Hospitalisations due to interpersonal violence: a population-based study in Western Australia

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ABSTRACT

Objective: To quantify the impact on the Western Australian health care system of hospitalisations due to interpersonal violence, and to identify risk factors for a repeat hospital admission for interpersonal violence.

Design and setting: A population-based, retrospective study of interpersonal violence in WA using linked data (1990–2004) from the Western Australian Mortality Database, the Hospital Morbidity Data System and the Mental Health Information System.

Main outcome measures: Number of hospitalisations and associated length of stay; risk factors for repeat hospitalisation.

Results: Over the period 1990–2004, there were 36 934 hospital admissions due to interpersonal violence, with 11 507 of these hospitalisations due to a subsequent episode of interpersonal violence. The average length of stay was 2.6 days (SD, 4.9 days). People who were more likely to be readmitted for interpersonal violence included women (adjusted hazard ratio [AHR], 1.31; 95% CI, 1.23–1.39), Indigenous people (AHR, 1.37; 95% CI, 1.28–1.46) and patients with a mental illness (AHR, 1.46; 95% CI, 1.37–1.54). People with more affluent backgrounds tended to have a lower risk of being readmitted than people in the most disadvantaged socioeconomic group.

Conclusion: Greater priority should be directed towards the primary prevention of violence. Groups at high risk, such as women, Indigenous people and those with a mental illness, should be targeted for special attention.

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Interpersonal violence is a significant public health issue in terms of its impact on the community and the health care system, both at a national and international level. Globally, interpersonal violence accounts for 10% of all deaths, which translates to half a million deaths a year.[1] About 11% of these deaths occur in the Western Pacific Region (as defined by the World Health Organization).[2] In Australia, interpersonal violence accounts for 4% of all injury deaths and ranks fifth as a primary reason for death from all other causes.[3,4] In Western Australia, for each year of the period 1989–2000, an estimated 70 000 people were assaulted, about 3000 people were hospitalised as a result of assault or maltreatment, and 30 people were murdered.[5-7] In terms of cost to the community, it was conservatively estimated that a third of the cost of injury in 2003 in WA could be attributed to interpersonal violence.[8]

Interpersonal violence is one of three categories of violence that have been identified by the WHO. The other two categories are self-directed violence (suicide) and collective violence (war). The WHO defines interpersonal violence as:

> The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in, or has a likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation.[9]

This definition includes victimisation perpetrated against intimate partners, parents, siblings, children, other relatives, friends, aquaintances, colleagues and strangers. There are many documented risk factors for interpersonal violence, including gender, age, poverty, alcohol and/or substance misuse disorders, a history of violent behaviour, Indigenous status and mental illness.[9-12] Previous research has also reported increased use of health services by victims of violence.[13] However, there has been little research into which groups are at particularly high risk of being involved in a subsequent incident of interpersonal violence, and, given the high cost to the health care system of such cases, preventive action is needed.

Although there has been a move towards preventive approaches, a lack of data at the population level has made it difficult to develop appropriate, evidence-based initiatives. Different definitions of interpersonal violence, small sample sizes, and lack of adjustment for confounders have been the major limitations to previous observational studies.[10-13]

The aims of our study were to quantify the impact on the WA health care system of hospitalisations due to interpersonal violence and to identify risk factors for repeat hospital admissions for interpersonal violence.

METHODS

We conducted a population-based, retrospective study of all hospital admissions of people of all ages due to interpersonal violence in WA over the period 1990–2004 using linked data from the WA Mortality Database, the Hospital Morbidity Data System (HMDS) and the Mental Health Information System (MHIS).

The Data Linkage Unit at the WA Department of Health retrieved de-identified data for the period 1990–2004. Hospital records in which the primary diagnosis was "injury" and the external cause was "injury inflicted by another" were extracted from the HMDS for the study period. This dataset was externally linked to the WA Mortality Database to identify deaths and the MHIS to identify all mental health service contacts from 1966 onwards. In view of the long-term nature of mental illness, the longer time frame for the MHIS was necessary to ensure that misclassification did not occur.

Definitions

Victim of violence admitted to hospital

A person was defined as a "victim of violence" if:

- The principal diagnosis for at least one hospital separation in the person's record was an injury, as designated by an International classification of diseases diagnosis code between 800.00 and 999.99 (ICD-9-CM),[14] or between S00.0 and T98.3 (ICD-10-AM);[15] and
- There was a primary external cause, with at least one injury in the case record reported to be inflicted by another person,

as designated by an external cause code between E960.0 and E969 (ICD-9-CM) or between X85 and Y09 (ICD-10-AM).

Victim of violence with mental illness admitted to hospital

A person was defined as a "victim of violence with mental illness" if the person met the criteria for being a victim of violence and the medical record included at least one hospital separation for which there was a diagnosis of a mental or behavioural disorder, as designated by a diagnosis code between 290 and 319 (ICD-9-CM) or between F00 and F99 (ICD-10-AM).

Comorbidity

Comorbidity was defined as the presence of one or more specific health conditions at baseline. These were defined using the broad ICD-9-CM and ICD-10-AM chapter headings, unless the condition was an injury at the time of the first admission for interpersonal violence.

Type of assault

The type of assault was defined according to subgroups of the major injury grouping framework devised by the United States Centers for Disease Control and Prevention. The external cause codes for injury inflicted by another were divided into four subgroups based on the method of inflicting injury:

- By bodily force (E960.0 [ICD-9-CM] or Y04 [ICD-10-AM]);
- By a sharp or blunt object (E966, E968.2 [ICD-9-CM] or Y99, Y00 [ICD-10-AM]);
- By maltreatment or rape (E960.1, E967.0–E967.9 [ICD-9-CM] or Y05, Y06.0–Y06.9, Y07.0–Y07.9 [ICD-10-AM]); or
- By other methods (all other codes between E960.0 and E969 [ICD-9-CM] or between X85 and Y09 [ICD-10-AM]).

Statistical analysis

Socioeconomic status was measured using the Socio-Economic Indexes for Areas based on postcode of residence.[16] The classifications were: extremely disadvantaged (< 20th percentile), disadvantaged (20–40th percentile), middle (40–60th percentile), advantaged (60–80th percentile) and extremely advantaged (≥ 80th percentile). Residential location, based on postcode, was categorised as metropolitan, rural or remote using the WA hospital department zones classification.[17]

Descriptive analysis was used to quantify the impact of interpersonal violence on the health care system. The outcome variables were total number of hospitalisations and total length of stay due to interpersonal violence during the study period.

A Cox proportional hazards regression model was used to identify factors independently associated with a repeat hospital admission for interpersonal violence. These factors were age, sex, residential location, type of assault, presence of a mental illness, presence of comorbidities, socioeconomic status, marital status and Indigenous status. The effects of all factors were considered simultaneously in the model. For the analysis, risk factors for repeat hospitalisation were determined using the time from the index admission discharge date to 31 December 2004 (censored) or until death occurred (censored) or until a second admission for interpersonal violence occurred (event). All deaths were regarded as censored regardless of their cause, whereas readmission not due to interpersonal violence was not counted.

Ethics approval

Ethics approval was obtained from the Human Research Ethics Committee of Curtin University of Technology and the Confidentiality of Health Information Committee of WA.

RESULTS

Hospital admissions

Between 1990 and 2004, there were 36 934 hospital admissions resulting from interpersonal violence, with 63% of hospitalisations for male victims. The mean age of those hospitalised was 29.6 years (range, infant to 96 years; SD, 12.2 years) for males and 30.7 years (range, infant to 101 years; SD, 12.2 years) for females. Overall, 26 439 hospitalisations (72%) were incurred by people between 15 and 44 years of age, and 17 384 hospitalisations (47%) were of Indigenous people.

Hospitalisations were evenly distributed across the five socioeconomic groups. Hospital admissions were significantly more common among people who had never married (56%). Thirty-nine per cent of hospital admissions were residents from remote areas, 38% were metropolitan (Perth) residents, and 23% were residents of rural WA. The most common type of assault was injury due to bodily force (42%), followed by injury with a sharp or blunt object (29%), injury due to other methods (specified and unspecified) (22%), and injury due to maltreatment or rape (6%).

Perpetrator–victim relationship

Before 2002, the relationship between the perpetrator and the victim was not recorded in the HMDS database. Therefore, only cases in which people were hospitalised between 1 July 2002 and 31 December 2004 could be analysed. Within this 30-month period, there were 8633 hospitalisations due to interpersonal violence. For about half of these hospitalisations (4263), the relationship code assigned to the record described the perpetrator as either an "unspecified person" (3875 [45%]) or an "other specified person" (388 [5%]). For the remaining 4370 hospitalisations in which the relationship was specified, 2468 of the perpetrators (28%) were either the victim's spouse or partner, with female victims over-represented among this group (91%). A further 541 hospitalisations (6%) involved people victimised by a parent, 415 (5%) by another family member, 310 (4%) by a friend or acquaintance, and 636 (7%) by a perpetrator unknown to the victim.

Impact on the health care system

The number of admissions for interpersonal violence per individual ranged from one to 24. The average length of stay per hospital admission was 2.6 days (range, 1–271 days; SD, 4.90 days). The mean length of stay was similar for males (2.54 days; SD, 4.97 days) and females (2.66 days; SD, 4.77 days). Indigenous people spent an average of 2.70 days (SD, 4.15 days) in hospital compared with 2.48 days (SD, 5.47 days) for non-Indigenous people.

Risk factors for repeat hospital admission

During the study period, there were 11 507 hospital admissions resulting from a second episode of interpersonal violence that was not related to the first episode. Seventy-four per cent ($n = 8545$) of these repeat hospital admissions involved Indigenous people, with the majority being female (65%), whereas most non-Indigenous repeat admissions involved males (79%).

The results of fitting the proportional hazards regression model with individual factors and all factors simultaneously are shown in the Box. Women (adjusted hazard ratio [AHR], 1.31), Indigenous people (AHR, 1.37) and patients with a mental illness (AHR, 1.46) were more likely to incur a subsequent admission for interpersonal violence. People living in rural areas (AHR, 1.48) and remote areas (AHR, 1.75)

of WA were at increased risk of readmission compared with those living in the metropolitan area. Similarly, the presence of comorbidities increased the risk of readmission (AHR, 1.70). However, compared with the most disadvantaged socioeconomic group, people with more affluent backgrounds tended to have a lower likelihood of being readmitted. The risk of repeat hospital admission was also significantly associated with the type of assault as well as the marital status and increasing age of the victim (Box).

DISCUSSION

Our results highlight the burden on the health care system resulting from multiple hospital admissions for interpersonal violence.

Indigenous victims of interpersonal violence accounted for nearly half of all hospitalisations, despite representing only 3%–4% of the WA population. The high rate of hospitalisations among Indigenous people in WA is comparable with data recorded for other states.[18,19]

Our finding that people with a mental illness were significantly more likely to be readmitted than those without is consistent with previous reports of a positive association between mental illness and the risk of violence.[20-22] Women and Indigenous people were also at an increased risk for a second hospital admission for interpersonal violence. In developing a response to violence and its associated problems (such as psychological harm), a variety of agencies and sectors of the community should be involved in prevention activities, and programs should be tailored to suit different cultural settings and population subgroups. Evaluation should be an integral part of any intervention program, so that lessons can be learnt and shared regarding what may and may not help to prevent violence.

Additionally, living in rural or remote areas posed significant risk for a repeat hospital admission for interpersonal violence. This is an important finding because, to be effective, services and preventive efforts must be appropriately focused on groups and areas identified as being at high risk.

The presence of comorbidities increased the risk of a repeat hospital admission due to interpersonal violence. Indeed, recent research shows that interpersonal violence has wide ranging consequences for the victim's physical and mental health that may transcend the specific effects of the violent event itself.[9,23,24]

Risk factors for a repeat hospital admission for interpersonal violence ($n = 22\,471$)

Factor	Unadjusted hazard ratio	Adjusted hazard ratio (95% CI)	*P*
Age (mean, 29.1 years; SD, 12.9)*	1.01	0.99 (0.98–0.99)	< 0.001†
Presence of mental illness			< 0.001†
No mental illness‡			
Mental illness	1.89	1.46 (1.37–1.54)	
Sex			< 0.001†
Male‡			
Female	1.79	1.31 (1.23–1.39)	
Indigenous status			< 0.001†
Non-Indigenous‡			
Indigenous	2.44	1.37 (1.28–1.46)	
Type of assault			< 0.001†
Bodily force‡			
Sharp or blunt object	1.37	1.07 (1.01–1.15)	0.032
Rape or maltreatment	0.99	0.73 (0.64–0.83)	< 0.001
Other methods	1.04	0.95 (0.88–1.03)	0.20
Marital status			< 0.001†
Not married at the time‡			
Married	1.51	1.17 (1.10–1.26)	< 0.001
Separated or divorced	0.99	1.04 (0.91–1.18)	0.55
Socioeconomic status			< 0.001†
Extremely disadvantaged‡			
Disadvantaged	0.59	0.80 (0.74–0.87)	< 0.001
Middle	0.61	0.88 (0.80–0.96)	0.01
Advantaged	0.54	0.79 (0.73–0.86)	< 0.001
Extremely advantaged	0.33	0.69 (0.62–0.76)	< 0.001
Residential location§			< 0.001†
Metropolitan‡			
Rural	1.90	1.48 (1.36–1.60)	< 0.001
Remote	2.73	1.75 (1.61–1.89)	< 0.001
Presence of comorbidities			< 0.001†
No comorbidity‡			
Comorbidity	1.82	1.70 (1.65–1.73)	

* There was no reference category for age, as it is a continuous variable. Risk of repeat admission was associated with increasing age. † Overall *P* value for category. ‡ Reference category. § Some data were missing. ◆

Low socioeconomic status, in particular the extremely disadvantaged group, was likely to be associated with a repeat episode of violence. The result lends support to the literature showing that interpersonal violence rises as area-level disadvantage increases.[13]

A limitation of our study was that the HMDS captured only victims that sought treatment at a hospital. It is well known that many violent events in domestic situations are never reported.[25,26] Therefore, the hospitalisation cases studied are likely to be those at the moderate-to-severe end of the injury spectrum. Nevertheless, hospital records can serve as good indicators of interpersonal violence at the community level as far as serious injury is concerned.

Another limitation was the lack of lifestyle information such as smoking status, alcohol and drug usage, and living conditions. Socioeconomic status categories, which were based on residential postcodes, may not have been accurate. Moreover, the presence of comorbidities referred to other conditions recorded at the first hospital admission.

Despite these limitations, we believe the results of our study will help researchers to plan and implement future interventions to reduce interpersonal violence in WA.

In conclusion, priority should be directed towards the primary prevention of violence. This will ultimately reduce hospitalisations due to interpersonal violence. High-risk groups such as women, Indigenous people and those with a mental illness should be targeted for special attention.

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COMPETING INTERESTS

None identified.

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Artist: Shorty Robertson *(see page 593)*