	0.2				
<i>By agricultural/horticultural, chemical and pharmaceutical preparations</i>			6	0.8	3	3.0		
<i>By corrosives &amp; caustics (NEC)</i>			6	0.8	1	1.0		
<i>From foodstuffs and poisonous plants</i>			24	3.0	5	5.1		
<i>By other and unspecified solid/liquid substances<sup>b</sup></i>			12	1.5	3	3.0		
<i>By gas inc. carbon monoxide</i>	1	1.0	12	1.5				
Sub-total	17	17.7	89	11.1	30	30.3		
Unspecified					1	1.0		
Wrongly classified					1	1.0		
Missing data	1	1.0						
<b>Total</b>	<b>96</b>	<b>100.0</b>	<b>799</b>	<b>100.0</b>	<b>99</b>	<b>100.0</b>	<b>nil</b>	

*Notes:* (a) Because VISS data are not classified for cause of injury using the ICD9E-coding system, a combination of ISIS breakdown factor and mechanism codes, with exclusions, were used to select accidental poisoning cases from VISS which approximated the ICD 9 E-code for accidental poisoning. ISIS breakdown factors were used to identify poisoning agents. Falls involving alcohol were removed manually from the electronically converted subset.  
(b) 'Other and unspecified solid and liquid substances' includes metals, plant foods & fertiliser, glues & adhesives, cosmetics.

*Sources:* Death data: Victorian Coroners' Facilitation System (CFS), 1989-90 to 1993-94 (5 years)  
Hospital admissions data: Victorian Inpatient Minimum Database, (VIMD) 1987-94 (7 years);  
Hospital ED presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods)  
General Practitioner presentations data: -Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-95 (1 year)

## 11.1 DEATHS

CFS ( $n=96$ ; mean annual rate (females age 15 years and over): 1.1 per 100,000; rank: 2)

### 11.1.1 The size of the problem

Accidental poisoning was the second-highest ranked cause of adult female home injury deaths, accounting for 12.1% of fatalities recorded on the CFS. Drugs and alcohol accounted for 98.9% of accidental poisoning deaths of adult women that occurred in the home.

### 11.1.2 Causes of deaths (poisoning agents)

The major poisoning agents that were involved in adult female accidental poisoning deaths in the home were:

- 'other specified and unspecified drugs' (81.3% of deaths: by specified drugs 79.2%; by unspecified drugs 2.1%)
- 'by other solid and liquid substances' (16.7%), all alcohol toxicity
- carbon monoxide (1.0%)

#### *Specific pharmaceutical drugs involved*

Table 11:2 shows the available data on the pharmaceutical drugs and medicines involved in accidental poisoning. Toxicology reports are available for all drug-related deaths reported to the Coroner but the results are not routinely included in CFS case narratives. Although the drugs and medicinal substances used in the accidental poisoning cases were reported as 'specified' in 76 of the 78 recorded cases of death by 'other specified drugs and medicinal substances', the drugs implicated in the deaths were recorded in less than one-third (31.6%) of case narratives. Two-thirds of cases where specific drugs were reported involved two or more drugs.

Table 11:3 reveals that three drug groups accounted for just under two-thirds (64.1%) of the drugs implicated in accidental drug-related deaths: antidepressants (24.5% of drug reports); opioid analgesics, methadone, heroin and oxycodone (20.7%); and hypnotics and sedatives (18.9%). The specific drugs most frequently reported were methadone (6 reports) and diazepam (4 reports).

It should be noted that there were another 75 poisoning cases involving drug overdoses classified in the CFS as 'injury undetermined whether accidentally or purposely inflicted' (E-code 980.0-980.5). The drugs used in these self-poisoning deaths were poorly reported. An additional 39 cases of heroin/morphine overdose deaths were classified in the CFS under 'adverse effects of drugs and medicants in therapeutic use' (E-code 935.00). This latter group is wrongly classified as the therapeutic use of heroin is illegal in Australia.

**Table 11:2 Drugs reported in case narratives of adult female accidental poisoning home injury deaths by ‘other specified drugs and medicinal substances’.**

<b>Reported drugs</b>	<b>Frequency (n=53) n</b>	<b>Proportion %</b>
Psycholeptics- anxiolytics, hypnotics and sedatives -Diazepam ( <i>Ducene &amp; Valium</i> ) -Oxazepam ( <i>Serapax</i> ) -Flunitrazepam( <i>Rohypnol</i> ) -Nitrazepam ( <i>Mogadon</i> ) -Temazepam ( <i>Normison &amp; Euhypnos</i> ) -‘benzodiazepines’ (N.F.S.) -Chloral hydrate -‘barbiturates’	 4 1 1 1 2 4 1 1 15	        28.3
Psycholeptics-antipsychotics -Thioridazine ( <i>Aldazine &amp; Melleril</i> ) -Chlorpromazine ( <i>Largactil</i> ) -Pericyazine ( <i>Neulactil</i> )	 1 1 1 3	   5.7
Psychoanaleptics-antidepressants -Amitriptyline ( <i>Amitrol &amp; Tynelol</i> ) -Clomipramine ( <i>Anafranil &amp; Placil</i> ) -Dothiepin ( <i>Prothiaden</i> ) -Doxepin ( <i>Dephran &amp; Sinequan</i> ) -Trimipramine ( <i>Surmontil</i> ) -Fluoxetine ( <i>Prozac &amp; Zactin</i> ) -Moclobemide ( <i>Aurorix</i> ) -‘antidepressants’ (N.F.S.)	 3 1 2 2 2 1 1 1 13	        24.5
Psychostimulants -‘amphetamines’	 2 2	  3.8
Analgesics-opioids -Methadone -Heroin/morphine -Oxycodone -‘unspecified opiates’	 6 2 2 1 11	    20.7
Analgesics-other -Codeine -Paracetamol - ‘painkillers’	 2 1 3 6	   11.3
Other drugs	3	5.7
<b>TOTAL</b>	<b>53</b>	<b>100.0</b>
<i>Source:</i> Victorian Coroners’ Facilitation System (CFS), 1989-90 to 1993-94 (5 years)		

### 11.1.3 Contributory factors

Details of the circumstances (including contributory factors) were not reported in early years and inconsistently reported in the last two years of one-line narratives in the dataset, 1992-3 and 1993-4 ( $n=34$  cases, 16 with mention of contributory factors in the case narrative). As Table 11:3 reveals, a history of drug abuse, mental or physical illnesses or pain were identified in case narratives as contributory factors to accidental self-poisoning deaths.

**Table 11:3 Contributory factors to accidental poisoning home injury deaths of adult women aged  $\geq 15$  years, 1992-93 to 1993-94**

<b>Contributory factors</b>	<b>Frequency (<math>n=34</math> cases) <i>n</i></b>	<b>Proportion %</b>
Depression - <i>depression NOD</i> - <i>in association with physical illness/injury</i> - <i>in association with traumatic life events</i> Sub-total	1 1 ( <i>asthma</i> ) 1 ( <i>separation</i> ) 3	8.8
Other specified contributory factors - <i>chronic pain</i> - <i>chronic illness/disease</i> - <i>history of mental illness</i> - <i>history of drug abuse/addiction</i> - <i>history of self-neglect</i> Sub-total	2 4 ( <i>heart(3), diabetes</i> ) 2 ( <i>schizophrenia</i> ) 4 1 13	38.2
Unspecified reason - <i>unspecified – NOD</i>	18	53.0
<b>TOTAL</b>	<b>34</b>	<b>100.0</b>
<i>Source: Victorian Coroners' Facilitation System (CFS) 1992-93 to 1993-4 (2 years)</i>		

### 11.1.4 Rates at different ages

Accidental poisoning death rates (per 100,000 population) were generally higher for middle to older aged women. With the exception of women aged 50-54, the mean accidental poisoning mortality rates for women in the five-year age groups from age 40-74 years were all approximately one-and-a-half times higher than the mean accidental poisoning rate for all adult women (rate ratios 1.3 to 1.7).

## 11.2 HOSPITAL ADMISSIONS

VIMD ( $n= 799$ ; mean annual rate: n.a.; rank: 4)

### 11.2.1 The size of the problem

Accidental poisoning accounted for 3.5% of hospital admissions for home injury and was the fourth- highest ranked cause of home injury admissions. The VIMD recorded 799 adult female home accidental poisoning cases over the 7-year data collection period (annual average, 114 cases). However, less than one-fifth (18.5%) of accidental poisoning cases on VIMD ( $n=5,159$ ) were coded for location of injury (the home was the place where

the injury occurred in 83.9% of coded cases). If the coded cases are assumed to be a representative sample of all adult female injury hospitalisations for accidental poisoning (and this could not be checked) then the annual incidence of adult female hospitalisations for accidental poisoning that occurred in the home in Victoria would be in the vicinity of 620 cases.

### **11.2.2 Causes (poisoning agents involved)**

Table 11:4 shows the poisoning agents implicated in hospital admissions. Nearly nine-tenths (88.9%) of cases admitted to hospital involved drugs, medicinals and biologicals. The next most frequently reported poisoning agents were: foodstuffs and poisonous plants (3.0%), mainly involving mushrooms and fungi; and alcohol (2.9%), mainly beverages.

#### ***Pharmaceutical drugs involved***

The pharmaceutical drugs most frequently involved in accidental poisoning by drugs, medicinal substances and biologicals were:

- tranquillisers, (28.7% of cases, predominantly benzodiazepine-based tranquillisers);
- analgesics (22.3%, predominantly paracetamol); and
- other psychotropics (19.3%, predominantly antidepressants). (Table 11:4).

**Table 11:4 Pharmaceutical drugs involved in VIMD hospital admissions for accidental poisoning by drugs, medicinal substances and biologicals**

<b>Reported pharmaceutical drugs</b>	<b>Frequency (n=710) n</b>	<b>Proportion %</b>
Analgesics, antipyretics and antirheumatics		
<i>Heroin</i>	12	
<i>Other opiates &amp; related narcotics (including codeine, morphine pethidine and opium)</i>	9	
<i>Salicylates (aspirin)</i>	5	
<i>Paracetamol</i>	115	
<i>Antirheumatics</i>	9	
<i>Other specified analgesics and antipyretics</i>	6	
<i>Unspecified analgesics and antipyretics</i>	2	
<b>Sub total</b>	<b>158</b>	<b>22.3</b>
Sedatives and hypnotics		
<i>Chloral hydrate group</i>	6	
<i>Gluthemide group</i>	1	
<i>Other specified</i>	22	
<i>Unspecified</i>	15	
<b>Sub total</b>	<b>44</b>	<b>6.2</b>
Tranquillisers-anxiolytics		
<i>Phenothiazone-based</i>	47	
<i>Butyrophenone-based</i>	3	
<i>Benzodiazepine-based</i>	149	
<i>Other specified</i>	4	
<i>Unspecified</i>	1	
<b>Sub total</b>	<b>204</b>	<b>28.7</b>
Other psychotropics		
<i>Antidepressants</i>	124	
<i>Psychodisruptives (hallucinogens)</i>	1	
<i>Psychostimulants (amphetamine, caffeine)</i>	11	
<i>Central nervous system stimulants (analeptics and opiate antagonists)</i>	1	
<b>Sub total</b>	<b>137</b>	<b>19.3</b>
Other drugs acting on central nervous system		
<i>Anticonvulsants and antiparkinson drugs</i>	35	
<i>Other specified</i>	15	
<i>Unspecified</i>	2	
<b>Sub-total</b>	<b>52</b>	<b>7.3</b>
Antibiotics	4	0.6
Anti infectives	7	1.0
Other drugs		
<i>Hormones and synthetic substitutes</i>	16	
<i>Primarily systemic agents</i>	17	
<i>Affecting blood constituents</i>	4	
<i>Affecting cardiovascular system</i>	22	
<i>Affecting gastrointestinal system</i>	2	
<i>Water, mineral and uric acid metabolism drugs</i>	15	
<i>Acting on smooth and skeletal muscles and respiratory system</i>	10	
<i>Skin &amp; mucous membrane etc</i>	3	
<b>Sub total</b>	<b>89</b>	<b>12.5</b>
Other specified (inc. central appetite depressants)	10	1.4
Unspecified	5	0.7
<b>Total</b>	<b>710</b>	<b>100.0</b>
<i>Source: Victorian Inpatient Minimum Database, (VIMD) 1987-94 (7 years).</i>		

### **11.2.3 Age factors**

Age-related rates could not be calculated because of the lack of denominator data due to the inconsistent reporting of place of occurrence (location) of injury. However, the available data suggested that women aged 15-39 years were over-represented in accidental poisoning hospital admissions. They comprised 50.3% of the Victorian population over the VIMD data collection period, yet contributed 64.4% of hospital admissions for accidental poisoning. This over-representation was most pronounced in the 15-19 year olds who comprised 9.7% of the Victorian population yet contributed 16.0% of accidental poisoning cases on VIMD.

### **11.2.4 Nature of injury**

More than one injury can be reported per case (the mean number of reports per poisoning case, 1.3 per case). As would be expected poisoning accounted for most of the reports (94.2%), followed by 'other/unspecified injury' (2.9%), bruising/haematoma (0.8%) and open wounds (0.7%).

## **11.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)**

VISS ( $n=99$ ; mean annual rate: n.a.; rank: 10)

### **11.3.1 The size of the problem**

Accidental poisoning accounted for 1.7% of VISS emergency department presentations (admissions and non-admissions) for adult female home injury and was a low-ranked cause of emergency department presentations.

### **11.3.2 Causes - poisoning agents involved**

VISS data are not ICD9E-coded for cause of injury. A combination of ISIS breakdown factor and mechanism codes, with exclusions, was used to select accidental poisoning cases from VISS, which approximated the ICD 9 E-code for accidental poisoning. ISIS breakdown factors were used to identify poisoning agents. Falls involving alcohol were removed manually from the electronically converted subset. Case narratives were then analysed to manually categorise cases into the finer E-code breakdown groupings. The selected cases were then subjected to a more detailed analysis to elicit further details on the cause of injury and to see if there was any differences between the circumstances of admitted and non-admitted cases.

As shown in Table 11:5, the analysis of the case narratives of all accidental poisoning cases revealed that:

- pharmaceutical drug overdoses (either alone or in combination with alcohol) were the major cause of accidental poisoning accounting for over two-thirds (67.2%) of cases; and
- drug overdoses were over-represented in the more serious cases i.e., those requiring hospital admission.

**Table 11:5 Causes of accidental poisoning, VISS hospital emergency department presentations (admissions and non-admissions)**

Accidental poisoning E-code breakdown (E850-E858) <sup>a</sup>	VISS admissions n=44		VISS Non-admissions n=55		All cases n=99	
	n	%	n	%	n	%
Dugs, medicinal substances, and biologicals	33	75.0	27	49.1	60	60.1
Drugs and alcohol in combination	4	9.1	3	5.5	7	7.1
Alcohol <sup>b</sup>	4	9.1	6	10.9	10	10.1
Agricultural/horticultural, chemical and pharmaceutical preparations (other than plant foods and fertilisers)	2	4.5	1	1.8	3	3.1
Corrosives and caustics (NEC)			1	1.8	1	1.1
Cleansing, polishing agents, disinfectants, paints, and varnishes			8	14.5	8	8.1
Other and unspecified solid and liquid substances (including cosmetics)			3	5.5	3	3.1
Foodstuffs and poisonous plants	1	2.3	4	7.3	5	5.1
Unspecified			1	1.8	1	1.1
Wrongly classified			1	1.8	1	1.1
<b>Total</b>	<b>44</b>	<b>100.0</b>	<b>55</b>	<b>100.0</b>	<b>99</b>	<b>100.0</b>

*Notes:* (a) Because VISS data are not ICD9E-coded for cause of injury, a combination of ISIS breakdown factor and mechanism codes, with exclusions, were used to select accidental poisoning cases from VISS which approximated the ICD 9 E-codes for accidental poisoning. ISIS breakdown factors were used to identify poisoning agents  
(b) this is not a standard E-code.

*Source:* Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods, nine hospital years of data)

### ***Specific pharmaceutical drugs involved in accidental poisoning***

A more detailed examination of the narratives of all cases that involved drugs (table 11:6) revealed that the most frequently reported drugs were:

- opioids and analgesics (heroin, codeine phosphate, paracetamol preparations and paracetamol);
- anxiolytics (oxazepam and diazepam); and
- antidepressants (dothiepin, doxepin and amitriptyline)

Cases involving antidepressants were more likely than other drug-related accidental poisoning cases to be admitted to hospital (90.0% of cases involving antidepressants were admitted).

**Table 11:6 Drugs (excluding alcohol) reported in accidental poisoning case narratives, VISS hospital presentations (admissions and non-admissions)**

Drugs	VISS Admissions (n=47 reports)		VISS non-admissions (n=38 reports)		All VISS Presentations (n=85 reports)	
	n	%	n	%	n	%
Anxiolytics -Diazepam ( <i>Ducene &amp; Valium</i> ) -Oxazepam ( <i>Serapax &amp; Murelex</i> )	1 4 5		3 1 4		4 5 9	10.6
Hypnotics and sedatives -Nitrazepam( <i>Mogadon</i> ) -Temazepam ( <i>Normison &amp; Euhygnos</i> ) -‘sleeping pills’	2 1 3	6.4	1 1 2	5.3	1 3 5	5.8
Antipsychotics -Thioridazine ( <i>Melleril</i> ) -Chloroprazine ( <i>Largactil</i> ) -Trifluoperezine ( <i>Stelazine</i> )	1 1 1	2.1	1 1 2	5.3	1 1 3	3.5
Antidepressants -Amitriptyline ( <i>Amitrol &amp; Tryptenol</i> ) -Dothiepin ( <i>Prothiaden</i> ) -Doxepin ( <i>Dephran &amp; Sinequan</i> ) -Imipramine ( <i>Tofranil</i> ) -Tranlycycloimine ( <i>Parnate</i> ) -Lithium Carbonate Sub total	2 2 2 1 1 1 9	19.2	1	2.6	2 3 2 1 1 1 10	11.8
Opioids and analgesics Opioids -Pethidine -Methadone -Morphine/Heroin Analgesics -Paracetamol ( <i>Panamax, Panadol &amp; Tylenol</i> ) -Codeine phosphate with paracetamol ( <i>Panadeine, Fiorinal, Dymadon, Mersyndol</i> ) Sub total	1 1 2 4 4 12	25.5	10	26.3	1 1 7 6 7 22	25.9
Other specified drugs	12	25.5	14	36.8	26	30.6
Unspecified drugs	5	10.6	5	13.2	10	11.8
<b>TOTAL</b>	<b>47</b>	<b>100.0</b>	<b>38</b>	<b>100.0</b>	<b>85</b>	<b>100.0</b>
Note: : (a) more than one drug may be reported for each case						
Source: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods – nine hospital years of data)						

### 11.3.3 Contributory factors to accidental poisoning

The analysis of the contributory factors to all accidental poisoning (drawn from case narratives) revealed some probable inconsistencies in the VISS database in the classification of cases with regard to intent. On the information supplied in these case narratives, a proportion of the deliberate pharmaceutical drug overdose cases (approximately one-half) could have been classified as self-inflicted because the circumstances described in the case narratives were identical to those found in the intentional drug overdose subset. Some cases involving alcohol and drug abuse may also have been deliberate self-harm. In only one-third of cases (33.3%) could the poisoning be regarded as unequivocally accidental i.e. where the victim mistook liquid chemicals for beverages, mistakenly took the wrong medicines or dosage, or reacted badly to ingesting, handling or inhaling medications, foodstuffs or household cleansers (Table 11:7).

**Table 11:7 Contributory factors to accidental poisoning in VISS case narratives**

Contributory factors	VISS Admissions (n=44)		VISS Non-admissions (n= 55)		VISS All cases (n=99)	
	n	%	n	%	n	%
Deliberate ingestion of poisoning agent – prescription drugs taken in overdose -‘depression’, ‘felt depressed’	8				8	
-psychological problems	3		1		4	
-traumatic life events (death of family member, memory of sexual abuse)	1		1		2	
-domestic/relationship problems	2		1		3	
-transient pain (e.g. headache)	3		3		6	
-sleep difficulties/overtiredness	4		2		6	
Sub-total	21	47.7	8	14.5	29	29.3
Deliberate ingestion of poisoning agent – alcohol and drug misuse/abuse						
-history of alcohol abuse or binge drinking	4		8		12	
-history of drug abuse or drug misuse	4		6		10	
Sub-total	8	18.2	14	25.5	22	22.2
Non-deliberate ingestion/exposure to drug and poisoning agents						
-mistaken ingestion/exposure to chemicals	3		4		7	
-mistakes in medication/dosage	3		7		10	
-allergic reactions to medication	1		3		4	
-allergic reaction to food (mushrooms, peach)			3		3	
-allergic reaction to cleansers, glues, sprays, or dyes			9		9	
Sub-total	7	15.9	26	47.3	33	33.3
No other details/wrongly classified	8	18.2	7	12.7	15	15.2
<b>TOTAL</b>	<b>44</b>	<b>100.0</b>	<b>55</b>	<b>100.0</b>	<b>99</b>	<b>100.0</b>

*Source:* Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods – nine hospital years of data)

The remainder of the analysis in this section reports the routine output from VISS based on an analysis of the electronically reclassified (from ISIS to E-codes) subset of VISS data ( $n=99$ ) which includes the one wrongly classified case.

#### **11.3.4 Age factors**

Age-related rates could not be calculated because population denominator data for VISS hospital catchment areas is not known. However, it appeared that women aged 15-34 years (and particularly young women aged 15-19 years) were over-represented in hospital emergency department presentations for accidental poisoning. This age group contributed 59.6% of the accidental poisoning cases, yet comprised 40.6% of the Victorian population over the VISS data collection period.

#### **11.3.5 Time of injury**

Saturdays were the peak day for presentations for accidental poisoning, accounting for 22.3% of attendances (expected proportion if injuries evenly distributed across week-14.3%)

#### **11.3.6 Place of occurrence (location) of injury**

Most accidental poisoning (84.9%) occurred in the living/sleeping area of the home.

#### **11.3.7 Activity being undertaken at time of injury (context)**

Most accidental poisoning occurred when women were engaged in 'other' leisure/recreation (61.6% but this code is used as the default code in the system) and eating or drinking (15.2%).

#### **11.3.8 Nature of injury and body part injured**

As expected, the predominant injury was systemic poisoning through mouth/skin/lungs etc (86.3% of reports - up to three injuries may be reported per case).

#### **11.3.9 Identified breakdown factors (what went wrong)**

Up to three factors may be reported per case. The most frequently reported specific breakdown factors were:

- barbiturates/sedatives/tranquillisers/psychotropics (27.3% of reports);
- alcohol (13.2%);
- aspirin and aspirin substitutes including paracetamol (9.1%); and
- drugs and medications NEC (7.4%).

#### **11.3.10 Disposal of patients**

Most (93.9%) of accidental poisoning cases required treatment, 44.4% required hospital admission:

- minor treatment, no referral (25.3%)

- treated, referred to O.P.D. (5.1%)
- treated, referred to GP (14.1%)
- other referral (1.0%)
- casualty review (4.0%)
- admissions (44.4%)

## 11.4 GENERAL PRACTITIONER PRESENTATIONS

**(nil cases reported)**

No cases of accidental poisoning to adult women presented to GPs in the ELVIS data collection period (1994-95).

## 11.5 DISCUSSION AND RECOMMENDATIONS

Prescription drug overdoses were the predominant cause of accidental home poisoning among adult women. This mirrors the major finding for intentional self-inflicted injury by poisoning. For this reason the discussion and recommendations on strategies and countermeasures to reduce self-poisoning by prescription drugs have been integrated and are to be found in the *Suicide and self-inflicted injury* chapter (Chapter 9). The discussion in this section is limited to the main findings of the analyses and some specific recommendations on improvements to data collection and suggested countermeasures to non-pharmaceutical drug accidental poisoning.

Accidental poisoning was a mid- to high- ranked cause of death and serious injuries (hospital admissions) accounting for approximately 14 deaths and an estimated 620 hospitalisations each year. The latter is partly accounted for by the high rate of admission for observation in poisoning cases, most of which were for drug overdoses. VISS data indicated that one-quarter of the 44.4% of cases admitted to hospital were for short stay ward observation, a common precautionary measure in drug overdose cases.

### *Drug overdoses*

Accidental drug overdoses were responsible for more than four-fifths of the accidental poisoning deaths and hospital admissions and two-thirds of VISS emergency department presentations. Most drug overdose cases involved prescription drugs and the evidence in the CFS and VISS case narratives suggests that, commonly, two or more drugs are ingested together.

Although pathology reports are available for all accidental poisoning deaths investigated by the Coroner the drug agents involved were reported in only one-third of the case narratives in the Coroners' Facilitation System (CFS). This situation needs to be rectified in the National Coronial Information System which is currently in its developmental phase. The available evidence suggested that antidepressants (amitriptyline, dothiepin, doxepin and trimipramine), hypnotics and sedatives (benzodiazepines NOD and temazepam) and opioids (methadone, heroin and oxycodone) are the drugs most implicated in deaths. Diazepam, a benzodiazepine-based anxiolytic, was also prominent. However, these findings are tentative because the reporting of drugs was inconsistent and only a small

number of specific drugs were reported in each E-code group of drugs. More research needs to be done to accurately identify the drugs involved in accidental (and intentional) poisoning deaths and to determine which drugs are over-involved in terms of community prescription numbers.

The drug groups involved were reported for all drug overdose hospital admissions on the VIMD database, but the ICD9E-coding system generally identifies the involvement of broadly defined drug groups rather than specific drugs. Tranquillisers (predominantly benzodiazepine-based drugs), psychotropics (predominantly antidepressants) and analgesics (predominantly aromatics ie. paracetamol) accounted for seven-tenths (70.3%) of hospitalised drug overdose cases. VISS emergency department presentations data are more specific and confirmed that analgesics (mainly heroin, paracetamol and codeine/paracetamol mixtures), antidepressants (mainly dothiepin, doxepin and amitriptyline) and anxiolytics (mainly oxazepam and diazepam) were most frequently involved in accidental drug overdoses presenting to VISS hospitals. However, as for CFS death data, the number of reports in each drug category was small and, consequently, these findings are tenuous.

### ***Alcohol***

Alcohol (taken singly) was the most prominent of the other accidental poisoning agents. It was reported as the primary cause of 16.7% of accidental poisoning fatalities and 10.1% of accidental poisoning VISS emergency department presentations. Additional information was only given in one-third of the case narratives on fatalities and in all of these cases the victim was described as an alcoholic or a person with a history of alcohol abuse. Information in the VISS narratives was also limited. The circumstances reported in one-half of the cases were: binge drinking at parties; drinking in response to domestic problems and feelings of depression; and a personal history of alcohol abuse. The quality of information in case narratives needs to be improved, including initiatives to improve the consistency of reporting the circumstances of the abuse of alcohol, BAC readings and any predisposing factors.

### ***Foodstuffs and plants***

A range of foodstuffs and poisonous plants (most frequently mushrooms and other fungi) were implicated in a small proportion of VIMD hospital admissions (3.0%) and VISS emergency department presentations (5%) for accidental poisoning.

### ***Other agents***

Cleansing and polishing agents contributed a significant proportion of less serious injuries (8.1% of VISS emergency department presentations). In a small number of VISS cases the victims mistook chemical cleaning substances for beverages (*Kemdex* solution for milk, lemon scented bleach for lemon drink, carpet cleaner for lime soda, industrial window cleaner stored in a lemonade bottle for lemonade, oleander fluid for wine). Householders should avoid decanting cleaning agents into drink bottles and store all cleaning agents securely, away from sinks and bottles of drink. Manufacturers should not perfume or colour cleaning agents in ways that increase the risk of householders (especially older householders) confusing cleaning products with beverages.

### *Age factors*

Women aged 40 years or older were at higher risk of accidental poisoning death whereas younger women appeared to be at higher risk of hospital admission and emergency department presentation for accidental poisoning. The same pattern was evident for suicide and self inflicted injury and requires further investigation.

### *Other contributory factors*

Contributory factors to accidental poisoning were not well or consistently reported in the one-line narratives in the Coroners' Facilitation System but a history of drug abuse or chronic mental or physical illnesses appeared to be predisposing factors. Just over one-half of the accidental poisoning cases on the VISS databases appeared to be deliberate self poisoning with drugs and alcohol and highlight the difficulty of assigning self poisoning cases to intentional or accidental injury classifications.

## **Recommendations**

The recommendations relating to self-poisoning by drug overdose (intentional and accidental) are in the Suicide and self-inflicted injury chapter (Chapter 9).

### **Strategies and countermeasures**

- Discourage manufacturers of cleaning products from adding perfumes and colours to cleaning agents that increase the risk of users confusing cleaning products with beverages.
- Educate householders to avoid decanting cleaning agents into drink bottles and to store all cleaning agents securely, away from sinks and separate from storage areas used for bottles of drink.

### **Surveillance, research and investigations**

- Develop definitions (and guidelines for their application) for accidental and self-inflicted poisoning to assist the consistent classification of cases in surveillance databases.
- Improve the content of one-line narratives in injury surveillance systems so that the specific poisoning agents (including BAC reading for alcohol-related deaths), circumstances, predisposing and contributory factors are consistently reported.
- Investigate the different age-related pattern for self-poisoning deaths (intentional and accidental) compared to hospitalisations and emergency department presentations for self-poisoning.

## 12. HIT/STRUCK/CRUSHED INJURY

Hit/struck/crushed injuries were rarely fatal. They were a middle-ranked cause of more serious injury (hospital admissions and emergency department presentations) but accounted for a sizeable proportion of GP presentations (16.2%) (Table 12:1).

- At all levels of severity, except fatalities, the victim striking against or being struck unintentionally by objects or persons most frequently caused hit/struck/crushed injuries.
- The two fatalities were caused by falling objects, which were also prominently involved in emergency department presentations, causing approximately one-third of injuries at that level of severity.

**Table 12:1 Causes of hit/struck/crush injury among adult women (age >15 years) that occurred in the home, at all levels of severity**

Hit/struck/crushed E-code breakdown (E916-E918)	Deaths		Hospital admissions		Hospital E.D. Presentations <sup>a</sup>		GP presentations	
	<i>n</i> =2 Rate: 0.02/100 000 Rank: 9		<i>n</i> =546 Rate: n/a Rank: 5		<i>n</i> =498 Rate: n/a Rank: 5		<i>n</i> =104 Rate: n/a Rank: 3	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Striking against or struck by objects or persons			366	67.0	175	35.2	71	68.3
Struck by falling object	2	100.0	75	13.8	148	29.7	18	17.3
Caught in or between objects			105	19.2	103	20.7	12	11.5
Striking against or by objects or persons in sports					16	3.2	3	2.9
Unspecified cause					17	3.4		
Wrongly classified					39	7.8		
<b>Total</b>	<b>2</b>	<b>100.0</b>	<b>546</b>	<b>100.0</b>	<b>498</b>	<b>100.0</b>	<b>104</b>	<b>100.0</b>

*Note:* (a) Because VISS data are not ICD9E-coded for cause of injury, the closest equivalent ISIS mechanism of injury code, with some exclusions, was used to extract hit/struck/crushed cases. The finer E-code breakdown was estimated from re-coding a sample of cases (all admissions and just over one-half of the non-admitted cases) and scaling up the proportions.

*Sources:* Death data: Victorian Coroners' Facilitation System (CFS), 1989-90 to 1993-94 (5 years)  
Hospital admissions data: Victorian Inpatient Minimum Database, (VIMD) 1987-94 (7 years), public hospitals  
Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), four hospitals 1991-1995 (various periods)  
General Practitioner presentations data:-Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-95 (1 year)

### 12.1 DEATHS

CFS (*n*=2, mean annual rate 0.02/100 000, rank: 6)

#### 12.1.1 The size of the problem

There were only two deaths in the five-year period 1989-90 to 1993-94, one victim was struck by the limb of a tree and the other by a wardrobe.

## **12.2 HOSPITAL ADMISSIONS**

VIMD ( $n=546$ , mean annual rate  $n/a$ , rank: 9)

### **12.2.1 The size of the problem**

Hit/struck/crush injuries were a minor cause of home injury hospital admissions accounting for 2.4% of home injury cases on the VIMD database. The VIMD recorded 546 adult female hit/struck/crushed home injury cases over the 7-year data collection period (annual average, 78 cases). The frequency of hospital admissions for hit/struck/crushed injuries is underestimated on VIMD because only approximately two-fifths (41.5%) of all hit/struck/crushed cases on the database ( $n = 3,414$ ) were coded for location of injury. In nearly two-fifths (38.5%) of coded cases the home was the place of occurrence of the injury. If the coded cases are assumed to be a representative sample of all adult female injury hospitalisations for hit/struck/crushed injuries (and this could not be checked) then the annual incidence of adult female hospitalisations for hit/struck/crushed injuries occurred in the home would be in the vicinity of 187 cases.

### **12.2.2 Cause of hospitalisations**

As shown in Table 12:1, approximately two-thirds (67.0%) of the injuries were caused by the victim striking against or being struck by an object or person. The other major causes were being 'caught in or between objects' (caught, crushed, jammed or pinched - 9.2%) and 'struck by falling object' (13.8%). There are no case narratives in the VIMD system to provide specific information on these incidents. The analysis of the small number of hospitalised cases on the VISS system did not assist in identifying any patterns in the circumstances of the injuries (see below).

### **12.2.3 Age factors**

Age-related injury rates could not be calculated because of the poor reporting of place of injury. However, women aged 60 years and older appear to be at higher risk of hit/struck/crush injuries. They accounted for 54.8% of hit/struck/crush hospital admissions, yet comprised only 22.1% of the mean adult female population in Victoria over the VIMD data collection period. Risk also appeared to increase with age and was most pronounced among the oldest group of women. Women aged 80 years and older experienced 22.0% of the hit/struck/crush injuries but comprised only 3.9% of the Victorian population in the VIMD data collection period.

### **12.2.4 Nature of injury**

The most frequently reported injuries were: open wounds (39.9% of reports), fractures (26.5%) and bruises/haematoma (9.5%). More than one injury can be reported per case, the mean number of reports per case was 1.2.

## **12.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)**

VISS ( $n=498$ , mean annual rate:  $n/a$ , rank: 5)

### **12.3.1 The size of the problem**

Hit/struck/crushed injury accounted for 5.5% of hospital emergency department presentations and was a middle-ranked cause of adult female emergency department presentations for home injury.

### **12.3.2 Causes of hit/struck/crushed injury presentations**

Because VISS data are not ICD9E-coded for cause of injury, the closest equivalent ISIS mechanism of injury code with some exclusions was used to select hit/struck/crushed cases from the VISS database. The finer E-code breakdown was estimated by manually coding a sample of case narratives (all admissions and randomly selected pages of non-admitted cases). The groupings of narratives (61.4% sample) were subjected to a more detailed analysis to elicit detailed information on the cause of injury and to identify any differences between the circumstances of admitted and non-admitted cases (table 12:2)

- More than one-third (34.8%) of selected hit/struck/crushed injuries occurred when the victim struck against or was struck by another person or an object (Table 12:2). Over one-quarter (25.7%) of these injuries occurred because of contact with another person, usually during playing or ‘mucking around’. A diverse range of objects were involved in the remaining cases, the more prominent of which were doors (11% of total cases, mostly slamming against victim), objects, e.g., stones, pieces of wood and wire flung from lawn mowers and whipper snippers (8%); and hammer blows to the user’s finger or hand (6%).
- Falling objects caused approximately three-tenths (29.1%) of selected hit/struck/crushed injuries. Items of furniture (including beds, drawers, tables, chairs or stools and wardrobes or cupboards) were most prominently involved, accounting for about one-quarter (23.6%) of ‘struck by falling object’ injuries. A wide variety of objects caused the remainder of these injuries.
- Crushing injuries, responsible for approximately one-fifth (21.3%) of selected hit/struck/crushed injuries, most frequently involved doors, which were involved in 40.0% of crushing injuries.
- All but one of the sports-related selected ‘struck against or by’ injuries (during informal backyard games) were caused when a ball (cricket ball, basketball, football or golf ball) hit the victim. The remaining case was caused when the victim bumped into another person when playing football.
- A greater proportion of struck by falling objects and crushing injury cases required hospital admission than did striking against or struck by cases
- There was no discernible pattern of causes in hospital admissions, perhaps because of the small number of cases. Two cases were caused by collisions with persons and a number of different objects were involved in the other thirty correctly classified cases, none of which predominated.

**Table 12:2 Causes of hit/struck/crush injuries derived from VISS case narratives, presentations and admissions**

Causes of injury (ICD9 E916-E918)	VISS Admissions (all cases)		VISS Non-admissions (58.3% sample)		Selected cases (61.4% sample)		All cases (Scaled up in correct proportion) n=498	
	n = 35		n = 247		n = 282 <sup>b</sup>		n = 498	
	n	%	n	%	n	%	n	%
Striking against or struck against by objects or persons	14	40.0	86	34.8	100	35.4	175	35.2
Struck by falling object	6	17.1	76	30.8	82	29.1	148	29.7
Caught in or between objects	11	31.4	49	19.8	60	21.3	103	20.7
Striking against or struck against by objects or persons <i>in sports</i>	1	2.9	8	3.2	9	3.2	16	3.2
Unspecified cause			9	3.7	9	3.2	17	3.4
Wrongly classified (in electronic conversion or in original coding)	3	8.6	19	7.7	22	7.8	39	7.8
<b>TOTAL</b>	<b>35</b>	<b>100.0</b>	<b>247</b>	<b>100.0</b>	<b>282</b>	<b>100.0</b>	<b>498</b>	<b>100.0</b>
<i>Note:</i>	(a) Because VISS data is not E-coded, the ISIS mechanism of injury code, with some exclusions, was used to extract hit/struck/crushed cases approximating the ICD 9 E code for hit, struck, crushed injuries. The finer E-code breakdown was estimated from re-coding a sample of cases, all admissions and just over one-half (53.3%) of the non-admitted cases.							
	(b) Hospital admissions are over-represented in the sample of cases selected for analysis.							
<i>Source:</i>	Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods)							

The remainder of the analysis is based on the routine output of the VISS database. The subset (n=498) includes the wrongly classified cases (estimated to be 7.8% of dataset) because these cases could not be removed electronically from the dataset.

### 12.3.3 Age of injured women

Age-related injury rates could not be calculated because population denominator data for the VISS hospital catchment areas are not available. However, if Victorian population data is used for comparison it would appear that hit/struck/crushed injuries over-represent women aged 20-24 years (who comprised 10.3% of the Victorian population in the years covered by the VISS database, yet contributed 16.3% of hit/struck/crushed injuries) and women aged 60 years and older (who comprised 9.4% of the Victorian population yet contributed 22.1% of hit/struck/crushed injuries).

### 12.3.4 Time of injury

- The weekend was the peak time for presentations for hit/struck/crushed home injuries, accounting for 40.0% of emergency department presentations for this cause (the expected proportion if injuries on weekends if they were evenly distributed across the week is 28.6%).

- With the exception of February and May, the summer and autumn months - December, January, March and April - were the peak months for hit/struck/crushed injuries, accounting for 42.0% of injuries (the expected proportion for these four months if injuries were spread evenly across the year is 33.3%).

### **12.3.5 Place of occurrence (location) of injury**

Hit/struck/crushed injuries mostly occurred in the living/sleeping areas (48.4%) and the garden/garage/yard (41.0%)

### **12.3.6 Activity being undertaken at time of injury**

Hit/struck/crushed injuries mostly occurred when women were participating in:

- ‘other leisure /recreation’ (39.6% but this code is used as a default code in the system);
- gardening (9.6%);
- playing or general activity (9.2%);
- ‘other’ maintenance (9.6%);
- do-it-yourself maintenance - not vehicle (5.4%);
- ‘other’ household activity (5.2%);
- cleaning (5.0%); and
- moving furniture (3.8%)

### **12.3.7 Nature of injury and body part injured**

The most frequently reported injuries were:

- bruising/haematoma (22.9% of reports, mostly foot NEC, toe, finger and hand NEC);
- cuts and lacerations (22.6% of reports, mostly to finger, face/cheek/forehead/scalp and lower leg NEC);
- inflammation/swelling/oedema/pain (13.4% of reports, mostly to the finger, foot, face/cheek/forehead/scalp and hand NEC); and
- fractures (13.0% of reports, mostly finger, toe and nose).

### **12.3.8 Breakdown factors - what went wrong**

More than one factor may be reported per case. The factors most implicated in hit/struck/crushed injuries were:

- adult other than victim (9.9% of reports);
- doors, not specified (6.2%);

- child other than victim (5.4%);
- injured person (5.2%);
- wood items (3.4%);
- cabinets/racks/room dividers and shelves NEC (2.9%);
- lawn mowers - not specified (2.9%);
- dogs (2.3%);
- sticks/branch/tree (2.0%);
- hammers/sledges/mallets - not powered (1.8%); and
- trailers/horse floats (1.6%).

### **12.3.9 Disposal of patients**

Most (94.6%) of hit/struck/crushed cases required treatment, 6.6% required hospital admission:

- treated, no referral (34.7%)
- treated, referred to O.P.D. (7.2%)
- treated, referred to GP (22.2%)
- other referral (2.2%)
- casualty review (21.1%)
- admissions (6.6%: short stay ward observation (1.0%) admitted to short stay ward or inpatient ward (5.6%))
- transferred (0.4%)

## **12.4 GENERAL PRACTICE PRESENTATIONS**

ELVIS (n=104, mean annual rate: n/a, rank: 3)

### **12.4.1 The size of the problem**

Hit/struck/crushed injuries were the third-highest ranked 16.2% cause of ELVIS GP presentations.

### **12.4.2 Causes of injuries**

As shown in Table 12:2, over two-thirds (68.3%) of these injuries were caused by the victim 'striking against or being struck by an object or person'.

The analysis of all 104 hit/struck/crushed one-line case narratives revealed that:

- Most (87.3%) of the 71 'striking against or by objects or persons' cases involved objects, the most prominent of the 23 objects mentioned were pieces of furniture (26.8% of 'striking against/by' cases) and doors or door frames (16.9%)
- The 18 cases of 'struck by falling objects' involved 16 different objects as diverse as heavy metal, an oven door and a typewriter
- There were eight different objects involved in the 12 crushing injuries ('caught in or between objects'). Doors jams (involving fingers, arms and legs) predominated, accounting for five (41.6%) of the crushing injuries.
- The three sports injuries were in backyard games: play fighting, basketball and football.

#### **12.4.3 Body parts injured**

The body parts injured in hit/cut/crushed cases were:

- lower limb (46.2%, mostly lower leg, foot and toe);
- upper limb (34.6% of cases, predominantly fingers);
- head and face (11.5%); and
- trunk (5.8%).

#### **12.4.4 Nature of injuries**

The most common injuries were bruising (38.5% of cases) and lacerations (19.2%)

#### **12.4.5 Disposal of patients**

Just over four-fifths (83.7%) of hit/struck/crushed patients required treatment:

- treated, no referral (41.4%)
- referred to specialist (1.9%)
- other referral (2.9%)
- admitted to hospital (1.9%)
- re-appointment (21.2%)
- re-appointment/investigation (14.4%).

## **Discussion and recommendations**

Hit/struck/crushed injuries were rarely fatal. Although these injuries were a middle-ranked cause of hospital admissions and emergency department presentations, they accounted for only a small proportion of home injuries at each of these levels (2.4% and 5.5% respectively). They were a more prominent cause of minor injuries, accounting for 16.2% of ELVIS GP presentations. It is estimated from projecting available data that 190 women are admitted to hospital each year in Victoria for hit/struck/crushed injuries that occur in the home. The annual frequency of emergency department and GP presentations could not be estimated from the available data. Older women (women aged  $\geq 60$  years) appeared to be more at risk of hit/struck/crushed injuries at all levels of severity

### ***Hit by/struck against injuries***

Overall, most hit/struck/crushed injuries occurred when the victim was doing chores around the house and in the yard and garden. The analyses of the CFS, VISS and ELVIS case narratives revealed that a large number of objects were implicated in these injuries. For example, there were 26 different objects involved in the 56 'striking against/struck by' injury cases on the VISS database (excluding cases involving persons and animals).

Doors (hitting victims), motor mowers or whipper snippers (kicking up debris onto users or bystanders) and hammers (mainly hitting the user's finger or hand) were the objects most frequently involved in VISS injury cases (although the number of reports in each grouping was small). Items of furniture (stools, chairs, coffee tables, beds, couches, cupboards and benches) and doors were the objects most frequently involved in 'striking against/struck by' injury cases presenting to GPs.

### ***Struck by falling objects***

Falling objects caused the two deaths recorded on the CFS: a tree limb and a wardrobe. Household furniture items (beds, drawers, tables, wardrobes and cupboards and chairs and stools) were also the most prominent of the 'struck by falling object' cases that presented to VISS hospital emergency department and ELVIS General Practitioners. Information on what objects were involved in 'struck by falling object' cases for VIMD hospital admissions is not available and there were only six hospital admissions involving a variety of objects in VISS data. Items of furniture were the most prominent of the falling objects for VISS emergency department non-admissions, the heavier furniture items causing injury when they were being moved.

### ***Crushing injuries***

Door jam injuries (involving both swing and sliding doors) were the most frequent 'caught between or in' injuries. The analysis of VISS hospital emergency department narratives showed that a variety of doors were involved e.g. room, oven, cupboard, shower and car but in ELVIS GP narratives room and entry doors were most commonly implicated. The closing, not the hinge, side of household doors appears to be the problem for adults (in contrast to children's door jam injuries).

### *Type of injuries*

Open wounds and fractures were the most frequent causes of hospital admissions. Bruising and cuts and lacerations (to the foot, toe, finger, hand and face) predominated in VISS emergency department and ELVIS General Practitioner presentations.

### **Recommendations**

#### **Strategies and countermeasures**

Educate householders to implement the following safety measures:

- Install door stops and door closures on room and entry doors to prevent door-jam injuries.
- Fix heavy wardrobes, bookshelves and wall units to walls.
- Only move heavy items (wardrobes, wall units and shelving systems) if trained, and use special moving equipment as appropriate
- To prevent injuries from debris thrown up by lawnmowers:
  - clear area of all debris before commencing mowing
  - -allow no bystanders or helpers (including people gardening) around the area during mowing
  - wear safety equipment (goggles, ear muffs, gloves, heavy clothing and boots).
  - *(see also recommendations to prevent cutting and piercing injuries)*
- To prevent hammer-related injuries:
  - wear goggles and gloves
  - make sure hammer head is not chipped or burred
  - strike a hammer blow squarely, with the striking face of the hammer parallel to the surface being struck
  - use only the striking face of the hammer, never the side or flat of the hammer.

## 12.5 REFERENCES

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### 13. FIRE, BURN AND SCALD INJURY

- Fire, burn and scald injuries were a middle-ranked cause of adult female home injuries at all levels of severity (table 7:1).
- The predominant cause of death was fire and flames, whereas hot substances (hot water, fat and oil, hot drinks and steam) and hot objects caused most injuries at the other levels of severity (table 13:1).

**Table 13:1 Causes of fire/burn/scald injury among adult women (aged ≥ 15 years) that occurred in the home, at all levels of severity**

Fire/burns/scalds E-code breakdown: E890-899; E924	Deaths n=48 Rate: 0.6/100 000 Rank: 4		Hospital admissions n=470 Rate: n/a Rank: 6		Hospital E.D. presentations <sup>a</sup> n=353 Rate: n/a Rank: 7		GP presentations n=38 Rate: n/a Rank: 6	
	n	%	n	%	n	%	n	%
Fire and flames								
- conflagration in private dwelling	5	10.4	31	6.7	19	5.4		
- conflagration in other and unspecified buildings/structures			6	1.2				
- by ignition of clothing	6	12.5	26	5.7	4	1.1		
- by ignition of highly inflammable material - fuels, fat (with ignition of clothing)			28	6.0	23	6.5		
- by burning by controlled fire (heating ) in private dwelling	4	8.3	20	4.3			1	2.6
-by burning by controlled fire in other and unspecified building/structure			4	0.8				
- by burning by controlled fire not in building (bonfire, trashfire)			2	0.4			1	2.6
- by other specified fire/flames (e.g. burning bedclothes, burning by cigarettes/matches, room fires NOS)	25	52.1	10	2.1	16	4.5	1	2.6
- unspecified	1	2.1	23	4.9	3	0.9	1	2.6
<b>Sub-total</b>	<b>41</b>	<b>85.4</b>	<b>150</b>	<b>32.1</b>	<b>65</b>	<b>18.4</b>	<b>4</b>	<b>10.4</b>
Hot substances/objects								
- hot liquids/vapours (steam)	7	14.6	241	51.1	178	50.4	19	50.0
- caustic/corrosive substances			6	1.3	42	11.9	2	5.3
-other hot object			66	14.0	55	15.6	11	29.0
<b>Sub-total</b>	<b>7</b>	<b>14.6</b>	<b>313</b>	<b>66.4</b>	<b>275</b>	<b>77.9</b>	<b>32</b>	<b>84.3</b>
Unspecified cause/missing data/wrongly classified cases			7	1.5	13	3.7	2	5.3
<b>Total</b>	<b>48</b>	<b>100.0</b>	<b>470</b>	<b>100.0</b>	<b>353</b>	<b>100.0</b>	<b>38</b>	<b>100.0</b>
<i>Note</i>	(a) Because VISS data are not classified for cause of death using the ICD9E-coding system, the available ISIS mechanism, breakdown, group classification and factors codes, with some inclusions and exclusions, were used to electronically extract fire/burns/scalds cases that most closely approximated the ICD9E-codes for fire/burn/scald injury. Information in case narratives was then used to manually classify cases into the finer E-code breakdown codes.							
<i>Sources:</i>	Death data: Victorian Coroners' Facilitation System (CFS), 1989-90 to 1993-94 (5 years) Hospital admissions : Victorian Inpatient Minimum Database, (VIMD) 1987-94 (7 years), public hospitals Hospital emergency department presentations: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods) General Practitioner presentations data:-Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-95 (1 year from catchment area of Latrobe Regional Hospital)							

## 13.1 DEATHS

CFS ( $n= 48$ , mean annual rate: 0.6 per 100 000, rank: 4)

### 13.1.1 The size of the problem

Fire/burns/scald injuries were the fourth-highest ranked cause of injury deaths accounting for 6.0% of all adult female home injury deaths (an average of 9-10 deaths per year recorded on the CFS in the five-year period 1989-1994)

### 13.1.2 Causes of fire/burn/scald deaths

Table 13:1 shows the breakdown of fire/burn/scald fatalities.

- More than four-fifths (85.4%) of the fire/burns/scald deaths were caused by fire and flames. Three-fifths (60.9%) of these cases (52.1% of all fire/burns/scalds) were classified under 'accidents caused by other specified fire and flames' and were mainly caused by unextinguished cigarettes and fire in rooms associated with electrical faults and equipment.
- Other major causes of death by fire and flames were: ignition of clothing (12.5%, mainly ignited by flame or heat from cooking stove, heating appliances and cigarettes); fires in private dwellings (10.4%, predominantly asphyxia from smoke inhalation); and controlled fires (8.3%, mainly involving a heater or radiator),
- The deaths from contact with hot objects and substances (14.6%) were all scalds, all but one from hot water when the victim was showering or bathing.

### *Products involved in fire/burn/scald deaths*

The one-line case narratives for all fire/burns/scald deaths were analysed to determine the products causing the ignition of fires or causing the scalds. As shown in Table.13: 2, the products most frequently involved in fire/burn/scald deaths were:

- smoking-related products-cigarettes or matches (in one-third of these cases alcohol was mentioned as a contributory factor);
- hot water (all when victims were showering or bathing);
- electric blankets (see note in table), household stoves and radiators or heaters.

Three of the hot water scald victims were reported to have suffered a seizure (identified as epileptic in two cases) when showering or bathing.

**Table 13:2 Consumer products identified in case narratives as involved in fire/burn/scald deaths in the home among women (aged ≥ 15 years).**

<b>Consumer products<sup>a</sup></b>	<b>Frequency <i>n</i>=48</b>	<b>Proportion %</b>
Smoking-related products- cigarettes or matches	11	22.9
Hot water (shower or bath scald)	6	12.5
Electric blankets <sup>b</sup>	5	10.4
Cooking stove	5	10.4
Radiator or heater	4	8.3
Faulty electric house wiring	2	4.2
Other single products: radio, toaster, pot belly stove, open fire, candle, fan, soup scald	7	14.7
Arson	1	2.1
Unknown cause	7	14.5
<b>Total</b>	<b>48</b>	<b>100.0</b>

*Notes:* (a) in eight cases the cause of the fire/burn is given as probable rather than definite  
(b) in two cases there is an alternative cause of the fire proposed, a television and a bedside lamp

*Source:* Victorian Coroners' Facilitation System, 1989-90 to 1993-94 (5 years)

### 13.1.3 Rates at different ages

In general, women aged 65 years and older were the highest risk group for home fire/burn/scald deaths and the risk increased with age. The crude mean death rates per 100 000 for fire/burns/scalds for women aged 65-69, 70-74 and 80+ years were, respectively, approximately two-and-a-half, four-and-a-half and five times the fire/burns/scalds all-age death rate for adult females (rate ratios 2.3, 4.7 and 4.8).

## 13.2 HOSPITAL ADMISSIONS

VIMD (*n*=470, mean annual rate: *n*/*a*; rank: 6)

### 13.2.1 The size of the problem

Burns and scalds accounted for a small proportion (2.0%) of VIMD hospital admissions for home injury and were the sixth-highest cause of admissions. The VIMD recorded 470 adult female home fire/burn/scald cases over the 7-year data collection period (annual average, 67 cases). However, less than one-half (44.3%) of all burn and scald cases on VIMD (*n*=1 414) were coded for location of injury. The home was the place where the injury occurred in three-quarter (75.1%) of coded cases. If the coded cases are assumed to be a representative sample of all adult female injury hospitalisations for fire/burns/scalds (and this could not be checked) then the annual incidence of adult female hospitalisations for burns and scalds that occurred in the home would be in the vicinity of 152 cases.

### **13.2.2 Causes of fire/burns/scald hospital admissions**

Over one-half (51.1%) of fire/burns/scald injuries were caused by scalds from hot liquids and vapours including steam. The VIMD does not provide any further information on the products involved in these scalds but the analysis of VISS hospital emergency department data for cases admitted to hospital suggests that these scald injuries would most likely be caused by hot water or cooking oil (see below). The other major causes were burns/smoke/fume inhalation from fire and flames (32.1%, mainly caused by house fires, ignition of clothing from a heating source and ignited fuels and fats and burning by a heating source) and burns from hot objects (14.3%, no other details given) (Table 13:2)

### **13.2.3 Age-related factors**

Age-related injury rates could not be calculated because the inconsistent reporting of place of occurrence (location) of injury prevented the calculation of population denominators. However, women aged 60 years and older appeared to be more at risk. This age group accounted for 46.0% of the home fire/burn/scalds hospital admissions, yet made up only 22.0% of the Victorian adult female population over the VIMD surveillance period. Within this older group risk increased with age and was most pronounced among the oldest group of women. Women aged 70 years and older accounted for 17.2% of VIMD admissions, yet comprised only 3.9% of the Victorian adult female population.

### **13.2.4 Nature of injury**

As would be expected 94.1% of injury reports were burns, 2.1 % were poisoning. There was an average of 2.1 injury reports per case.

## **13.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)**

VISS ( $n=353$ ; rate n/a.; rank: 7)

### **13.3.1 The size of the problem**

Burns and scalds were a lower ranking cause of VISS hospital emergency department presentations (admissions and non-admissions) accounting for a small proportion (4.3%) of adult female home injury presentations.

### **13.3.2 Causes of fire/burn/scald injuries**

Because VISS data are not classified for cause of death under the ICD9E-coding system, the ISIS mechanism, breakdown, group classification and factors codes, with some inclusions and exclusions, were used to electronically extract fire/burns/scalds cases that most closely approximated the ICD9E-codes for fire/burn/scald injury. Information in case narratives was then used to manually classify cases into the finer E-code breakdown codes.

Table 13:3 shows a more detailed breakdown of fire/burn/scald injury. Burns and scalds from hot substances and objects accounted for approximately four-fifths (77.9%) of all fire/burns/scalds. A more detailed examination of the case narratives in this grouping revealed that the major causes of these injuries were:

- hot liquids and vapours (50.4% of all cases)
  - *hot water* (19.2% of all cases, which mainly occurred when the victim was using boiling water to make hot drinks or during cooking)
  - *hot cooking oil or fat* spills, splashes and spits (15.6% of all cases)
  - *hot beverage spills*- coffee, tea, soup (10.6% of all cases)
  - *steam*, (5.4% of all cases, mainly when the victim was lifting plastic wrap off microwaved food and lids from casseroles, saucepans and pressure cookers);
- hot objects (15.6% of all cases), predominantly cookware (5.7%) and stoves (4.2%); and
- caustic and corrosive substances (11.9% of all cases), predominantly cleaners/disinfectants (2.8% of all cases) and bleaches, ammonia or chlorine (3.1% of all cases).

Over one-half (54.8%) of VISS hospital admissions were for scalds by hot liquids and vapours. However, a higher proportion of women injured by fire and flames, than women injured by hot substances, objects, caustics, corrosives and steam required hospital admission (18.5% versus 6.1%).

**Table 13:3 Causes of fire/burn/scald injuries based on an analysis of VISS case narratives, admissions and non-admissions**

Causes (from analysis of case narratives) <sup>a</sup>	Admissions (all cases) <i>n</i> = 31		Non-admissions (all cases) <i>n</i> = 322 <sup>b</sup>		Total <i>n</i> = 353	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Accidents caused by fire and flames						
- conflagrations in private dwellings	5	16.1	14	4.3	19	5.4
- ignition of clothing	2	6.5	2	0.6	4	1.1
- ignition of highly inflammable material (fuels, fat) with ignition of clothing)	3	9.7	20	6.2	23	6.5
- other specified fire/flames			16	5.0	16	4.5
- other/unspecified	2	6.5	1	0.3	3	0.9
Sub total	12	38.8	53	16.4	65	18.4
Accidents caused by hot substance or object, caustic or corrosive material, and steam						
- hot liquids and vapours (include. steam)	17	54.8	161	50.0	178	50.4
- caustic and corrosive substances			42	13.0	42	11.9
- other hot object			55	17.1	55	15.6
Subtotal	17	54.8	258	80.1	275	77.9
Unspecified cause	1	3.2	6	1.9	7	2.0
Wrongly classified	1	3.2	5	1.6	6	1.7
<b>Total</b>	<b>31</b>	<b>100.0</b>	<b>322</b>	<b>100.0</b>	<b>353</b>	<b>100.0</b>
<p><i>Note</i> (a) Because VISS data are not classified for cause of death using the ICD9E-coding system, the available ISIS mechanism, breakdown, group classification and factors codes, with some inclusions and exclusions, were used to electronically extract fire/burns/scalds cases that most closely approximated the ICD9E-codes for fire/burn/scald injury. Information in case narratives was then used to manually classify cases into the finer E-code breakdown codes.</p> <p>(b) includes one intentional case which was not identifiable from case narratives and could not be manually removed</p> <p><i>Source:</i> Hospital ED presentations data: Victorian Injury Surveillance System (VISS), four hospitals 1991-1995 (various periods)</p>						

The remainder of the results reported in this section are based on the routine ISIS coded output for VISS using the electronically converted fire/burns/scalds dataset ( $n=353$ ), including the wrongly classified cases which comprised 1.7% of cases.

### **13.3.3 Age-related factors**

Burns and scalds appeared to over-represent women aged 39 years and under (particularly women aged 20-24 years). Under 40 year-olds accounted for two-thirds (66.7%) of fire/burns/scald injury presentations to VISS hospital emergency departments but comprised one-half (50.2%) of the Victorian population over the period covered by the VISS database. However, the age distribution of the population in the VISS hospital catchment areas is not known.

### **13.3.4 Time of injury**

Fire/burns/scalds hospital emergency department attendances were higher on Saturday (16.2%), Sundays (16.5%) and Tuesdays (17.9%). If injuries were evenly distributed, 14.3% of cases would occur each day.

### **13.3.5 Place of occurrence (location)**

Fire/burns/scalds mostly occurred in the kitchen (59.6%) and the living/sleeping area (25.6%).

### **13.3.6 Activity being undertaken at the time of injury**

Most fire/burns/scalds occurred during cooking (50.9%) and 'other' leisure/recreation activities (14.8%) (note that the system defaults to the latter code).

### **13.3.7 Breakdown factors - what went wrong**

The most frequently reported breakdown factors were: cookware (11.6%), cooking oils/fats (11.1%), hot water (7.8%), the injured person's own actions (6.5%), ovens and ranges and parts thereof (5.6%) and flame/fire/smoke (3.8%).

### **13.3.8 Nature of injury and body part injured**

More than one injury can be reported per case. Approximately three-quarters (76.5%) of the reported injuries associated with fire/burns/scalds (more than one report could be given per case) were partial thickness burns (mostly to the hand, finger, forearm and face/cheek/forehead /scalp). Other injuries included full thickness burns (7.2%, predominantly to the hand and upper leg) and respiratory difficulty (3.4%).

### **13.3.9 Disposal of patients from emergency department**

Almost all (98.6%) of fire/burns/scalds patients required some treatment, 8.0% required hospital admission:

- treated, no referral (28.7%)
- treated, referred to O.P.D. (8.5%)
- treated, referred to GP (21.0%)

- other referral (2.0%)
- casualty review (29.5%)
- admissions (8.0%, short stay ward observation (0.9%) admitted to short stay ward or inpatient ward (7.1%)
- transferred (0.8%)

## **13.4 GENERAL PRACTICE PRESENTATIONS**

ELVIS ( $n=38$ , mean annual rate: n/a, rank: 6)

### **13.4.1 The size of the problem**

Fire/burns/scald injury accounted for a small proportion (5.9%) of ELVIS GP presentations for adult female home injury and was the sixth-highest ranked cause of GP presentations

### **13.4.2 Causes of fire/burn/scald injuries**

Table 13:1 shows the causes of ELVIS GP presentations for fire/burns/scalds. Most (84.3%) of the injuries were caused by hot substances and objects, predominantly hot liquids and vapours including steam (which accounted for 50.0% of all fire/burns/scalds) and 'other hot objects' (29.0%). A closer analysis of these fire/burns/scald case narratives revealed that:

- six different substances were involved in the 19 fire/burn/scald injuries caused by hot liquids and vapours- boiling water (9 cases-47.4 % of hot liquids/vapours cases), fat/oil (5 cases-26.3% of hot liquid/vapour cases), steam, tea, soup and jam; and
- six different objects were involved fire/burn/scald injuries by hot objects- heater, stove hotplate, baking tray, iron, mower exhaust and curling wand.

### **13.4.3 Nature of fire/burns/scalds injuries**

Most burns (84.2% of cases) were partial thickness; a small proportion (5.3% of cases) was full thickness.

### **13.4.4 Body parts injured**

The body parts injured by fire/burns/scalds were: upper limb (65.8% of cases, mostly to the forearm, hand and finger), lower limb (23.7%, mostly to the foot), head and face (2.6%) and trunk (2.6%).

### **13.4.5 Disposal of fire/burns/scalds patients**

Three-quarters (76.3%) of fire/burns/scalds patients required treatment (treated, no referral 39.5%, re-appointment 36.8%).

## 13.5 DISCUSSION AND RECOMMENDATIONS

Fire, burn and scald injury was a middle-ranked cause of adult female home injury at all levels of severity. On average, 9 to 10 adult women die each year in Victoria from fire, burns and scalds that occur in the home (representing 6.0% of injury deaths recorded on the CFS). Projected from available data, an estimated 150 women are admitted to hospital with fire/burn/scald injuries each year (2.0% of VIMD hospital admissions for injury). Burns and scalds accounted for 4.3% of VISS emergency department presentations and 5.9% of GP presentations. The annual incidence of hospital emergency department and GP presentations could not be estimated from the available data.

A different pattern of causes was evident for fatalities when compared with fire/burns/scald injuries at the other levels of severity. Over four-fifths of the deaths were caused by fire and flames. Scald injuries from hot liquids and vapours, including steam, predominated at the other levels of severity (hospitalisations, emergency department presentations and GP presentations), where they contributed approximately one-half of the fire/burns/scalds cases. However, fire and flame injuries were still a significant cause of hospitalisations, contributing one-third of VIMD hospital admissions. Burns from hot objects were less frequent overall, but contributed a significant proportion of hospitalisations and less severe injuries (14% and 29% respectively). These major causes will be discussed separately because, in general, they require different preventive interventions.

### **Burns and smoke inhalation associated with fire and flames**

House and room fires and ignition of clothing and bedclothes caused deaths due to burns and smoke inhalation. The predominant sources of ignition for fatal fires were smoking products (unextinguished cigarettes and matches) and faulty electricals either house wiring or household items, particularly electric blankets.

Smoking-related products were the predominant ignition source for the fires involving the younger age group (women aged under 65 years), followed by faulty electrical products and wiring. By contrast, only one of the eleven fires started by smoking-related products occurred in the older age group (women aged over 65 years). The main sources of ignition for the fatal fires involving older women (who were the highest risk group for fire-related deaths) were heating sources (radiators, pot belly stove, open fire), cooking stoves (fires from food left unattended, gas left on or clothing catching fire while the victim was cooking) and faulty electric products or wiring.

Similar findings were noted by Elder et al (1996) in a study of fatal dwelling house fires in Scotland. They found that older people were significantly less likely to be cigarette smokers and significantly more likely to be killed by fires caused by faulty or misused electrical items, particularly electric blankets. Electric blankets are also the electrical product most implicated in fire-related deaths for both the younger and older age groups in this study, although a possible alternative ignition source was reported for three of the five fatal fires attributed to them. Overall, alcohol was mentioned as a factor in three fire-related deaths, but was probably inconsistently reported.

The main causes of VIMD hospital admissions for fire and flame burns were: house and outbuilding conflagrations; ignition of clothing; ignition of highly inflammable material (fuels, fat) with ignition of clothing; and burning by controlled fires (sources of heating). The only one of these causes that was not associated with the fatal fires recorded on CFS was ignition of inflammable materials. The VIMD does not give any more information on

sources of ignition and other contributory factors, and the VISS one-line narratives were not useful in establishing causal patterns as there was only a small number of fire and flame hospitalisations on the VISS database. The fire incident statistics for Australia for 1993 and an analysis of fire incidents where smoke alarms were successfully activated (undertaken for the Victorian and Tasmanian Fire Authorities) reveal that the type of material most frequently ignited in house fires (defined as one- and two-family dwellings) is food fat and grease or oil and that the fires usually occur when the fat, grease or oil (or food) catches fire on a cooktop when cooking is left unattended (CSIRO 1995, AFAC 1996).

As noted with fatalities, the analysis of the VIMD hospital admissions data revealed that it is probable that the older age groups (women aged 60 years and older) are more at risk of hospital admission for burns. Elder et al (1996) recommend that more prospective research is needed on elderly house fire victims to establish how often the fire risk was known before the fire incident and the relative importance of risk factors, such as pre-morbid conditions and poor maintenance or misuse of electrical appliances. The authors also recommend that future research should assess the effectiveness of fire prevention strategies, taking into consideration the physical or personal behavioural characteristics that may place some elderly individuals at enhanced risk of fire outbreak or reduce their capacity to detect fire and escape to safety.

## **Interventions-fire and flame injuries**

### *Smoke alarms*

Domestic smoke alarms provide the best first line of defence against injuries (burns and smoke inhalation) from unattended fires in private dwellings. The current Victorian campaign on smoke alarms, led by the Metropolitan Fire Brigade (MFB) and Country Fire Authority (CFA), and supported by other safety organisation, aims to achieve 100 percent penetration in owner-occupied houses. The campaign appears to be 'on track'. The number of households in Melbourne with smoke detectors installed has more than doubled since 1992 from 32.3% (366,600) to 83.8% (1,039,500) in 1998 (ABS Household Safety Survey 1999). Current Victorian legislation requires that a 240V hard wired smoke alarm with back-up battery must be installed in all new homes and substantially renovated dwellings and, since February 1999, that smoke alarms (hard wired or battery operated) must be installed in all existing flats, units and homes. Under the legislation, local government building surveyors and the fire authorities (MFA and CFA) have enforcement responsibilities. There is a \$200 on-the-spot fine for non-compliance or a maximum \$500 fine if the matter is heard in the Magistrate's Court. The fire authorities currently favour community education and incentive schemes over large-scale house inspections and fining systems.

A single purpose lithium smoke alarm battery (estimated to last ten years) is now available and should be promoted in Australia. The widespread use of this battery, in place of short-term multi-purpose batteries, would ensure that longer-term protection is achieved in existing houses and would also decrease the likelihood of non-functioning fitted alarms. Also, their use would reduce the disablement of alarms by householders who remove multi-purpose batteries for other uses. Among the additional design improvements recommended to US manufacturers by a Task Force set up by the U.S. National Centre for Injury Prevention and Control (NCIPC 1997) is a silencing button that would allow people to interrupt a smoke alarm for 15 minutes, to reduce the frustration caused by false alarms activated during cooking.

Victorian fire authorities specially target older people in their smoke alarm campaigns (which included free installation of smoke alarms by fire brigade officers) and for general fire safety education conducted by fire brigade officers (“Retire-Ed”). The written material distributed to older people focuses on the activities and products found to be associated with burn injuries in older people in this study ie. safety in the kitchen, especially when cooking and the safe use and care of heaters and electric blankets. The fire authorities offer a Retire-Ed program free-of-charge to Senior Citizens’ Clubs and other ‘over 50s’ organisations. Consideration should also be given to accessing housebound older people and people with disabilities through local council home care workers. Schmeer et al (1988) report the success of a U.S. outreach burns prevention program for homebound patients (that included installation of smoke detectors), conducted by hospital home-care staff. Similar schemes are starting in some areas of Victoria through local councils, health and welfare agencies and local emergency services.

Door-to-door smoke alarm giveaway schemes have been shown to reduce the annualised fire injury rate by eighty percent and the injury rate per 100 fires by 74 percent in the targeted high fire injury risk area in a controlled trial in Oklahoma City (Mallonee et al 1996) and to reduce injury deaths in a pre-post evaluation study of a campaign run by the Baltimore Fire Department (Hammond & Varas 1990). Both these intensive community-based campaigns successfully engaged high fire-risk (usually low-income) populations e.g. renters, migrants and illegal aliens. The success of Baltimore program was ascribed to the amount of media attention it received which led to heightened awareness and anxiety coupled with a reduced or absent financial barrier, and the need for the target group to engage in a one-time activity (Hammond & Varas 1990). An issue of concern for Victoria that warrants further study, is the recent research by Begg et al (1998, unpublished) that suggests that the mandatory alarm protection laws in Victoria may not have had the predicted positive impact on fire-related mortality and morbidity (which have increased between 1991/2 and 1996/97). The authors raise a number of data-related biases and confounders that may have affected their study results.

Notwithstanding the preference for education over hard-line enforcement of fire alarm legislation in Victoria, it is recommended that the MFB and the CFA trial and evaluate the effectiveness of a local doorstep purchase/free installation smoke alarm scheme in association with a local area survey on smoke alarm compliance in at least one defined area. A systematic door-to-door survey would provide data on non-compliance with the new regulations and, importantly, hard data on the proportion of non-functioning smoke alarms in households (ABS data is self-reported). The initiative could be sponsored to cover the cost of providing free alarms for cases of genuine hardship (e.g. pensioners). Insurance companies also have a role to play. They should uniformly require smoke detectors and fire extinguishers in residential premises as a condition of home insurance (Silverstein 1987). Some companies are giving a lead in this area.

#### *Domestic sprinkler systems and building controls*

The Victorian Building Control Commission (BCC) has commissioned research on the demographic, socioeconomic and other factors associated with deaths and injuries in fires in residential buildings. This 18-month project will review, evaluate and test potential new countermeasures including residential sprinklers and electric current protection devices and make recommendations to the BCC on the potential effectiveness and cost-benefits of the wide application of these and other countermeasures.

Building code regulations in force in other countries that warrant consideration in Victoria include: the requirement for two protective pathways out of every room in the home (one can be by fire brigade ladder through a window); dampers used in vents (triggered by smoke detectors) to stop recirculation of smoke; fire brigade inspection of new wood stoves and fireplaces; the banning or limitation of wood construction of homes in cities; and the mandatory use of chimney sweeps once a year in household with open fires (Schaenman 1993). Also, in the U.K. upholstered furniture cannot be sold for home use if it does not meet stringent open flame and smouldering tests. The equivalent Australian standard is voluntary rather than mandatory.

#### *Fire-safe cigarettes*

The ban on the sale of non-child-resistant cigarette lighters came into effect in Victoria on October 1, 1997. Although this intervention should reduce fires started by young children, our analysis reveals that cigarettes are the most hazardous of the smoking products (and of all products involved in deaths). Information on the involvement of smoking products in burn hospitalisations (through the VIMD database) was not available. Brands of cigarettes burn at different rates, apparently some self extinguish in five minutes but most are deliberately designed to continue burning for 20-45 minutes after the last puff, if left to their own devices (O'Malley 1979).

In the U.S., fires started by dropped cigarettes are estimated to cause more than 1,000 deaths each year. Two federal U.S. studies have established the technical feasibility of producing a cigarette with a reduced likelihood of starting a fire and a validated method to test cigarette brands for this attribute (Brigham & McGuire 1995). These studies pave the way for the development and implementation of a standard for cigarettes that requires them to be fire-safe (self-extinguishing). However, a preliminary report from a research study conducted by the Department of Trade and Industry in Britain (Department of Trade and Industry 1997) indicated that although fire safe cigarettes did give a lower proportion of smouldering ignitions than popular tipped or untipped brands, they still caused ignitions with some types of furniture (those which failed the UK safety regulations on ignition-resistant upholstery). Clearly these product safety issues need to be dealt with in one package. Fire-safe cigarettes would have an added benefit for high-risk bushfire regions where discarded cigarettes may be an ignition source.

#### *Safer electrical appliances*

Faulty house wiring was cited as responsible for two of the ten fatal electrical fires. The electrical products named as the ignition source in the other eight fatal electrical fires were electric blankets (5 cases), a toaster, an electric fan and a radio. Bedside lamps (2 cases) and a television were cited as possible alternative ignition sources for three of the five fires attributed to electric blankets. It is not known if the products were damaged or being misused at the time of the fire. Data on the products involved in burn injury hospitalisations (on VIMD) are not collected but only two of the 352 emergency department presentations (which included 31 admissions) for burns and scalds on the VISS database were caused by fires ignited by faulty electrical products (a hairdryer and a portable heater). Neither of these cases required hospital admission.

The Mistral Gyro Aire Fan was implicated in 109 fires, and the death of two children in Victoria, before it was recalled. The Coronial Report, which covered the 22 fires (including the fatal fire) involving the fan that occurred between 1985 and 1990, described the tardiness of the process of identifying this product as a fire risk by the responsible

authorities. The report mainly attributed the delay in action to the lack of fire surveillance data and formal systems of communication between those responsible for fire and product safety (Victorian Coronial Services 1991). This tragic case underlines the need for the establishment and ongoing monitoring of high quality state and national electronic injury and fire incident surveillance systems in Coroners' Offices and Fire Services.

State and national government departments and agencies have supported the establishment of the Monash University National Centre for Coronial Information (which operates the on-line National Coronial Information System). The NCIS should be linked to the CSIRO-based National Fire Statistics database in Sydney, to enable the early identification of unsafe products. In the U.S., manufacturers must report all products about which they have received reports of associated injury to the U.S. Consumer Product Safety Commission. Similar legislation is recommended for Australia and Victoria. Too often our system of identifying hazardous products has proved to be reactive rather than proactive.

The Office of the Chief Electrical Inspector (OCEI), established in 1994, is responsible for regulating and promoting electrical safety in Victoria. It is now compulsory for Fire Services to notify the OCEI of all electrical products implicated in fires because the previous system of voluntary notification had broken down. The fire authorities are currently overhauling their data collection and data systems to upgrade and streamline surveillance. All agencies that have responsibility for preventing fire-related deaths and injuries should have electronic access to relevant databases (e.g. National Coroners Information System, MFB and CFA databases) and be involved, routinely, in monitoring and sharing of data and information.

Most household electrical appliances are 'prescribed items' ie. they cannot be sold unless they have been approved by one of the State Electrical Approvals Boards. Approved status is only possible where there is a reasonable safety standard against which the appliances can be measured. For example, television sets did not become 'prescribed' until July 1 1997, because until then there was no Australian Standard for televisions in place. All of the appliances implicated in fire-related injuries in this study (electric blankets, electric fan, toaster and bedside lamp) are on the prescribed list. Presumably they conformed to the relevant Australian Standard at the time of sale (except if they predated prescription or the standard was upgraded in the interim) which indicates that they may have developed faults through wear and tear or may have been misused or carelessly used.

The promotion to householders of the safety benefits of installing hard-wired and other safety switches in existing houses to prevent electrocution together with their need to regularly check electrical appliances (particularly electric blankets) and cords for wear and tear should be done in a systematic way. The timing of existing annual campaign to educate consumers to replace smoke alarm batteries corresponds particularly well for electric blanket checks and fire authorities should consider extending the promotional message to "Change Your Clock, Change Your Battery, Check Your Electricals".

#### *Education, warning labels and equipment design changes*

The MFB and CFA have instituted comprehensive fire safety education for children (particularly at primary school level), families, older Victorians, new arrivals to Australia and professional groups, including environmental health and building surveyors, designers and engineers. Home Economics classes at the junior secondary school level provide another avenue for fire-safety education in a teaching environment that closely resembles

the home kitchen. These classes present opportunities for learning safe cooking behaviours (particularly in the safe use of cooking oils and dealing with fat fires), the safe use and care of electrical appliances and the modelling of recommended fire-safety practices (fire escape planning and practice, the installation and correct use of fire blankets and dry powder extinguishers in the kitchen and appropriate first aid for burns).

Resources should be made available to schools to assist students to identify burn (and scald) hazards and solutions. At the more senior schooling levels, this would apply to classes where students are encouraged to take a risk-management approach when designing, planning and executing practical projects (for example, in VCE Materials and Technology-Food and Technology, Design and Development-Food). The HomeSafe Home Page on the Internet (devised and regularly updated by WorkSafe, Western Australia) is a useful resource for students as it encourages a risk identification and assessment approach and offers solutions to a broad range of home injuries.

Other burn prevention interventions suggested in the literature that warrant consideration are:

- requiring warning labels on cooking oils about the danger of serious grease burns to the hand that occur when the cook attempts to move a pan with burning cooking oil (Bill et al 1996); and
- education of older people to reduce the risk of ‘granny gown’ burns ie. the ignition of clothing caused by reaching across a stove (Turner et al 1989). ‘Granny gown’ burns were responsible for 10.7% of fire, burns and scald deaths among women over 65 years of age recorded on the CFS.
- the development of protective sleeves made of fire-resistant material with elasticised wrists (to be promoted particularly to older people and to people with disabilities that affect their manual dexterity and reach); and
- the incorporation of timer cut-out switches in the design of stoves, ovens and electric blankets.

### **Scalds by hot liquids and vapours**

Six of the seven scald injury deaths recorded on CFS were caused when the predominantly elderly victims were bathing or showering (the other was caused by a spilt pot of hot soup). Over one-half of VIMD hospital admissions were for scalds from hot liquids and vapours but the ICD9E-code does not differentiate between types of liquids and steam. VISS emergency department admissions data suggest that hot water (predominantly contacted when bathing) and hot oil splashes and spills are the main causes of the more severe burns and scalds, although the number in the VISS hospital admissions subset was small ( $n=31$ ).

Hot water scalds were the primary cause of VISS emergency department non-admissions but these injuries were predominantly boiling or hot water spills when victims were making hot drinks or cooking (less than 1.0% happened during bathing). This was also the case for GP presentations. Oil and fat splashes and spills during cooking, hot drink spills and steam burns were the other major causes of less severe injuries (VISS hospital emergency department non-admissions and GP presentations).

Epilepsy/fitting was a factor in three of the six scald deaths that were associated with bathing. Pre-burn morbid conditions are not reported in the other Victorian data collection systems but they have been shown to be factors in a number of research studies on fire and burn victims, especially among elderly females (Spitz 1992; Duggan & Quine 1995; Backstein et al 1993). Spitz (1992) investigated a small group of seizure-related hospitalisations for thermal injuries. He reported that epileptic seizure frequency (2-3 times a month) was a risk factor and recommended that this group of people with epilepsy should reduce their bathroom hot water temperature and minimise household activities that bring them into contact with hot objects such as cooking stoves and irons.

Backstein et al (1993) found that in 4.5% of 812 cases admitted to one burns centre in Canada the burn injury was directly related to premorbid disabilities (spinal cord disorders, seizure disorders, diabetes, neurological disorders, syncope, emphysema and obesity). They reported that the seizure disorder patients had subtherapeutic blood levels of anti-seizure medication on admission to hospital. They produced a useful set of burn prevention guidelines for people with disabling conditions that increase their risk of mishaps leading to burns or impair their ability to recognise and physically withdraw from a potential burn stimulus. These are reproduced (with some additions) at the end of the recommendations below.

Similarly, Duggan & Quine (1995) found in a retrospective study of 184 burn hospital admissions to Concorde Hospital in NSW (including intentional and unintentional cases) that preburn morbid conditions were prevalent, especially among female burn admissions. The most frequent conditions were psychiatric disorders (particularly for men), cardiac disease (particularly for women), respiratory diseases, alcohol-related conditions and gastrointestinal diseases. Almost two-thirds of the total burn population in the study were under medical treatment, and over one-half of all patients were taking prescribed medication for one year or more before the burn event. Lewandowski et al (1995) undertook a retrospective study of all patients over the age of 65 years admitted to the Royal Brisbane Hospital Burns Unit between July 1981 and June 1990 ( $n=88$ ). The authors found that 43% of these older burn patients had at least one significant predisposing factor likely to have contributed to their burn injury such as a physical or mental disability or syncope (dizziness). Syncope was commonly associated with scalds and contact burns while cooking.

#### *Reducing the temperature of hot tap water*

The obvious countermeasure to the risk of hot tap water scalds during bathing and showering is to reduce the temperature of hot water. The temperature at bathroom outlets should be reduced to below 50 degrees Celsius in the homes of older people and people with medical conditions or disabilities (e.g. epilepsy) that put them at higher risk of scalds. Lower hot water temperature can be achieved by turning down the thermostat on hot water services or installing devices into hot water systems or taps to control the temperature at bathroom outlets. The current multidimensional Victorian campaign led by Kidsafe, *Hot water burns like fire* (which combines education and legislation) is focussed on families with young children. It should be adapted and extended to cover community living older people, and other high-risk groups.

This Victorian initiative was modelled on successful overseas campaigns where a combination of education and legislation limiting the allowable temperature of hot water at bathroom outlets to 50 degrees Celsius was effective in reducing tap water scalds in children (Erdmann et al 1991). Similar legislation came into effect for new systems in

Victoria in early 1998. However, existing hot water systems and services (that have a 'life' of 10-15 years) still pose a hazard. The community requires ongoing education to alert householders to the risk of hot water scalds (especially high scald-risk groups such as families with young children, older people and people with disabilities). The purpose of campaigns should be to convince them to adjust hot water services to deliver bathroom water at a temperature below 50 degrees Celsius or to install other available safety products to hot water systems or taps.

Katcher (1987) reported from an evaluation of a multimedia injury control program to prevent tap water scalds conducted among two million residents of Wisconsin, that a combination of methods - radio and television messages, utility bill inserts and the provision of free liquid crystal thermometers on request - was more successful than any single method in raising awareness and producing injury prevention behaviour. As a result of this program, thermostats on approximately 20,000 water heaters were lowered from dangerously high levels. The intervention cost \$US 210,000 which covered prime time television and radio commercials, newspaper advertisements, utility bill inserts and 200,000 liquid crystal thermometers (the single highest cost item) and the evaluation. The sustainability of this effect needs to be investigated.

Additional agency would need to be found to extend the current campaign, led by *Kidsafe Victoria*, to assist its delivery older people and people with disabilities that put them at higher risk of scalds. Key agencies that should be involved include state and local government aged care, disability and home help services, home care agencies for people with disabilities, community health centres and community advocacy organisations and foundations servicing older Victorians and people with disabilities (e.g. Epilepsy, Arthritis and Diabetes Foundations and service organisations).

Katcher et al (1989) reported from a randomised controlled trial conducted in Wisconsin that a short intervention by a paediatrician (consisting of handing over an information pamphlet and a one-minute discussion about tap water safety) was effective in getting paediatric clinic clients to lower the setting of their hot water services. Over three-quarters (77.3%) of clinic clients with an accessible hot water service that was delivering water at above scalding temperature turned the thermostat setting down to 50 degrees Celsius (verified by later home visits). This approach could be trialed among high-scald risk groups of older people by General Practitioners, through an interested Division of General Practice.

#### *Provision of bathing aids*

After finding that the very young, old and disabled were at highest risk of burn injuries in a retrospective study of hot water scalds victims admitted to the Mt Vernon Hospital Burns Unit in the UK, Murray (1988) conducted a small follow-up household survey of 60 homes inhabited by people over the age of 70 years. This revealed that over half of the old people did not have adequate bathing aids such as hand rails, and one-third were living in homes where the hot tap-water temperature was greater than 60 degrees C. He recommended that the wider provision of these aids, combined with the installation of thermoscopic mixing valves to deliver hot water to bathroom tap outlets at 43 degrees Celsius, would reduce scalds.

Consideration should be given to the introduction of a building regulation that would require that taps are fitted to the side wall of a shower recess, rather than at the rear. This

change would prevent scalds caused when bathers reach through hot water to adjust the temperature or turn the tap off.

### *Education*

General community education to raise awareness among women of the hazards posed by boiling water, hot oil and steam and to re-enforce the cooking and handling techniques which reduce the risk of burns and scalds appears warranted. MUARC has done the preliminary developmental work on a spill-resistant mug with the aim of reducing scalds from hot drink spills in children (Cassell et al 1995). Further development of the mug requires industry investment or sponsorship. The mug may also be of some value in reducing hot tea and coffee scalds among older people, particularly those with arthritis or other disabilities that reduce dexterity and grip. However, the one-line narratives for VISS emergency department presentations reveal that boiling water is the main culprit in scalds. Scalds to the hands, arms and/or legs usually occur when the victim is pouring hot water from the kettle or pot into a receptacle, or is splashed with hot water during cooking.

Improved consumer education and warning labels (including instructions on safe frying techniques) on cooking oils and frozen products cooked by shallow and deep frying may be effective in reducing hot oil burns. Cooks also need to be educated to routinely lift and tilt saucepan and casserole lids so that steam is released away from, rather than towards, the face and body. The routine use of mitts made of fire-retardant material and the technique of unfolding plastic wrap from steaming microwaved food so that steam escapes away from the cook's face and body should also be promoted. Some of the more expensive brands of saucepans have a steam release function fitted into the lid knob. This innovation should be more widely integrated into the design of saucepans.

### **Burns from hot objects**

There were no deaths from burning by hot objects although one case was reported where a woman collapsed against a heater, which set her clothes on fire. The VIMD does not record details of the objects causing burns (which comprised 14% of burns and scald hospitalisations). VISS data on emergency department non-admissions and the GP data indicate that the women were mostly burnt handling hot cookware (pots, pans, dishes and trays), when they touched hotplates, stoves and ovens when cooking or, to a lesser extent, when they fell onto a heater or fell asleep in front of a heater.

### **Design changes, countermeasures and education**

Improvements to the design of stoves, particularly cooktops, have the potential to reduce hot object burns as would improvements in the heat resistance of saucepan handles and knobs on casseroles and lids. The newest technology in cooktop heating uses an induction coil, which heats the pan by activating its metallic properties. The cooking surface does not get hot which virtually eliminates the risk of burns from the cooking surface. Although available in Australia these cooktops are prohibitively expensive at this stage.

Two features of these (and other) stoves that should be universally adopted by manufacturers are: the positioning of controls at the front or side of the cooktop so that the user does not have to reach over the heat source to use controls; and the installation of a heat guard panel between the controls and the cooktop that protects the hand from open flames and hot surfaces.

Cooks should be educated to store utensils or other supplies (such as condiments and spices) away from the back of stoves and to routinely use oven mitts and casserole paws (made of flame-retardant fabric) when handling hot cookware. Householders (particularly older people) should be educated to keep the space around heaters clear of objects (including drying frames for clothes) and furniture (particularly armchairs) to reduce the risk of tripping and falling onto heaters and the close items catching fire.

## **Recommendations**

### **Strategies and countermeasures**

- Promote the availability and widespread installation of single purpose lithium smoke alarm batteries (which last ten years) and electric safety switches (power outlet, permanently installed switchboard units and portable units) in existing homes.
- The MFB and the CFA should trial and evaluate the effectiveness of a local doorstep purchase/free installation smoke alarm scheme in association with a local area survey on smoke alarm compliance in at least one defined area.
- Adapt and extend the current multidimensional Victorian child scalds prevention campaign, *Hot water burns like fire* to cover community living older people, and adults with disabilities, conditions and illnesses (particularly epilepsy) that put them at higher risk of burn and scald injuries.
- Implement outreach burn and scald prevention programs (which include installation of smoke detectors) for homebound older people and people with disabilities (see safety guidelines below).
- Implement general community education, to raise awareness among women of the hazards posed by boiling water, hot oil and steam and to re-enforce the cooking and handling techniques which reduce the risk of burns and scalds.
- Advocate the development and implementation of an Australian & New Zealand Standards that require cigarettes to be fire-safe (self-extinguishing) in collaboration with international developments.
- Upgrade fire and burn safety education in secondary school level courses, particularly in Home Economics, and develop or make available resources to assist students to identify burn hazards and solutions when designing their individual practical projects at the more senior levels of study.
- Identify industry or sponsorship support for the further development of a spill-resistant mug to reduce scalds from hot drink spills.
- Approach manufacturers of stoves and cooktops to seek design changes to reduce the risk of ‘granny gown’ and contact burns and investigate the incorporation of US developments to prevent cooker-top fires. .
- Develop and trial protective sleeves made of fire-resistant material with elasticised wrists to prevent clothing ignitions while cooking (to be promoted particularly to older people and to people with disabilities affecting their manual dexterity and reach).

- Encourage food manufacturers and distributors to place warning labels (including instructions on safe frying techniques and the correct response to fat and oil fires) on cooking oils and frozen products cooked by shallow and deep-frying.
- Encourage manufacturers, importers and consumer authorities to conduct a product safety review of stoves and cooktops.

### Surveillance, research and investigations

- Produce guidelines to improve one-line case narratives on data surveillance systems, for example CFS, so that the ignition source of the fire, premorbid conditions of victims and alcohol involvement are routinely reported.
- Improve quality and accessibility of data collection systems on fire-related injuries and institute systematic monitoring and routine sharing of information among agencies with responsibility for prevention and control measures.

### BURN PREVENTION STRATEGIES FOR PEOPLE WITH DISABILITIES

Activity	Recommendation for burn risk reduction
Bathing and showering	<ul style="list-style-type: none"> <li>• Turn thermostat on water heaters limiting maximum hot water temperature to 50 degrees Celsius or install a tempering valve or another anti-scald safety device</li> <li>• Supervision while bathing</li> <li>• Use liquid crystal thermometer in tub, do not enter water if tub exceeds 50 degrees Celsius</li> <li>• Run cold water first then add hot water to reduce the risk of burn by falling into tub while its being filled</li> <li>• Test water with a fully sensible body part before entering</li> <li>• Clearly label hot and cold water taps</li> <li>• For single tap units, turn valve to cold after tub is filled</li> <li>• Tighten or remove hot water valve after tub is filled</li> <li>• Install push and turn taps to reduce the risk of accidental closing or opening</li> <li>• Minimise bathing and showering duration and frequency</li> </ul>
Cooking	<ul style="list-style-type: none"> <li>• Supervision during cooking</li> <li>• Hot foods prepared by others</li> <li>• Avoid wearing synthetic clothing (e.g. polyester) while cooking</li> <li>• Use of microwave ovens</li> <li>• Install fitted guards on hot elements</li> <li>• Avoid deep frying or use self sealing deep fat fryers instead of chip pans</li> <li>• Use of insulated plastic kettles</li> <li>• Improved cooker-top design, including US developed automatic shut-off if pots over-heat and use of stoves with controls and supplies kept at front to reduce reaching across hot stove</li> <li>• Avoid wearing loose clothing such as night gowns when cooking</li> <li>• Minimise number of hot dishes prepared</li> </ul>

<b>Activity</b>	<b>Recommendation for burn risk reduction</b>
<b>Therapeutic heating devices</b>	<ul style="list-style-type: none"> <li>• Lie under heating pad instead of on top of it</li> <li>• Avoid use in areas of the body with compromised blood supply</li> <li>• Use heating pads with thermostats</li> <li>• Avoid areas where skin is thinnest</li> <li>• Flame-retardant furniture</li> <li>• Minimise frequency and duration of use of heating devices (12-20 consecutive hours at 42-43 degrees Celsius has been shown to cause partial skin thickness burns)</li> </ul>
<b>Resting in front of fireplace or heaters</b>	<ul style="list-style-type: none"> <li>• Supervision</li> <li>• Keep adequate distance from heat source</li> <li>• Keep insensible part of body farthest from heat source</li> </ul>
<b>Smoking</b>	<ul style="list-style-type: none"> <li>• Investigate availability of fire-safe cigarettes – including those with shortest burning time or least heat generated. Avoid smoking in bed, particularly after alcohol.</li> <li>• Advise to quit</li> <li>• Allow others to light cigars/cigarettes</li> <li>• Allow others to refill lighters with lighter fluid to avoid spills on clothes</li> <li>• Caution when prescribing sedatives to patients who smoke</li> <li>• Flame retardant apron covering front and back</li> <li>• Flame retardant furniture and wheelchairs</li> <li>• Smoke detectors (preferably hard wired) with emergency light in bedrooms, hallway and lounge room</li> <li>• Sprinkler system</li> </ul>
<b>Home oxygen therapy</b>	<ul style="list-style-type: none"> <li>• Caution with prescribing if patients continue to smoke</li> </ul>

Activity	Recommendation for burn risk reduction
<p><b>Electric blankets*</b></p>	<ul style="list-style-type: none"> <li>• People who are invalids, infirm or incontinent should not use electric blankets</li> <li>• The blanket should be securely fixed using the tapes attached to it for the purpose, use the right size and kind for the mattress</li> <li>• Keep the blanket in a fully spread and flat condition at all times (to prevent heat build up in folds)</li> <li>• Clothing and bedclothes should not be left piled on bed while the blanket is in use</li> <li>• Switch off the blanket before going to bed.</li> <li>• Keep supply cord and switch outside of bed</li> <li>• If blanket becomes soiled, unplug and sponge lightly, allow to dry on flat surface</li> <li>• Annual electrical check</li> <li>• Regularly inspect, particularly at the start of winter: <ul style="list-style-type: none"> <li>-examine blanket for wear and creases;</li> <li>-examine supply cord, control switch and plug for damage, cracks or heat marks;</li> <li>-test blanket by covering it with an ordinary blanket to retain the heat and switch it on to the highest setting for about 10-15 minutes. Run your hand over the blanket and check for localised hot spots (the hot spot is an indication of damage to the heating agent)</li> </ul> </li> </ul>
<p>This table was compiled by Backstein et al (1993) and includes recommendations from Katcher and Shapiro (1987); Maley (1989); Murray (1988); Spitz (1992); Hampton et al (1988); McLoughlin et al 1982; Turner et al (1989); Sandanam (1982) and Trier and Spaabaek (1987). The recommendations on electric blankets are based on material issued by the Office of the Chief Electrical Inspector, Melbourne.</p>	

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## 14. INTENTIONAL ASSAULTIVE INJURY (HOMICIDE AND INJURY PURPOSELY INFLICTED BY ANOTHER)

- Homicide was the third-highest ranked cause of adult female home injury deaths, accounting for 7.9% of deaths on the CFS database. Assaultive injury accounted for a smaller proportion of hospital admissions (1.7%) and emergency department presentations (5.1%) for home injury but these are probably underestimations because of under-reporting of domestic violence. (Table 7:1)
- The deaths (homicides) and assaultive injuries that occurred in the home were mostly incidents of domestic violence (defined as ‘partner inflicted injury’) and violence between family members. A different pattern of injury was evident when homicides were compared to assaultive injuries at other levels of severity (Table 14:1).
- Over three-quarters (76.2%) of assaultive injuries causing death (homicides) involved a weapon such as a firearm, cutting piercing instrument or blunt object (all deaths classified under ‘assault by other and unspecified means’ were by striking by blunt object). At all levels of severity (except fatalities) approximately two-thirds or more of assaultive injuries were from unarmed physical assaults.

**Table 14:1 Causes of intentional assaultive injuries that occurred in the home among adult women (aged ≥ 15 years) at all levels of severity.**

Intentional injuries (homicide) E-code breakdown (E960-E969)	Deaths <i>n</i> =63 Rate: 0.7/100 000 Rank: 3		Hospital admissions <i>n</i> =399 Rate: n/a Rank: 7		Hospital E.D. Presentations <i>n</i> =467 Rate: n/a Rank: 6		GP presentations <i>n</i> =9 Rate: n/a Rank: 8	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Unarmed fight, brawl, rape	6	9.5	284	71.2	305	65.3	8	88.9
Assault by hanging/strangulation/suffocation	9	14.3			4	0.8		
Assault by firearms	20	31.7	5	1.3				
Assault by cutting/piercing instrument	19	30.2	36	9.0	33	7.1		
Child battering/mistreatment			4	1.0				
Assault by other/unspecified means	9	14.3	70	17.5	85	18.2	1	11.1
Misclassified and wrongly coded cases					40	8.6		
<b>TOTAL</b>	<b>63</b>	<b>100.0</b>	<b>399</b>	<b>100.0</b>	<b>467</b>	<b>100.0</b>	<b>9</b>	<b>100.0</b>

*Notes:* (a) VISS data is not classified for cause of injury under the ICD9E-code system. The closest equivalent ISIS code (grouping of victim type-‘intended violence between persons’) was used to select intentional assaultive injury cases. Information in the one-line case narratives was then used to manually group cases (to the extent possible) into the finer E-code classifications in the ICD9-E-code system.  
(b) The misclassified and wrongly classified cases (*n*=40) consisted of intentional injuries where the injured person hit or punched a hard surface or glass in anger during an altercation or hurt themselves hitting another person (*n*=38) and wrongly classified falls (*n*=2). These cases could not be electronically removed from the dataset.

*Sources:* Death Data: Victorian Coroners’ Facilitation System (CFS), 1989-90 to 1993-94 (5 years)  
Hospital admissions data: Victorian Inpatient Minimum Database, (VIMD) 1987-94 (7 years), public hospitals  
Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods)  
General Practitioner presentations data:-Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-95 (1 year)

## 14.1 HOMICIDES

CFS ( $n=63$ , crude mean annual rate: 0.7 per 100 000 population, rank: 3)

### 14.1.1 The size of the problem

Homicide was the third-highest ranked fatal cause of injury to women in the home accounting for 7.9% of all injury fatalities. The CFS recorded 63 assaultive injury deaths in the five-year period 1989-94, an average of 12-13 women were victims of homicides committed in their own or another person's private home in each of these years

### 14.1.2 Causes (methods) of homicide

Assaultive injury deaths were mostly caused by firearms and cutting and piercing instruments ('stabbing'). These methods together accounted for just over three-fifths (61.9%) of all homicide deaths (Table 14:2). Shotguns were used in three-quarters of the homicides by firearms. The weapons used in cutting and piercing homicides was named in only four case narratives. They were knives (3) and meat cleaver (1).

In 8 of the 9 cases of homicide by 'other means' a blunt instrument (e.g. baseball bat or hammer) was used. The other case was an assault by fire.

**Table 14:2 Frequency and ranking of causes (means) of homicide in the home among adult women (aged  $\geq 15$  years).**

<b>Cause of homicide Breakdown of E-code 960-969</b>	<b>Frequency <math>n=63</math> <math>n</math></b>	<b>Proportion  (%)</b>	<b>Rank</b>
Fight, brawl rape <i>-unarmed fight or brawl</i> Sub total	6 6	9.5	4
Assault by hanging and strangulation	9	14.3	3 eq
Assault by firearms and explosives <i>-handgun</i> <i>-shotgun</i> <i>-hunting rifle</i> Sub total	1 15 4 20	31.7	1
Assault by cutting and piercing instrument	19	30.2	2
Assault by other and unspecified means <i>-fire</i> <i>-striking with blunt or thrown object</i> Sub total	1 8 9	14.3	3 eq
<b>Total</b>	<b>63</b>	<b>100%</b>	
<i>Source: Victorian Coroners' Facilitation System, 1989-90 to 1993-94</i>			

### 14.1.3 Assaultants' relationship to victim

The assaultants' relationship to the victim was specified in just over one-half (54.0%) of the homicide case narratives (in only one of these narratives was the assailant described as unknown to the victim). In most (84.8%) of the cases where the assailant was reported as known to the victim, the assailant was or had been a partner ('intimate') of the victim ie. the former or current husband, de facto partner or boyfriend. (Table 14:3)

**Table 14:3 Relationship of victim to the assailant in case narratives, homicides among women aged ≥ 15 years in the home.**

Relationship to victim	Frequency <i>n</i> =63 <i>n</i>	Proportion (%)
Known to victim		
-husband	18	
-de facto or former de facto	4	
-boyfriend	6	
-other family member	2	
-friend, acquaintance	3	
Sub-total	33	52.4
Unknown to victim	1	1.6
Relationship not specified or assailant unknown	29	46.0
<b>Total</b>	<b>63</b>	<b>100.0</b>
<i>Source: Victorian Coroners' Facilitation System, 1989-90 to 1993-94</i>		

### 14.1.4 Rates at different ages

The examination of mean annual homicide rates (per 100,000 population) across the five-year-age groups of women from age 15 years (table 3:4) revealed that women aged 20-24 and 25-29 and women aged 65-69 and 70-74 were at increased risk of homicide compared to other adult age groups. In each of these age groups, the mean annual rate of homicide was approximately one-and-a-half to two-and-a-half times the mean adult female all-age rate for homicide that occurred in the home (Rate ratios 2.4, 1.9, 1.3 and 1.6 respectively).

## 14.2 HOSPITAL ADMISSIONS

VIMD (*n*=399 cases, mean annual rate: *n/a*; rank: 7)

### 14.2.1 The size of the problem

Assaultive injury was a lower-ranked cause of hospital admissions for women injured in the home, accounting for 1.7% of home injury hospital admissions, although this may be an underestimation because of under-reporting of domestic violence. The VIMD recorded 399 adult female assaultive home injury cases over the 7-year data collection period, an annual average of 57 cases. However, only approximately one-fifth (21.4%) of all cases of assaultive injury on VIMD (*n* =2 633) were coded for location of injury. In 70.7% of coded cases the home was the place of occurrence of the assaultive injury. If the coded cases are assumed to be a representative sample of all adult female injury hospitalisations

for assaultive injury (and this could not be checked) then the annual incidence of adult female hospitalisations for assaultive injury that occurred in the home would be in the vicinity of 266 cases.

### **14.2.2 Causes of assaultive injury**

As shown in Table 14.1, just over seven-tenths (71.2%) of the women admitted to hospital for assaultive injuries were injured during unarmed ‘fights’, which included one case of rape. The other major causes of hospital admissions were assault by cutting/piercing instrument (9.0%) and assault by striking by blunt or thrown object (8.3%) classified under ‘assault by other and unspecified means’.

### **14.2.3 Age factors**

Although the age structure of the population from which the home injury reports of assaults were drawn is not known, women aged 20-39 years appear more at risk of assaultive injury. They accounted for 60.7% of assaultive injury cases on VIMD, yet comprised 40.5% of the mean annual adult female population in Victoria in the VIMD data collection period

### **14.2.4 Nature of injury**

More than one injury report can be given per case (the mean number of reports per case for assaultive injury was 1.7). The most frequently reported injuries were: bruising/haematoma (30.4%); open wounds (21.1%); and fractures (20.1%).

## **14.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)**

VISS ( $n=467$  cases; mean annual rate  $n/a$ ; rank: 6)

### **14.3.1 The size of the problem**

Assaultive injury was the sixth-highest ranked cause of female home injury presentations to hospital emergency departments, accounting for 5.6% of home injury presentations.

### **14.3.2 Causes of assaultive injury**

VISS data are not classified for cause of injury using the ICD9E-code classification system. The closest equivalent ISIS code (grouping of victim type- ‘intended violence between persons’) was used to select intentional assaultive injury cases from the VISS database. Information in the one-line case narratives was then used to group cases (to the extent possible) into the finer E-code classifications in the ICD9-E-code system.

Table 14:4 displays the major causes of assaultive injury emergency department presentations.

- Unarmed fights were the major cause of assaultive injury, accounting for approximately two-thirds (65.3%) of all assaultive injuries.
- Assault by cutting and piercing (7.1%) and assault by blunt or thrown objects (10.3%) were the other significant causes of assaultive injury.

- 12.0% of cases presenting to VISS emergency departments were admitted to hospital
- Assaults involving weapons or hard objects (cutting implements, striking with or against objects) were more likely than unarmed assaults (fight, brawl rape and strangling) to result in hospital admission (18.3% of cases of assault involving a weapon/hard object were admitted to hospital compared to 10.0% of unarmed assault cases).

**Table 14:4 Causes of assaultive injury derived from VISS hospital narratives<sup>a</sup>**

Cause (from analysis of case narratives)	Admissions (all cases) <i>n</i> =56		Non-admissions (all cases) <i>n</i> =411		Total <i>n</i> =467	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Unarmed fight, brawl, rape <i>-unarmed fight or brawl</i>	31	55.4	270	65.7	301	64.5
<i>-rape</i>			4	1.0	4	0.8
Sub total	31	55.4	274	66.7	305	65.3
Assault by hanging and strangulation			4	1.0	4	0.8
Assault by cutting/piercing instrument	8	14.3	25	6.1	33	7.1
Assault by other and unspecified means <i>-striking by blunt or thrown object</i>	7	12.5	41	10.0	48	10.3
<i>-other specified means (struck against object)</i>	6	10.7	28	6.8	34	7.3
<i>-unspecified means</i>			3	0.7	3	0.6
Sub-total	13	23.2	72	17.5	85	18.2
Misclassified cases <sup>b</sup>	4	7.1	36	8.7	40	8.6
<b>TOTAL</b>	<b>56</b>	<b>100.0</b>	<b>411</b>	<b>100.0</b>	<b>467</b>	<b>100.0</b>

*Notes:* (a) VISS data are not classified for cause of injury under the ICD9E-code system, the closest equivalent ICD9 code (grouping of victim type- 'intended violence between persons') was used to extract intentional assaultive injury cases. Information in the one-line case narratives was then used to group cases (to the extent possible) into the finer E-code classifications in the ICD9-E-code system. This analysis revealed that the converted subset (n=467) included 40 cases (8.6% of subset) that did meet the E-code definition of assaultive injury. These cases could not be removed electronically and are included in the analysis.  
(b) The majority of misclassified cases were intentional injuries where the injured person deliberately hit a hard surface or glass in anger during a fight or hurt him or herself when hitting another person.

*Source:* Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods)

The one-line case narratives for all cases of assaultive injury were further analysed to elicit more detail on the injury event. While the narratives are rich sources of information it should be noted that the information in them is not consistently reported. Therefore, care should be taken when using these results.

### ***Unarmed fights***

Unarmed fights (excluding rape) accounted for nearly three-quarters (72.0%) of hospital emergency department presentations for assaultive injury that did not require hospital admission and approximately three-fifths (59.6%) of admitted cases.

In at least one-third (35.5%) of all cases involving unarmed fights the victim was hit/punched and/or kicked during an argument. In over one-half (55.2%) the precipitating circumstances (if any) were unexplained (for example 'punched by husband') or the assault appeared to be 'out-of-the-blue' (for example: 'sleeping /watching television/cleaning, hit

by boyfriend'). Although the word 'fight' was used to describe both verbal and physical fights it appeared from information in the narratives that the injured women were involved in physical fights in, at most, just under one-tenth (9.3%) of fight/brawl cases.

#### *Assaults by other specified means ('struck by...' cases)*

Striking by blunt or thrown objects accounted for 10.1% (48 cases) of assaultive injuries. A wide range of objects 'to hand' were used as weapons, the most prominent of which were pieces of wood, iron or steel (8 cases) and bottles and other glass objects (7 cases).

#### *Assaults by other specified means ('struck against...')*

'Struck against' injuries accounted for 7.3% of assaultive injuries (34 cases, classified under assault by 'other specified means') and were caused when the women was pushed, thrown or battered against an object such as a door (10 cases), wall (7 cases), the floor or ground (5 cases).

#### *Cutting/piercing*

Cutting/piercing injuries accounted for 7.7% (33 cases) of assaultive injuries. Knives (19 cases) and glass (9 cases) were the most used weapons. A knife was used to stab the victim in all but one (87.5%) of the eight cases that required hospital admission.

### **14.3.3 Assailants' relationship to victim**

The assailants' relationship to the victim is shown in table 14:5.

The analysis revealed that in three-fifths (61.4%) of all VISS cases the victim knew the assailant but the proportion is likely to be much higher. The following evidence supports this contention:

- The intentional assaults occurred in the victim's own or another person's private home, therefore it is likely that the assailant was known to the victim in the majority of cases where no information on the relationship (if any) was given in the narrative (23.2% of cases). It is also probable that the women would be more likely to identify the assailant as a stranger, if that were so, in the case report.
- The victim was described as being involved in an argument or fight with the assailant (in their own or another person's home) in over half (57.1%) of the cases where no information was given on the assailant's identity in the case narrative ( $n=98$ ).
- Although the victim appeared not to know the assailant in 15% of all cases (classified as 'assailant unknown or unidentified') this is probably an overestimation, because in only one-fifth of the cases was the assailant described as a stranger, intruder or unknown to victim. In nearly four-fifths of the cases classified into this grouping the victim used descriptors such as 'person', 'male' 'man', 'someone' when describing the assailant who may have been known to her.

The assailant was most frequently the current or ex-partner/intimate (husband, defacto or boyfriend) of the victim (42.8% of all cases, 56.1% of cases where information on the assailants' relationship to the victim was given in the case narratives).

A wide range of ‘first degree’ relatives and relatives by marriage inflicted the assaultive injuries by family members other than partners (12.4% of all cases; 16.3% of cases where information on the assailants’ relationship to the victim was given in the case narratives). Family members most frequently involved in the assaults were son (11 cases), brother (11 cases), father (6 cases) and sister (6 cases).

**Table 14:5 Assailants’ relationship to adult female victims of assaultive injury inflicted in the home (n=427)<sup>a</sup>.**

Assailants’ relationship to victims	Admissions (all cases) <i>n</i> =52		Non-admissions (all cases) <i>n</i> =375		Total (all cases) <i>n</i> =427	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
	Partner					
-husband/ex-husband	9	17.3	79	21.0	88	20.6
-defacto/ex-defacto/‘partner’	4	7.7	19	5.1	23	5.4
-boyfriend/ex-boyfriend/ ‘male friend’/‘companion’	8	15.4	40	10.7	48	11.2
-‘domestic’, no other details	3	5.8	21	5.6	24	5.6
Sub-total	24	46.2	159	42.4	183	42.8
Family member other than partner	4	7.7	49	13.1	53	12.4
Friend or acquaintance (including client)	4	7.7	22	5.9	26	6.1
Assailant unknown to victim or not identified by victim (intruder/burglar/robber/assailant/ ‘male’/‘person’/‘someone’ etc.)	9	17.3	55	14.6	64	15.0
No information given on assailant	11	21.1	87	23.2	98	23.0
No detail on assault in narrative			3	0.8	3	0.7
<b>TOTAL</b>	<b>52</b>	<b>100.0</b>	<b>375</b>	<b>100.0</b>	<b>427</b>	<b>100.0</b>
<i>Note:</i> (a) The 40 misclassified cases (which were mainly self-harm) were manually removed from the dataset for this analysis.						
<i>Source:</i> Hospital ED presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods)						

The results that follow are based on the analysis of the routine output from the VISS database using the ISIS classification system. The data subset (*n* =467) includes the 40

misclassified and wrongly classified cases (mostly self-harm cases) because these could not be removed electronically. These cases comprise 8.6% of the data subset.

#### **14.3.4 Age factors**

The age distribution of the population in the VISS hospitals catchment areas is not known. However, assaultive injuries appear to be raised for women aged 39 years and younger. They contributed 78.0% of the assaultive injuries, yet comprised 39.9% of the Victorian population over the VISS data collection period.

#### **14.3.5 Time of injury**

Hospital emergency department presentations for assaultive injury were high on Saturdays (21.0%) and Sundays (18.2%), although presentations were raised from around 8 p.m. on Fridays. If even the expected daily distribution would be 14.3% on each day. Approximately three-fifths (59.0%) of the assaultive injuries that occurred on the weekends occurred in the 12 hours from 7pm on both Saturday and Sunday.

#### **14.3.6 Place of occurrence of assaultive injuries**

Assaultive injuries mostly occurred in the living or sleeping areas of the home (80.3%).

#### **14.3.7 Activity being undertaken at the time of injury**

Most assaultive injuries occurred during a fight or quarrel (71.1%) and 'other' leisure/recreation activities (14.3%), (note that the system defaults to this code).

#### **14.3.8 Nature of injury and body part injured**

More than one injury can be reported per case. The most frequently reported assaultive injuries were:

- bruising (35.5% of reports, mostly to the face/cheek/forehead/scalp, eyes, ocular adnexa, nose, upper arm and chest);
- cuts and lacerations (22.3% of reports, mostly to the face/cheek/forehead /scalp and to the mouth, forearm and finger); and
- inflammation, swelling, oedema and pain (15%).

Fractures (most prominently of the nose) accounted for 8.6% of the injury reports.

#### **14.3.9 Disposal of patients from emergency department**

Nine-tenths (90.2%) of assaultive injury patients required some treatment, 11.6% required hospital admission:

- treated, no referral (28.5%)
- treated, referred to O.P.D. (10.3%)
- treated, referred to GP (20.0%)

- other referral (4.1%)
- casualty review (15.4%)
- admissions (11.6% - short stay ward observation (5.2%) admitted to short stay ward or inpatient ward (6.4%))
- transferred (0.4%)

#### 14.4 GENERAL PRACTICE PRESENTATIONS

ELVIS ( $n=9$ , mean annual rate: n/a, rank: 8)

- Assaultive injury represented only a small proportion (1.4%) of ELVIS GP presentations.
- In at least two-thirds (66.7%) of the nine reported cases the assailant was known to the victim, either the partner of the victim (4 cases- husband/boyfriend) or a family member (2 cases - mother, daughter in law). The assailant was not identified in the other three case narratives.

#### 14.5 DISCUSSION AND RECOMMENDATIONS

The deaths (homicides) and assaultive injury to women that occurred in the home were mostly incidents of domestic violence which is variously defined as ‘partner’ or ‘spousal (legal or defacto)’ violence or violence between ‘intimates’. Violence perpetrated by family members is sometimes included in the definition of domestic violence (VCCAC 1996). For this study assaults perpetrated by boyfriends and ex-boyfriends were grouped with other ‘partners’ and assaults perpetrated by other family members were grouped separately. The lack of an agreed definition of ‘domestic violence’ complicates the estimation of incidence in an area where data is necessarily drawn from a number of sources (e.g. health, police and crime statistics and community surveys).

This discussion is limited to the major findings from the analysis and a few recommendations on improving the available data because an earlier, substantial MUARC report ‘*Domestic Violence-Patterns and Indicators*’ (Sherrard et al 1994) covers much the same ground and includes a substantial literature review. A number of major policy and program initiatives have developed in response to domestic violence at the national and state levels since 1995 and these will be mentioned briefly.

##### Major findings

Homicide was the third-highest ranked cause of female injury death in the home, accounting for 7.9% of home injury deaths. Assaultive injury was a low- to middle-ranked cause of VIMD hospital admissions and VISS emergency department presentations, accounting for 1.7% and 5.1% of injuries respectively. It was a low-ranked cause of GP presentations, contributing 1.4% of home injuries but this is probably an underestimation of Victorian GP presentations as the ELVIS collection was drawn from GPs in a rural region.

It was difficult to estimate the proportion of domestic and family violence cases in the CFS and hospital-based systems because of lack of information on the perpetrators and their

relationship with the victim. Under-reporting, at all levels of injury severity, is also a well-documented feature of all data collections on domestic and family violence (Sherrard et al 1994; VCCAV 1996).

Sixty-three adult female deaths from assaultive injuries that occurred in the home were recorded on the CFS database over the 5-year period 1989-90 to 1993-94 (an average of 12-13 fatal assaults per year). They were mainly shootings and stabbing. A substantial proportion of these fatal assaults were the result of 'domestics' but an accurate estimation of how many is not possible because the assailant's relationship with the victim was only specified in just over one-half (54.0%) of the fatal assaults recorded on the CFS.

In approximately eighty-five percent of cases where the assailant was reported as known to the victim, the assailant was identified as a partner ('intimate') of the victim ie. the former or current husband, de facto, 'partner' or boyfriend. In a further six per cent of cases the assailant was a family member or related by marriage to the victim. In only one narrative was the assailant described as unknown to the victim. The assailant's relationship with the victim needs to be consistently reported (or the unavailability of this information signalled in case narratives) to increase the usefulness of Coronial data as a source of information on domestic violence.

Similarly, the poor reporting of the place of occurrence (location) of injury in the VIMD hospital admissions database prevents an accurate estimation of the incidence of hospitalisations from violent episodes in the home. There were 399 cases of assaultive home injury hospitalisations on VIMD for the seven-year period 1987/88 to 1993/94 (annual average 57 cases). However, only about one-fifth of the 2,633 female assaultive injury cases on the VIMD were coded for place of occurrence of injury. Based on the fact that 70.7% of the coded cases were for assaultive injury that occurred in the home, it is estimated that the annual incidence of hospitalisation from assaults that occurred in the home is more likely to be in the vicinity of 270 cases. The accuracy of this estimation depends on whether the group of cases coded for location is a representative sample of all cases of assaultive injury (and this could not be checked) and does not take into account undetected cases of domestic violence that are admitted to hospitals.

There is also no code in the current VIMD system to identify the relationship of the assailant to the victim. Therefore, hospital admissions data offer little useful information to assist the monitoring of domestic and family violence that occurs in the home. This information should be collected from patients and routinely written into case records so that it is available for research purposes. Although VISS had the capacity to report the assailant's identity for hospital emergency department presentations, it is not a statewide collection and therefore cannot be used to estimate the incidence of domestic violence in Victoria. Details on the assailant and other circumstances of the assault were not consistently reported on CFS (for homicides) and VISS (for hospital presentations).

Assaultive injury was the sixth-highest ranked cause of female home injury presentations to VISS hospital emergency departments, accounting for 5.6% of home injury presentations. Unarmed fights (65.3%), assault by cutting and piercing (7.1%) and assault by blunt or thrown objects (10.3%) were the significant causes of injury. The assailant was most frequently the current or ex-partner/intimate (husband, defacto or boyfriend) of the victim (56.1% of cases where information on the assailants' relationship to the victim was given in the case narratives). A wide range of 'first degree' relatives (mostly sons and brothers) and relatives by marriage inflicted the assaultive injuries by family members

other than partners (16.3% of cases where information on the assailants' relationship to the victim was given in the case narratives).

Sherrard et al (1994) estimated that a substantial proportion of hospital presentations for domestic violence, possibly as high as 70%, is missed or not reported in-patient records. They recommended the introduction of a locally expanded ICD9 E-code classification to identify the perpetrator and other circumstances of injury in cases of interpersonal injury and abuse presenting to hospitals, and the training and on-going support to enable hospital staff to identify and deal with domestic violence cases. The new Victorian Emergency Minimum Database (VEMD), that collects information from 25 major public and private hospital emergency departments across the state, has the potential to provide a better indication of the incidence of domestic violence in Victoria because it has the capacity to report on location and to identify the assailant. However, the staff in the emergency departments will need training and on-going incentives to collect this data from victims.

Only a small proportion (1.4%) of ELVIS GP presentations was for assaultive injury. This relatively low proportion could be partly explained by the rural nature of the ELVIS collection and unavailability of GPs at weekends when there is a peak in assaultive injuries presenting to emergency departments (as shown in VISS data). It may also be that, for reasons of privacy, women choose to attend an emergency department with assaultive injury, rather than go to their GP.

The ABS Women's Safety Survey (1996) reported that a significant proportion of women identify their GP as a person they can turn to after an incident of assault. The main action taken by women after experiencing an assault by a man was talking to other people (particularly family or friends). The survey showed that 8.4% of women (33,000 Australian women) who had experienced physical or sexual assault by a male perpetrator in the previous twelve months had sought help from a G.P after the last incident. Nonetheless, research also shows that under-detection of non-self reported domestic violence cases is a problem at the GP level. This indicates that the training programs on domestic violence currently being undertaken by several Divisions of General Practice in Victoria need to be expanded so that all GPs become confident at identifying and dealing with domestic violence cases and provide appropriate treatment and referral (VCCAV 1996).

### *Methods of assault*

The majority of homicides involved a weapon. Guns (31.7%, mostly shotguns) and cutting and piercing instruments (30.2%, presumably knives) were the most frequently used weapons. Although the picture is complicated, there is evidence that the tightening of the Victorian Gun Laws in 1988 has resulted in a 37% decline in firearm assaults in Victoria (Ozanne-Smith et al, in preparation). This indicates that further controls on gun ownership, particularly restricting or discouraging the storage of weapons in private homes, may be effective in reducing fatal assaults in the home. In particular, firearm restrictions imposed in relation to DV intervention orders should be rigorously enforced.

At the other levels of severity, the injurious assaults were mostly unarmed and VISS data suggests that a substantial proportion of these occurred during domestic arguments. There is a proliferation of groups that work with men to stop their violent behaviour but it is noted in the Violence Against Women Strategy (1996) that these programs need to be closely monitored and their effectiveness evaluated, particularly if they are to be used in the legal system as an alternative to other penalties for perpetrators of domestic violence.

### ***Age of injured women***

At all levels of injury severity women aged 39 years and younger appear more at risk of assaultive injury. There was also a peak of homicides among women aged 65-74 years but this pattern was not evident at the other levels of severity. This could be a manifestation of under-detection because older women may be less likely to report domestic assault as the cause of their injuries or identified as victims by hospital emergency department staff and general practitioners.

### ***Time of injury event***

VISS data on emergency department presentations showed that there was a higher risk of assaultive injury presentations at weekends, starting from Friday at around 8pm and particularly at night from 7pm on Saturday and Sunday. Also, there were peaks in the evenings of weekdays. This pattern has implications for the provision of referral services.

The tentative nature of these findings highlight the problems with available data on assaultive injury in the home, particularly in relation to domestic violence, and the need for systems-wide improvements in data collection on domestic violence in the health system.

### **Recent national and state initiatives to prevent domestic violence**

#### ***ABS Women's Safety survey***

On the data front, in a major national initiative the Office of the Status of Women and the Commonwealth Department of Health and Family Services funded the Australian Bureau of Statistics (ABS) to conduct a survey on women's safety in the home and the community. The survey titled '*Women's Safety, Australia*' (ABS 1996) was conducted between February and April 1996 and provides a somewhat clearer picture of the prevalence of physical and sexual assaults experienced by women aged 18 years and older across Australia. It established some benchlines on the level of injurious assaults which (if supplemented by available but unreported data from the survey) could be used to improve reporting of assaultive injury in the health sector's injury surveillance systems.

Based on interviews with a representative sample of 6,300 women across Australia, the survey found that 5.7% of Australian women ( $n=391,900$ ) had experienced physical and/or sexual assault perpetrated by a male in the previous twelve months. Of these women, 41.2% ( $n=162,900$ , 2.4% of Australian women) sustained physical injuries in the last incident. The most common injuries for physical violence were bruises, cuts and scratches and the most common injury for sexual assaults was bruising. One-fifth (20.3%,  $n=33,100$ ) of injured women (0.5% of all Australian women) reported 'other injuries' which included broken bones and teeth, penetrative injury, stab and gunshot wounds, miscarriage and 'other' injuries. The only kind of medical treatment on which data were collected was visits to the doctor (as mentioned above). In 57.0% ( $n=245,100$ ) of last incidents of physical and sexual violence (which was defined as 'physical assault and physical attempt or threat of assault') by a male perpetrator in the previous twelve months, the perpetrator was the current partner, previous partner or boyfriend/date of the woman. Separated data on the relationship of the perpetrators to women who suffered physical and sexual assaults in the previous twelve months were not published. Unfortunately, data were not collected for location of assaults by partners, but presumably they would mostly occur in the home. The home was revealed to be the location where the greatest proportion of

assaults by a perpetrator other than a partner (other known man and stranger) occurred (42.6%).

The Office for the Status of Women has followed up a range of other issues highlighted in the survey results including alcohol and violence, victims' experience of abuse as children, family violence, and child witnesses to violence.

### *Partnerships Against Domestic Violence*

The Domestic Violence Summit in early 1997, involving the Prime Minister and State and Territory Premiers, determined that governments across Australia would work together under an initiative entitled *Partnerships Against Domestic Violence* (<http://www.dpmc.gov.au/osw/padv/>). A major objective of this initiative is to test new approaches to domestic violence. Heads of Government agreed to take co-operative action on a number of key issues steered by a joint government taskforce. They also agreed to the development of model domestic violence legislation across Australia to ensure continuity of protection for victims across the country.

The Prime Minister used the summit in 1997 to announce a \$25.3m Commonwealth package of measures to address domestic violence issues and, more recently, announced a further \$25m allocation in the 1999-00 budget. Major national projects that are in progress include *the Domestic violence perpetrators program* and *the Working with adolescents to prevent domestic violence program*. Both these projects have been developed co-operatively under the umbrella of the National Campaign Against Violence and Crime (NCAVAC), the National Anti-Crime Strategy (NACS) and the Partnerships Against Violence Taskforce. The additional Commonwealth allocation included \$10m for a community awareness campaign, \$1m to resource a Clearinghouse, \$5m for prevention and early intervention with children at risk and \$6m to implement grassroots programs in indigenous communities.

Projects that are being managed by the Victoria government under the *Partnership* initiative include a mapping project to examine service entry points for women affected by family violence to identify the weaknesses and strengths in current service pathways, the development of an information/resource kit to help GPs identify family violence and the development of family strengthening models for Koori communities to promote education, prevention and early intervention.

### *Victorian initiatives*

At the state level, in 1996 the Victorian Community Council Against Violence (VCCAV) submitted to the Victorian Minister Responsible for Women, The Hon. Jan Wade MP, a detailed strategy entitled '*Violence against women: an integrated strategy for change*' (VCCAV 1996) which aims to achieve an integrated and co-ordinated approach to eliminate or reduce violence against women across the state. The strategy was prepared by the Violence Against Women Task Force and involved broad community consultation including a two-day forum of key agencies.

The strategy outlines a plan to co-ordinate services at the statewide, regional and local levels and includes a comprehensive set of recommendations covering issues around access to services for victims of domestic violence, the provision of just treatment in the legal system, professional and community education, data collection and research. Broad recommendations on prevention were included, for example, the promotion of a non-

violent community through community education, a more integrated school education program, the development of a communication strategy, behaviour change groups for men with a history of violence and improvements in current community safety initiatives.

In response to the VCCAC report an *Interdepartmental Committee on Violence against Women* was established in 1996 with representation from the Office of Women's Affairs (chair) and the Departments of Premier and Cabinet, Justice including Victoria Police, Education, Human Services and Infrastructure to develop and implement a 'whole of government' strategy and to consider the recommendations from the VCCAV report. A number of new initiatives to strengthen government responses to domestic violence have been taken. These include the enhancements to services provided by the Department of Human Services eg. expanded children's services (the placement of children's workers linked to family violence outreach teams in Human Services regions and other initiatives), enhanced after hours access to services (including safe accommodation) and enhanced outreach services (rural and Koori). Also, Victoria Police has developed new family violence police procedures and an improved referrals process to ensure that both victims and perpetrators gain access to appropriate support services.

## **Recommendations**

### **Strategies and countermeasures**

- Train and support hospital emergency staff and GPs to identify, record and deal with domestic violence cases.
- Ensure that domestic violence referral services operate at night and on weekends.

### **Surveillance, research and investigations**

- Improve the compatibility of existing data systems that record cases of domestic and family violence
- Improve data collection and recording of domestic violence on Coronial databases, VIMD and emergency department injury surveillance systems:
  - ensure that the assailant's relationship with the victim and other useful information on the circumstances of the injury event are systematically reported in Coronial and VEMD case narratives;
  - improve the reporting of the place of occurrence (location) of injury in VIMD hospital admissions database and the current emergency department system (VEMD);
  - introduce a locally expanded ICD9 E-code classification category of perpetrator (spouse, de facto, etc) and record other circumstances of injury in cases of interpersonal injury and abuse presenting to hospitals; and
  - encourage GPs to systematically record cases of domestic violence

## 14.6 REFERENCES

McLennan W. *Women's Safety Australia*. Australian Bureau of Statistics, Commonwealth of Australia 1996, Catalogue No.4128.0

Sherrard J et al. *Domestic violence: patterns and indicators*. Monash University Accident Research Centre. Report No 63, November 1994.

Victorian Community Council Against Violence. *Violence against women: An integrated strategy for change*. Melbourne, November 1996.



## 15. NATURAL AND ENVIRONMENTAL INJURY

Natural and environmental injury includes injuries caused by excessive heat or cold, venomous plants and animals and other animal-related injury (excluding animal being ridden, which is unlikely to occur in proximity to the home).

- Natural and environmental injury was a low-ranked cause of injury at most levels of severity except GP presentations, accounting for 0.6% of home injury deaths, 1.2% of hospital admissions and 3.9% of emergency department presentations. However, animal bites, stings and scratches accounted for a sizeable proportion (12.1%) of GP presentations.
- At all levels of severity the major causes of injury were ‘other injuries caused by animals’ (bites by animals and non-venomous snakes, lizards and arthropods, butts, gores, crushes, runovers, ‘stepped on’) and poisoning and toxic reactions to venomous animals and plants.

**Table 15.1: Causes of natural/environmental injuries that occurred in the home among adult women (aged ≥ 15 years) at all levels of severity**

Natural and environmental injury E-code breakdown (E900-E909)	Deaths <i>n</i> =5 Rate: 0.1/100 000  Rank: 8		Hospital admissions <i>n</i> =286 Rate: n/a  Rank: 10		Hospital E.D. Presentations <sup>a</sup> <i>n</i> =323 Rate: n/a  Rank: 8		GP presentations <i>n</i> =78 Rate: n/a  Rank: 4	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
	Excessive heat	1	20.0	17	5.9	2	0.6	
Excessive cold			38	13.3				
Hunger, thirst, exposure, neglect			11	3.9	2	0.6		
Venomous animals and plants			88	30.8	68	21.0	13	16.7
Other injuries caused by animals	4	80.0	131	45.8	245	75.9	65	83.3
Storms and floods			1	0.3	6	1.9		
<b>Total</b>	<b>5</b>	<b>100.0</b>	<b>286</b>	<b>100.0</b>	<b>323</b>	<b>100.0</b>	<b>78</b>	<b>100.0</b>

*Note:* (a) Because VISS data is not classified for cause of injury using the ICD9E-code system, the available ISIS mechanism and breakdown codes, with some exclusions were used to extract natural and environmental injury cases. Information in the one-line case narratives was then used to group cases (to the extent possible) into the finer E-code classifications in the ICD9-E-code system.

*Sources:* Death data: Victorian Coroners' Facilitation System (CFS) 1989-90 to 1993-94 (5 years)  
Hospital admissions data: Victorian Inpatient Minimum Database, (VIMD) 1987-94 (7 years), public hospitals.  
Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods)  
General Practitioner presentations data:-Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-95 (12 months)

### 15.1 DEATHS

CFS (*n*=5, mean annual rate: 0.1 per 100 000 population, rank: 8)

The five deaths were caused by excessive heat (the victim fell asleep in front of a heater), a dog bite, a bee sting, a horse kick and a ram butt.

## **15.2 HOSPITAL ADMISSIONS**

VIMD ( $n=286$ , mean annual rate: n/a, rank: 10)

### **15.2.1 The size of the problem**

Natural and environmental injury was a low-ranked cause of adult female home injury hospital admissions, accounting for 1.2% of home injury cases on the VIMD database. The VIMD recorded 288 natural/environmental home injury cases over the 7-year data collection period, an annual average of 41 cases. However, only approximately one-quarter (25.4%) of all natural/environmental injury cases on VIMD ( $n = 2\ 233$ ) were coded for location of injury. In one-half (50.4%) of these coded cases the home was the place of occurrence of the injury. If the coded cases are assumed to be a representative sample of all adult female injury hospitalisations for natural/environmental injury (and this could not be checked) then the annual incidence of hospitalisation for natural-environmental injury that occurred in the home would be in the vicinity of 160 cases.

### **15.2.2 Causes of natural and environmental injury**

The major causes of natural and environmental injury were 'other injuries caused by animals' (45.8%), venomous animals and plants (30.8%) and excessive cold (13.3%).

### **15.2.3 Age factors**

Age-related rates could not be calculated because only one-quarter of natural and environmental cases on the VIMD were coded for location of injury. However, women aged 60 years and older appear to be at higher risk. This age group accounted for 46.2% of the natural/environmental injury hospital admissions, yet made up only 22.1% of the Victorian female population over the data collection period. Their higher risk was most pronounced for hunger/thirst/exposure (they contributed all cases on the database), excessive cold (94.7% of cases), and excessive heat (76.5% of cases).

Within this older group of women, risk increased with age and was most pronounced among the very old. Women aged 80 years and older experienced 16.1% of the natural/environmental injuries but comprised only 3.9% of the mean adult female population over the VIMD data collection period. The increased risk for the very old was most pronounced for excessive heat, excessive cold and hunger /thirst /exposure.

### **15.2.4 Nature of injury**

The most frequently reported injuries were open wounds (26.0%), poisoning (24.8%), fractures (8.7%) and superficial injuries (8.0%). More than one injury can be reported per case, the mean number of injuries reported was 1.1 per case.

## **15.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)**

VISS ( $n=323$ , mean annual rate: n/a, rank: 8)

### 15.3.1 The size of the problem

Natural and environmental injury was a low-ranked cause of VISS hospital emergency department presentations accounting for 3.9% of adult female home injuries on the VISS database.

### 15.3.2 Causes of natural and environmental injuries

VISS data are not coded for cause of injury using the ICD9 E-code system. The available ISIS mechanism and breakdown codes, with some exclusions were used to extract natural and environmental injury cases. Information in the one-line case narratives was then used to manually group cases (to the extent possible) into the finer E-code classifications.

As shown in Table.15:2, the major causes of environmental injuries were bites of non-venomous arthropods (40.2%), dog bites (25.4%), hornets, bee and wasp stings (16.4%) and bites of other animals except arthropods (7.4%). Victims of bites from non-venomous snakes and lizards and non-venomous arthropods were over-represented in hospital admissions. These animals may have been venomous but were not specifically identified as such in the case narratives.

**Table 15:2 Causes of natural and environmental home injuries to adult females (aged ≥ 15 years).**

Causes (from analysis of case narratives) <sup>a</sup>	Admissions <i>n</i> =19		Non-admissions <i>n</i> =304		Total <i>n</i> =323	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Excessive heat	-	-	2	0.7	2	0.6
Hunger, thirst, exposure, neglect	2	10.5			2	0.6
Venomous animals and plants						
-snakes/lizards			2	0.6	2	0.6
-spiders			1	0.3	1	0.3
-scorpions			52	17.1	53	16.4
-hornets/wasps/bees	1	5.3	9	2.9	9	2.8
-'other' venomous arthropods (ants, caterpillars)			3	1.0	3	0.9
-unspecified- sting (NOS), venomous bite (NOS)			67	22.1	68	21.0
Sub-total	1	5.3				
Other injuries caused by animals						
-dog bite	3	15.8	79	26.0	82	25.4
-rat bite			1	0.3	1	0.3
-bite of non-venomous snakes and lizards <sup>b</sup>	3	15.8	1	0.3	4	1.2
-other animal bite except arthropod (cat, rodent except rat)			24	8.0	24	7.4
-bite of non-venomous arthropod (insect bite NOS) <sup>c</sup>	9	47.3	121	39.8	130	40.2
-unspecified injury caused by animal (NOD)			4	1.3	4	1.2
Sub-total	15	78.9	230	75.6	245	75.9
Wrongly classified	1	5.3	5	1.6	6	1.9
<b>Total</b>	<b>19</b>	<b>100.0</b>	<b>304</b>	<b>100.0</b>	<b>323</b>	<b>100.0</b>

Notes: (a) Because VISS data are not classified for cause of injury using the ICD9E-coding system, the available ISIS mechanism and breakdown codes, with some exclusions were used to extract natural and environmental injury cases. Information in the one-line case narratives was then used to manually group cases (to the extent possible) into the finer E-code classifications in the ICD9-E-code system.  
(b) all snake bite injuries were classified as non-venomous because the type of snake was not identified in case narratives  
(c) all except two spider bite injuries were classified under non-venomous arthropods because the type of spider was not identified in case narratives

Source: Victorian Injury Surveillance System (VISS), selected hospitals 1991-95 (various periods)

### ***Non-venomous arthropods (130 cases)***

The non-venomous arthropod bites were:

- insect bites NOS (69 cases, 21.8% of all natural or environmental injuries); and
- spider bites (61 cases, 19.2%).

Some of these arthropods may have been venomous but this information was not included in the case narratives.

### ***Dog bites (82 cases)***

- The breed of dog was only specified in 5 cases (6.1% of all dog bite cases) -German Shepherd, Doberman, Fox Terrier, Rottweiler and Bull Terrier
- The most frequently reported circumstances of dog bites were: unprovoked attack (28 cases, 34.1%, approximately one-half of which were on another person's property), separating fighting dogs (14 cases, 17.1%), and playing with dog (13 cases, 15.9%).
- Nearly two-thirds of the dog bites (53 cases, 64.6%) occurred in the injured person's own home, garage or garden, the remainder either occurred in another person's home (15 cases, 18.3%) or the place was not specified (14 cases, 17.1%).

### ***Hornets, bee, wasp stings (53 cases)***

- Bee stings (32 cases, 10.1% of all natural and environmental injuries) were more numerous than wasp stings (20 cases, 6.3%), 1 case did not specify.
- The most frequently reported circumstances of bee and wasp sting bites were: stung while in backyard or when walking on lawn (13 cases, 24.5%), stung while using clothesline (10 cases, 18.9%) and stung while gardening (9 cases, 17.0%).

### ***Bites of other animals except arthropods (24 cases)***

- Cat bites (22 cases, 6.9% of all natural and environmental injuries) accounted for all but two cases of other animal bite injuries. A mouse and a ferret caused the other two bites.
- The most frequently reported circumstances of bites of other animals were: trying to catch and move cat (9 cases, 37.5%, three of which involved feral cats), unprovoked attacks (3 cases, 12.5%) and bitten while playing with cat (3 cases, 12.5%).

The remainder of the results reported in this section is based on the analysis of the routine output from VISS using the ISIS classification system. The data subset ( $n = 323$ ) includes the 6 misclassified and wrongly classified cases because these could not be removed electronically.

### **15.3.3 Age factors**

Age-related rates could not be calculated because the age distribution of the population in the VISS hospital catchment areas is not known. However, natural and environmental injuries appear to be raised in the younger age group, 15-24 year olds. This age group

contributed 29.4% of natural and environmental injuries yet comprised 22.0% of the Victorian population in the VISS data collection period.

#### **15.3.4 Time of injury**

Hospital emergency department presentations for natural and environmental injuries were more numerous on Saturdays (22.0%) and Sundays (19.8%). The expected daily distribution if injuries are evenly spread over the week is 14.3%. They were also more numerous in the summer months-December (14.2%), January (13.0%), February (13.0%) and March (11.7%). The expected monthly distribution if injuries were evenly distributed throughout the year is 8.3%.

#### **15.3.5 Place of occurrence (location) of injuries**

Natural and environmental injuries mostly occurred in the garden and yard (67.2%) and the living/sleeping areas of the home (26.9%).

#### **15.3.6 Activity being undertaken at the time of injury**

Natural and environmental injuries mostly occurred during other leisure and recreation activities (39.0%), gardening (15.5%), sleeping and resting (11.1%), other household activities (9.9%) and playing (6.2%).

#### **15.3.7 Nature of injury and body part injured**

More than one injury can be reported per case. The most frequently reported natural and environmental injuries were:

- bites (70.0% of reports, mostly to the finger, hand, foot, lower leg and forearm);
- cuts and lacerations (7.0%, mostly to the hand, finger, forearm and eyes); and
- inflammation, swelling, oedema and pain (6.7%).

#### **15.3.8 Disposal of patients**

Most of the patients with injuries caused by natural and environmental factors (93.8%) required some treatment, 5.6% required hospital admission:

- treated, no referral (46.4%)
- treated, referred to O.P.D. (1.5%)
- treated, referred to GP (24.8%)
- casualty review (15.2%)
- admissions (5.6% - short stay ward observation (2.8%) admitted to short stay ward or inpatient ward (2.8%)
- transferred (0.3%)

## **15.4 GENERAL PRACTITIONER PRESENTATIONS**

ELVIS ( $n=78$  cases; mean annual rate: n/a, rank: 4)

### **15.4.1 The size of the problem**

Natural and environmental injuries were a middle-ranked cause of GP presentations accounting for 12.1% of ELVIS presentations for home injury.

### **15.4.2 Causes of injury**

The analysis of the natural/environmental injury case narratives showed that all cases were animal-related injuries. The major causes were:

- venomous animal bites/stings (13 cases, 16.7% of natural and environmental injuries) which consisted of bee stings (7 cases, 9.0%) and wasp sting (6 cases, 7.7%); and
- ‘other injuries caused by animals’ (65 cases, 83.3% of natural and environmental injuries) which consisted of non-venomous insect bites (43 cases, 55.1% of natural and environmental injuries, mostly spider and mosquito bites), dog bites (15 cases, 19.2%), ‘other specified’ injuries caused by animals (5 cases, 6.4%, mostly dog and cat scratches) and cat bites (2 cases, 2.6%).

### **15.4.3 Nature of injury**

Three-quarters (75.6%) of the injuries were bites, the remainder were lacerations, punctures, abrasions and poisoning.

### **15.4.4 Body parts injured**

Over one-half (53.8%) of the natural/environmental (animal-related) injuries were to the upper limbs (mostly to forearm, finger and hand), approximately one-third (34.6%) were to the lower limbs (mostly to the lower leg and foot) and a small proportion were to the head and face (2.6%) and to the trunk (1.3%).

### **15.4.5 Disposal of patients**

The vast majority (92.3%) of patients with natural/environmental (animal-related) injuries required treatment (treated no referral 75.6%, other referral 1.3%, re-appointment 14.1%, re-appointment/investigation 1.3%).

## 16. INJURIES FROM CHOKING, SUFFOCATION AND FOREIGN BODY IN ORIFICE

As shown in Table 16.1, there was a different pattern of injury at each of the four levels of severity:

- Choking on food caused all but two of the 18 deaths (88.9%).
- Hospitalisations and emergency department presentations were predominantly for foreign bodies in other orifices (ear, nose and mouth and digestive system), although the proportion of injury from this cause is lower for emergency department presentations because of the higher frequency of presentations for foreign body in the eye.
- Over four-fifths (83.3%) of General Practitioner presentations were for foreign body in the eye.

**Table 16:1 Causes of injuries by choking, suffocation and foreign body in orifice that occurred in the home among adult women (aged ≥ 15 years) at all levels of severity**

Choking, suffocation & foreign body in orifice E911-E915	Deaths <i>n</i> =18 Rate: 0.2/100 000 Rank: 6		Hospital admissions <i>n</i> =319 Rate: n/a Rank: 9		Hospital E.D. Presentations <sup>a</sup> <i>n</i> =279 Rate: n/a Rank: 7		GP presentations <i>n</i> =18 Rate: n/a Rank: 7	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Inhalation of food	16	88.9	36	11.3	6	2.1	1	5.6
Inhalation of other object	1	5.5	10	3.1	1	0.4		
Foreign body in eye			5	1.6	89	31.9	15	83.3
Foreign body in other orifice (including ingestions)	1	5.4	268	84.0	159	57.0	2	11.1
Other/NOD					6	2.2		
Wrongly classified					18	6.4		
<b>Total</b>	<b>18</b>	<b>100.0</b>	<b>319</b>	<b>100.0</b>	<b>279</b>	<b>100.0</b>	<b>18</b>	<b>100.0</b>

*Note:* (a) Because VISS data are not coded for cause of injury using ICD9E-codes, the closest equivalent ISIS mechanism and injury codes, with some exclusions were used to extract choking, suffocation and foreign body in orifice injury cases. Information in the one-line case narratives was then used to group cases (to the extent possible) into the finer E-code classifications.

*Sources:* Death data: Victorian Coroners' Facilitation System (CFS), 1989-90 to 1993-94 (5 years)  
Hospital admissions data: Victorian Inpatient Minimum Database (VIMD), 1987-94 (7 years), public hospitals  
Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods - nine hospital years of data in all)  
General Practitioner presentations data:-Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-95 (12 months)

### 16.1 DEATHS

CFS (*n*=18, mean annual rate: 0.2 per 100 000 population, rank: 6)

### **16.1.1 The size of the problem**

Choking, suffocation and foreign body in orifice was a low-ranked cause of unintentional injury deaths, accounting for between 3 and 4 deaths per year in the five-year period covered by the CFS (1989-94).

### **16.1.2 Causes of deaths**

Choking on foods or vomitus caused most deaths (88.9%). The foods were identified in only one-third of the case narratives: vomit/gastric contents (3 cases, 16.7%), meat (2 cases, including sausage, 11.1%) and vegetable (1 case, 5.6%).

## **16.2 HOSPITAL ADMISSIONS**

VIMD (n=319, mean annual rate: n/a, rank: 9)

### **16.2.1 The size of the problem**

Choking, suffocation and foreign body in orifice was a lower- ranked cause of VIMD hospital admissions accounting for 1.4% of injury hospitalisations. The VIMD recorded 319 choking, suffocation and foreign body in orifice home injury cases over the 7-year data collection period, an annual average of 46 cases. However, only approximately one-fifth (19.8%) of all choking, suffocation and foreign body injury cases on VIMD ( $n = 2,034$ ) were coded for location of injury. In approximately four-fifths (79.4%) of these coded cases the home was the place of occurrence of the injury. If the coded cases are assumed to be a representative sample of all adult female injury hospitalisations for choking, suffocation and foreign body in orifice injury (and this could not be checked) then the annual incidence of hospitalisation for these injuries that occurred in the home would be in the vicinity of 231 cases.

### **16.2.2 Causes of injury**

There was no finer breakdown of the E-code 'foreign body in other orifice', however an investigation of the medical procedures E-code for all choking, suffocation and foreign body in orifice cases revealed that the most common investigative procedures were to the digestive system (81.8%) and the respiratory system (7.7%) and that most of the 'removal of foreign bodies' were from the oesophagus (81.8%). These data and the VISS data for hospital admissions (see below) suggest that the ingestion of food and other objects are the most prominent causes of hospital admission for choking, suffocation and foreign body in orifice.

Age-related injury rates could not be calculated because of the inconsistent reporting of place of occurrence (location) of injury. However, women aged 60 years and older accounted for 46.4% of the choking, suffocation and foreign body in orifice injury hospital admissions, yet made up only 22.1% of the Victorian population in the period covered by VIMD. Within this older group risk appeared to increase with age and was most pronounced among the oldest group of women. Women aged 80 years and older experienced 11.6% of the choking, suffocation and foreign body in orifice injuries but comprised only 3.9% of the Victorian population over the study period. The increased risk for the very old was most pronounced for choking on food.

### **16.2.3 Nature of injury**

More than one injury could be reported per case. The most frequently reported injuries were foreign body in an orifice (87.6%), internal injury (5.2%) and open wound (3.0%).

## **16.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)**

VISS (n=279, mean annual rate: n/a, rank 7)

### **16.3.1 The size of the problem**

Choking, suffocation and foreign body in orifice was a lower-ranked cause of VISS emergency department presentations for home injury, accounting for 3.4% of presentations (admissions and non-admissions).

### **16.3.2 Causes of injury**

VISS data are not coded for cause of injury using the ICD9E-code system. The closest equivalent ISIS mechanism and injury codes, with some exclusions were used to extract choking, suffocation and foreign body in orifice injury cases. Information in the one-line case narratives was then used to group cases (to the extent possible) into the finer E-code sub-classifications.

Injuries caused by foreign bodies in orifice accounted for 88.9% of all choking, suffocation/foreign body in orifice injuries. The three major causes of these injuries were ingestions of foreign bodies through the mouth (36.6%), foreign body in the eye (31.9%) and foreign body in the ear (19.0%) (Table 16:2).

- Food was the predominant cause of the ingestion injuries (accounting for 82.4% of ingestion of foreign bodies into mouth, pharynx and digestive system) and bones were most frequently involved. Fish bones accounted for nearly one-half (47.6%) of the food ingestion cases.
- The foreign body was not identified in the case narratives in nearly one-half (49.4%) of eye injuries. The most frequently reported foreign body causing the eye injury was sawdust/wood (11.2% of all eye injury cases).
- Ear injuries were mostly cotton buds lodged in the ear (58.4% of cases) and insects in the ear (18.9% of cases)
- All cases but one (96.2%) of the hospital admissions were for ingestion of food. Chicken and meat ingestions were more frequently involved in hospital admissions than fish ingestions.

**Table 16:2 Detailed causes of choking, suffocation and foreign body in orifice home injury to adult females (aged ≥ 15 years)**

Detailed causes from analysis of case narratives	Admissions <i>n</i> =26		Non-admissions <i>n</i> =253		All cases <i>n</i> =279	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Choking						
<i>Inhalation of food (larynx/respiratory system)</i>			6	2.4	6	2.1
<i>Inhalation of other objects</i>	1	3.8			1	0.4
Sub-total	1	3.8	6	2.4	7	2.5
Foreign body in eye			89	35.2	89	31.9
Foreign body in other orifice						
-ear			53	20.9	53	19.0
-nose			4	1.6	4	1.4
-mouth ( <i>ingestions-pharynx/digestive system</i> )	25	96.2	77	30.4	102	36.6
Sub-total	25	96.2	134	52.9	159	57.0
Other/NOD			6	2.4	6	2.2
Wrongly classified			18	7.1	18	6.4
<b>Total</b>	<b>26</b>	<b>100.0</b>	<b>253</b>	<b>100.0</b>	<b>279</b>	<b>100.0</b>
<p><i>Notes:</i> (a) Because VISS data are not coded for cause of injury using the ICD9E-coding system, the closest equivalent ISIS mechanism and injury codes, with some exclusions, were used to extract choking, suffocation and foreign body in orifice injury cases. Information in the one-line case narratives was then used to manually group cases (to the extent possible) into the finer E-code classifications.</p> <p><i>Source:</i> Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), four hospitals 1991-1995 (various periods - nine hospital years in all)</p>						

The remainder of the analysis in this section is based on the routine ISIS coded output from the VISS system and includes wrongly classified cases (6.4% of cases) because they could not be removed electronically from the subset.

### 16.3.3 Age factors

The population of the adult females in VISS hospital catchment areas is not known so age-related rates could not be calculated. However, women aged 20-24 years and 35-39 years appear more at risk of injuries from choking, suffocation and foreign bodies. Women aged 20-24 years comprised 10.3% of the Victorian population over the VISS data collection period yet contributed 14.3% of choking/suffocation and foreign body in the orifice injuries. Similarly, women aged 35-39 years contributed 13.6% of injuries yet made up 9.6% of the Victorian population.

### 16.3.4 Time of injury

The frequency of injuries appear to be elevated on Saturday (17.9% of injuries) and Sunday (17.2%). The expected daily proportion if injuries were evenly distributed throughout the week is 14.3%. The peak months for injury were December and February.

### **16.3.5 Place of occurrence of injury**

Injuries caused by choking, suffocation and foreign bodies mostly occurred in the living or sleeping area (44.8%) and the kitchen (23.7%).

### **16.3.6 Activity being undertaken at the time of injury**

Injuries caused by choking, suffocation and foreign bodies mostly occurred when the injured person was eating or drinking (35.5%), engaged in 'other personal hygiene' activities (12.9%) or 'other leisure and recreation' activities (11.8%).

### **16.3.7 Nature of injury and body part injured**

More than one injury may be reported per case. Nearly three-quarters (73.7% of reports) of the injuries were 'foreign bodies in' (mostly in the eye, ear, oesophagus and pharynx).

### **16.3.8 Breakdown factors - what went wrong**

More than one factor may be reported per case. The most frequently reported breakdown factors were fish (9.2% of reports), first aid equipment (7.1%, presumably cotton buds), meat and poultry (6.9%), foreign body NEC (6.7%), the injured person's own actions (6.6%) and bones (6.6%).

### **16.3.9 Disposal from emergency department**

Most (91.0%) of patients with required some treatment, 9.0% required hospital admission:

- treated, no referral (37.6%)
- treated, referred to O.P.D. (0.7%)
- treated, referred to GP (15.0%)
- other referral (4.3%)
- casualty review (23.7%)
- admissions (9.0%, including short stay ward observation (1.8%) and admitted to short stay/inpatient ward (7.2%))
- transferred (0.4%)
- died/DOA (0.3%)

## **16.4 GENERAL PRACTITIONER PRESENTATIONS**

ELVIS (n=18, mean annual rate: n/a, rank: 7)

### **16.4.1 The size of the problem**

Choking, suffocation and foreign body in orifice injury was a lower-ranked cause of ELVIS General Practitioner presentations, accounting for 2.8% of presentations for adult, female home injury.

#### **16.4.2 Causes of injury**

As shown in table 16:1, most of the cases (83.3%) were foreign bodies in the eye. The analysis of the one-line narratives for the 15 cases of foreign body in the eye revealed that there 11 different foreign bodies were involved as diverse as bleach, a tree branch and glass.

#### **16.4.3 Nature of injury**

The injuries were mostly lacerations, abrasions and foreign bodies (each group was responsible for 22.2 % of cases)

#### **16.4.4 Body part injured**

The head region predominated (83.3% of reports, approximately three-quarters of which were eye injuries); the other reported injuries were to the digestive system and to the trunk.

#### **16.4.5 Disposal of patients**

The vast majority (88.9%) of the choking/suffocation/foreign body in orifice patients required treatment: treated no referral, 61.1% of patients; referral to specialist, 5.6%; re-appointment 16.7%; and re-appointment/investigation 5.5%.

## 17. INJURIES FROM OVEREXERTION AND STRENUOUS MOVEMENTS

Overexertion and strenuous movement was a middle-ranked cause of less serious injury. There is no finer ICD9E-code breakdown for this classification, which covers excessive physical exercise, strenuous movement in recreational and other activities and overexertion (sprains and strains) from lifting, pulling and pushing.

**Table 17:1 Causes of injury from overexertion/strenuous movement that occurred in the home among adult women (aged ≥ 15 years) at all levels of severity**

Overexertion/strenuous movements E927	Deaths		Hospital admissions <i>n</i> =334  Rate: n/a Rank: 8		Hospital E.D. Presentations <i>n</i> =567 Rate: n/a Rank: 4		GP presentations <i>n</i> =56 Rate: /100 000 Rank: 5	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<b>Total</b>	<b>nil</b>		<b>334</b>	<b>100.0</b>	<b>567</b>	<b>100.0</b>	<b>56</b>	<b>100.0</b>

*Note:* (a) There is no finer E-code breakdown for this classification, it covers excessive physical exercise, strenuous movement in recreational and other activities and overexertion from lifting, pulling and pushing.

*Sources:* Death data: Victorian Coroners' Facilitation System (CFS), 1989-90 to 1993-94 (5 years)

Hospital admissions data: Victorian Inpatient Minimum Database, (VIMD) 1987-94 (7 years);

Hospital emergency department presentations data: Victorian Injury Surveillance System (VISS), selected hospitals 1991-1995 (various periods)

General Practitioner presentations data:-Extended Latrobe Valley Injury Surveillance (ELVIS), 1994-95 (1 year)

### 17.1 DEATHS

#### CFS-nil

There were no deaths from overexertion/strenuous exercise recorded on the CFS database from 1989-90 to 1993-94.

### 17.2 HOSPITAL ADMISSIONS

VIMD (*n*=334; mean annual rate: n/a, rank: 8)

#### 17.2.1 The size of the problem

Overexertion and strenuous movement was a lower-ranked cause of home injury hospitalisations, accounting for 1.5% of VIMD adult female hospital admissions for home injury. The VIMD recorded 334 overexertion/strenuous exercise home injury cases over the 7-year data collection period, an annual average of 48 cases. However, only approximately two-fifths (39.4%) of all over-exertion and strenuous movement injury cases on VIMD (*n* =2,167) were coded for location of injury. In approximately two-fifths (39.2%) of these coded cases the home was the place of occurrence of the injury. If the coded cases are assumed to be a representative sample of all adult female injury hospitalisations for overexertion and strenuous movements (and this could not be checked)

then the annual incidence of hospitalisation for injuries caused by overexertion and strenuous movements that occurred in the home would be in the vicinity of 121 cases.

### **17.2.2 Age factors**

Age-related rates of injury could not be calculated because of the inconsistent reporting of place of occurrence (location) of injury on VIMD. However, women aged 65 years and older appeared to be at increased risk of injuries from overexertion and strenuous movements. They experienced 44.6% of these injuries, yet comprised 16.6% of the Victorian population over the period covered by the VIMD database. Within this older age group risk increased with age, the oldest group (women aged 80 years and older) experienced 15.9% of overexertion and strenuous movement injuries, yet comprised 3.9% of the Victorian population.

### **17.2.3 Nature of injury**

The most frequently reported injuries were: sprains and strains (39.7%); fractures (28.7%); and dislocations (11.8%).

## **17.3 HOSPITAL EMERGENCY DEPARTMENT PRESENTATIONS (INCLUDING ADMISSIONS)**

VISS ( $n=567$ ; mean annual rate: n/a, rank: 4)

### **17.3.1 The size of the problem**

Overexertion injuries were the fourth ranked cause of hospital emergency department presentations, accounting for 6.8% of adult female home injuries.

### **17.3.2 Causes of injury**

The analysis of a sample of nearly 40% of all one-line narratives for hospital emergency department presentations [all presentations admitted to hospital (70 cases) and one-third of the remainder of hospital presentations (216 cases-33.1% of non-admissions)] revealed the following pattern of injury.

- The most common causes of injury from overexertion and strenuous movements were: slips/trips/falls resulting in sprains/strains (16.4% of cases); running/walking (stepping awkwardly) (16.4%); playing/exercising/dancing (10.1%); lifting/moving/pushing/reaching objects (8.4%); and getting in/out of bed or chair (8.0%).
- There were some differences in the pattern of overexertion injury when the more serious cases (presentations that resulted in hospital admission) were examined separately. For hospital admissions the major causes were: slips/trips/falls (24.3% of admissions) followed by getting in/out of chair/bed (14.3%), bending over (12.9%) and changing position when sleeping/resting (8.6%).

### **17.3.3 Age factors**

Women aged 29 years and younger accounted for 38.2% of overexertion injuries yet comprised 30.3% of the Victorian population over the VISS data collection period and therefore appear more at overall risk of overexertion injuries presenting to VISS hospital emergency departments than older women. However, women aged 50 years and older

account for nearly two-thirds (62.9%) of emergency department presentations that resulted in hospital admission. These risk assessments are tentative because age-related rates could not be calculated because the age distribution of the population in the VISS hospital catchment areas is not known.

#### **17.3.4 Nature of injury**

More than one report could be given per case (there was an average of 1.1 reports per case). Overexertion injuries were mostly sprains and strains (39.7% of reports), fractures (28.7%) and dislocations (11.8%).

### **17.4 GENERAL PRACTITIONER PRESENTATIONS**

ELVIS (n=56 cases, mean annual rate: n/a, rank: 5)

#### **17.4.1 The size of the problem**

Overexertion and strenuous movements was a middle-ranked cause of General Practitioner presentations, accounting for 8.7% of adult female home injury presentations.

#### **17.4.2 Causes of injury**

An analysis of the 56 overexertion/strenuous movement case narratives revealed that these injuries occurred in a wide range of situations in the home, predominantly while the woman was doing housework/meal preparation (19.7% of cases), lifting/moving objects (17.9%, mainly furniture), getting in/out of bed/couch/chair (14.3%) and gardening (10.7%).

#### **17.4.3 Nature of injury**

Sprains and strains were the most common injury, accounting for 89.3% of cases. The body parts injured were: lower limb (50% of cases, mostly ankle and knee); trunk (30.4%); upper limb (16.1%, predominantly shoulder); and the head and face (3.5%).

#### **17.4.4 Disposal of patients**

Most of the patients (89.3%) presenting with injuries caused by overexertion and strenuous movements required treatment: treated, no referral, 50.0%; referred to specialist, 1.8%; referred to emergency department, 1.8%; other referral, 7.1%; re-appointment, 16.1%; and re-appointment /investigation, 12.5%.

### **17.5 RECOMMENDATION**

- Full application of place and activity codes is particularly important for over-exertion injuries, many of which would be expected to occur during sport and recreational injuries.
- Coding guidelines need to be clarified to ensure that fall injuries are identifiable (not obscured by overexertion category).



## 18. SUMMARY AND CONCLUSIONS

Injuries to Victorian adults, both male and female, are more likely to occur in the home than in any other single location. The home is the most frequently reported place of occurrence of injury to adult men and women (aged  $\geq 15$  years) for hospital admissions, hospital emergency department presentations and general practitioner presentations. If ABS data on home fall deaths to elderly people due to fracture neck of femur are taken into account then the home outranks transport areas as the foremost location of injury fatalities. At all levels of severity, including fatalities, approximately two-fifths of women's injuries occur in the home (ranging from 37.8% for emergency department presentations to 45.1% for hospital admissions).

The higher-ranked causes of home injury to adult women in Victoria are: falls, suicide and self inflicted injury, unintentional poisoning and cutting and piercing injury. Mid-ranked causes of home injury across most levels of severity in Victoria are hit, struck and crushing injuries; fire, burns and scalds and intentional injury - homicide and assaults.

In general, home injury is a neglected area in terms of research (as reflected in the small amount of published literature) and preventive activity. There appears to be a lack of appreciation of the magnitude of the home injury problem and a tentative attitude towards intervention. The latter may arise from the home being perceived as a difficult setting to access for injury prevention purposes, particularly for adults, because it is part of the private domain. Intentional injuries in the home (suicide and self-harm and family violence) are also viewed by some in the injury prevention and other public health fields as not within the province of injury prevention when, in fact, a collaborative approach between all personnel working on these issues would yield fruitful results.

The area of women's home injury where most research and preventive activity is occurring is home falls in older people. Proven strategies and countermeasures to elderly falls and fall injuries are few, but the list is growing. Funding agencies and governments should be wary of making large-scale investments in approaches that have not yet been shown to be effective in well-designed, controlled evaluations. Results from a number of Australian trials of falls prevention programs that focus on the effectiveness of home fall hazard identification and remediation should be released in late 1999.

There is a strong case for integrating action on some issues. For example, older women are at a higher risk than other age groups of women for home fall injury, serious cutting injury and serious burns and scalds. It appears sensible that these issues be tackled together because the interventions for all three include community education targeting older women, home assessment and hazard remediation and the introduction of safety aids. This study also found that younger women (aged less than 40 years) were a higher risk group for suicide attempts and unintentional poisoning, both of which were largely self-poisoning with prescription and over-the-counter drugs. Again, an integrated approach to these two problems is recommended, including validation of the intentional and accidental poisoning classification of cases. However, caution should be exercised in planning multi-issue and multi-faceted home injury prevention programs because 'pushing' too many issues and messages at once may reduce the impact of a program and spread resources too thinly.

A broad range of strategies and countermeasures to home injury are recommended in this report, including design changes. Generally, where evidence on the effectiveness of an innovative intervention is lacking, funding bodies should be prepared to make adequate investments in both the evaluation research and intervention components of these projects.

Research, development and implementation of a home safety rating system, focussing on structural features and fixtures should be coordinated to address home injuries in all population groups, including adult women.