

Female trauma patients in the emergency department: should their injury prevention programme be different?

KC Chan, E Seow, G Lau, SP Chan, KY Tham

Background: (1) To compare the characteristics of female and male trauma patients seen in the Emergency Department (ED) and (2) to determine if injury prevention programmes for women should be different. **Methods:** A prospective survey was conducted for 11544 trauma patients, aged 15 years and above, who presented to the ED of an urban public hospital in Singapore over 6 months. The following data were collected: demography, place, type and mechanism of injury and subsequent disposition from the ED. **Results:** Almost half (49.5%) the injuries sustained by females occurred at home, with low falls of less than 2 metres being the most common mechanism of injury (52.7%). Victims of domestic violence were predominantly female at $p < 0.0001$. **Conclusion:** Injury prevention programs for women should focus on home safety and low falls. Special assistance programs for the victims of domestic violence should be available in the ED as the latter may be their only access to safety. (*Hong Kong j.emerg.med.* 2003;10:13-18)

Keywords: Emergency department visits, female trauma patients, injury prevention, low falls

Introduction

It was proposed by Gordon¹ that epidemiology could be used as a foundation for injury prevention. The impact (mortality and morbidity) of trauma is not limited to its victims alone but affects society as a whole.

Since Gordon¹ formalised the concept, much progress has been made in identifying and controlling risk factors for different causes of injury²⁻⁴ and for different age-groups especially children^{5,6} and the elderly.^{7,8}

Few⁹⁻¹¹ have studied the differences between the genders. We set out to determine whether the characteristics of our female trauma patients were different from that of our male trauma patients. If present, we would recommend that injury prevention programmes be tailored accordingly.

Correspondence to:

Chan Kim Chai, FRCS(Ed)

Tan Tock Seng Hospital, Department of Emergency Medicine,
11 Jalan Tan Tock Seng, Singapore 308433

Email: kim_chai_chan@tsh.com.sg

Eillyne Seow, FRCS(Ed), FAMS

Tham Kum Ying, FRCS(Ed), FAMS

Centre for Forensic Medicine, Health Sciences Authority,
Singapore

Gilbert Lau, FRCPATH, FAMS

Tan Tock Seng Hospital, Clinical Epidemiology Unit, Singapore
Chan Siew Pang, MSc(Management), MSc(Medical Statistics)

Methods

All trauma patients 15 years and above who presented to the ED of an urban public hospital in Singapore from 1 December 1998 to 31 May 1999 were included in this study.

Interviews with patients were conducted with a close-ended questionnaire. For those who were unable to

answer, the information was obtained from eye-witnesses or ambulance crews.

The following data were obtained:

- a) patient's demographic data
- b) place of injury
- c) mechanism of injury
- d) type of injury (blunt or penetrating)
- e) disposition from ED (died, admitted or discharged)

Data analysis

Aggregate data was analysed by age. Five arbitrary age groups were created (15-34.99, 35-44.99, 45-54.99, 55-64.99 and >65 years) which may best represent patients with similar physiologic reserve, co-morbidity and lifestyle.

Descriptive statistics were performed for the following variables:

- Demographic data
- Mechanism of injury
- Place of incident
- Disposition from ED

Categorical variables were compared using the χ^2 test. Data were analysed using the Statistical Package for the Social Sciences (SPSS).

All statistical tests were conducted at 5% level of significance.

Results

In this study, 11544 cases were recruited. The number of female patients constituted 27.3% (3151) of the study population.

Demographic profile

The demographic profiles of female patients were compared with that of male patients. (Table 1)

Age

There was a statistical difference in the mean age between the female (49.4 years) and the male

(34.6 years) trauma patients ($p < 0.001$). A skewed age distribution was observed for the male study population with the majority within the 15 to 35 age-groups. However, in the female study population, the distribution was bimodal with the first peak in the 15 to 35 age-groups (similar to the male) and the second smaller peak in the age-band older than 65 years.

Ethnicity

There was a significant difference in the ethnic distribution of our female and male study population compared to that of the ED population ($p < 0.001$) and the general population ($p < 0.001$) during the study period. (Table 2)

Table 1. Profile of female and male trauma patients.

	Female (%)	Male (%)
<i>By ethnic group</i>		
Chinese (n=6898)	2413 (76.6)	4485 (53.4)
Malay (n=1015)	256 (8.1)	759 (9.0)
Indian (n=2046)	318 (10.5)	1728 (20.6)
Others (n=1585)	164 (5.2)	1421 (17.0)
Total	3151 (100)	8393 (100)
<i>By age group</i>		
15-24.99 (n=3054)	552 (17.9)	2502 (30.4)
25-34.99 (n=3286)	514 (16.7)	2772 (33.7)
35-44.99 (n=1728)	411 (13.3)	1317 (16.0)
45-54.99 (n=1097)	411 (13.3)	686 (8.3)
55-64.99 (n=701)	287 (9.3)	414 (5.0)
>=65 (n=1454)	910 (29.5)	544 (6.6)
Total (11320)	3085 (100)	8235 (100)

We were not able to ascertain the age-group of 224 patients.

Table 2. Ethnic distribution in the ED population of the study period.

	Female (%)	Male (%)
<i>By ethnic group</i>		
Chinese (n=33182)	13501 (72.4)	19681 (58.8)
Malay (n=5030)	1922 (10.3)	3108 (9.3)
Indian (n=8337)	2104 (11.3)	6233 (18.6)
Others (n=5531)	1102 (6.0)	4429 (13.3)
Total (n=52080)	18629 (100)	33451 (100)

The ethnic distribution of the general population of Singapore consists of Chinese 77%, Malay 14%, Indian 7.6%, other 1.4%.

Place of injury

A significant number of female patients injured themselves at home (1556/3151=49.5%) compared with male patients (14.5%) as shown in Table 3. This difference was evident across the age-bands ($p<0.001$). There was no predominant place of injury in the male population.

Mechanism of injury

34.3% (3948/11544) of these injuries (Table 4) were due to falls from height of less than 2 metres (Fall <2 m). The total incidence in the female study population was 52.7% (1659/3151) compared with 27.3% (2287/8389) for males ($p<0.001$).

Incidence of falls <2 m increased with increasing age and was the main cause of trauma in those above 55 years old. (Table 4)

There were 177 female patients (177/3151=5.6%, 95% confidence interval [CI] 4.4%-6.6%) and 48 male patients (48/8389=0.6%, 95% [CI] 0.4%-0.8%)

who were victims of domestic violence. The majority in both these population were between 22 to 54.99 years old.

Type of injury

Majority of the patients sustained blunt-force injuries (93.9% of females and 88.2% of males).

Disposition from ED

There was a significant difference ($p<0.001$) in the disposition from the ED between the 2 genders. Majority of female patients (76.4%) were discharged which was similar to the male population (80%). 23.6% of the female patients were admitted compared to 19.8% of the male. One female patient and 14 male patients died in the ED.

Discussion

Trauma was the fifth leading cause of death in Singapore in the year 2000.¹² Women formed 26.7% of this population.

Table 3. Place of injury of female and male patients across the age-bands.

Place of injury	Age (years)	15-24.99	25-34.99	35-44.99	45-54.99	55-64.99	>=65
Road	Female	189	137	102	90	42	67
	Male	660	537	322	199	152	97
Work	Female	58	65	44	49	30	21
	Male	601	1448	534	197	64	33
Home	Female	147	191	178	169	150	700
	Male	279	254	162	124	93	279
Common area	Female	92	79	70	78	54	98
	Male	396	322	211	133	82	118
Military	Female	4	0	0	0	0	0
	Male	128	14	2	0	0	0
Entertainment area	Female	6	10	2	3	1	2
	Male	35	28	18	7	3	3
Sports	Female	27	13	4	6	2	0
	Male	320	90	26	7	3	0
Suicide	Female	6	7	0	0	1	2
	Male	6	3	3	0	1	1
Other	Female	23	12	11	16	7	19
	Male	77	76	39	19	16	13
Total		11320	3054	3286	1728	1097	1454

The place of injury was not recorded in 224 cases.

Table 4. Mechanism of injury of female and male patients across the age-bands.

Mechanism of injury	Age (years)	15-24.99	25-34.99	35-44.99	45-54.99	55-64.99	>=65
Vehicle accident	Female	166	122	83	73	27	46
	Male	582	471	274	172	126	69
Domestic violence	Female	23	65	48	27	6	4
	Male	5	18	11	5	5	4
Other assault	Female	44	61	29	23	9	10
	Male	197	259	139	72	32	15
Fall > or=2 m	Female	14	9	3	3	1	5
	Male	64	149	56	18	5	3
Fall <2m	Female	169	147	157	198	186	776
	Male	657	510	324	228	157	376
Low impact collision	Female	119	95	68	69	47	63
	Male	876	1175	445	166	78	57
High impact collision	Female	1	1	3	2	0	0
	Male	33	64	16	11	1	3
Other	Female	17	15	20	17	12	7
	Male	92	130	53	16	11	15
Total		11335	3059	3291	1729	1100	703

Low impact collision refers to lacerations, abrasions and other injuries with low energy transfer. High impact collision includes amputations, crush injuries and other injuries with high energy transfer. The mechanism of injury was not available in 209 cases.

Should it be different for the female trauma patient?

Should injury prevention programmes be targeted?¹³

Our study has shown that there are differences in the characteristics between the female and male trauma patients in our ED population.

Ethnicity had an impact not only between the genders but within the genders. We had compared the ethnic distribution of our study population against that of the ED population during the study period (the study population being a subset of the ED population) and against that of the general population. We were surprised to find it in the female study population but had been expecting it in the male as building and construction industries in Singapore hire a substantial number of foreign workers.

We will have to study further how ethnicity impacts injury. Certain habits or cultural practices may increase the vulnerability of their practitioners to injury.

The mean ages of the female and male population were also different, the female victim being older than the male. The bimodal age distribution in the female population will have to be taken into consideration when developing injury prevention programmes for the female population as the 2 different age-bands will have different expectations and perceptions.

Accidents occurred predominantly at home in the female study population except for the youngest age-band and this increased with increasing age.^{14,15} Home safety programmes targeted at women should begin in school and continued with community outreach programmes. Special attention should be given to those aged 65 and above.¹⁶

The older women in our study population as in Hannan et al's¹⁷ tend to sustain injuries from falls <2 m. A programme similar to one conducted by Hogan⁴ which offered a consultation service using existing health care services may see a reduction of injury in this sub-population. Hogan's⁴ consultancy service

consisted of in-home assessment in conjunction with the development of an individualised treatment plan, including an exercise programme for those deemed likely to benefit.

Even if extra resources have to be committed to such a programme, economic savings can still be made as falls are associated with increased health care costs.¹⁸

As part of any injury prevention programme for women, we would encourage them to have a life-long engagement in exercise. Bischoff et al¹⁹ documented a beneficial effect of former exercise on fall risk at advanced age in women.

Help programmes for women who are victims of domestic violence or at risk of becoming one should be available at the ED as the latter may be their only access to safety.

What role can the ED play in injury prevention?

Cohen and Swift²⁰ described a framework for developing multifaceted approaches to injury prevention. The "spectrum of prevention" comprised of inter-related action levels: 1) strengthening individual knowledge and skills, 2) promoting community education, 3) educating providers, 4) fostering coalition and networks, 5) changing organisational practices and 6) influencing policy and legislation.

ED staff can use all 6 when formulating injury prevention programmes for female trauma patients or any other of our patient population or a few of these tools as recommended by Weigand.²¹

We are convinced that injury prevention programmes for female trauma patients should be different from that for the male and the best place to start is the home.

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