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Measuring the burden of interpersonal violence victimisation in Western Australia

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People who have been victimised by interpersonal violence have an increased risk of mental illness, and associated hospitalisation costs burden the Australian population. A paucity of data makes it difficult to develop appropriate preventative initiatives. This paper outlines a population-based study in Western Australia investigating mental illness in hospitalised victims due to interpersonal violence. Groups at risk of interpersonal violence include young people between 20 and 29 years old and Indigenous females. One in four hospital admissions for interpersonal violence also had a hospital admission for a mental illness during the study period. Hospital admission costs vary, with higher mean costs per hospital admission for males and the non-Indigenous population. Indigenous people are overrepresented as victims of interpersonal violence, contributing 41 percent of total hospital costs. Since 1998, there has been a small, steady decrease in overall hospitalisation rate, although an increase in that for Indigenous females with a mental illness.

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The World Health Organization (WHO) identifies three categories of violence: interpersonal, self-directed (i.e. suicide) and collective (i.e. war). The WHO has defined 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, mal-development or deprivation' (Krug et al. 2002: 5).This definition includes victimisation perpetrated against intimate partners, parents, siblings, children, other relatives, friends, acquaintances, colleagues and strangers (Krug et al. 2002). It also identifies psychological harm as one of the possible outcomes of interpersonal violence (Krug et al. 2002). Mental illness is more prevalent among this particular group (Taft 2003), particularly among individuals who have a history of alcohol and substance misuse, self-harm and suicide, depression, phobias, schizophrenia, anxiety disorders and post-traumatic stress disorder (Fergusson & Lynskey 1997; Roberts et al. 1998; Coker et al. 2002; Briere & Elliot 2003; Coid et al. 2003; Lau et al. 2003). People who have been victimised have an increased risk of psychiatric symptoms and are at a greater risk of lifetime victimisation. Additionally, the direct and indirect costs of interpersonal violence and mental illness also place a significant burden on the Australian population. Such a burden may be amplified due to a range of underlying risk factors, which can contribute to a cycle of violence within communities. Despite a move towards prevention from the public health field, a lack of data at the population level has made it difficult to develop appropriate, evidence-informed initiatives. Different definitions, small sample sizes and lack of adjustment for confounders were major limitations in previous observational studies. The proposed population-based study will use linked data from the Western Australian Data Linkage System to investigate the prevalence of mental

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illnesses among victims hospitalised due to interpersonal violence. The Western Australian Data Linkage System is an interlinking system of hospital and other health records developed in Western Australia (WA). It systematically links the administrative health data such as morbidity, mortality and mental health data. Every individual in WA who was admitted to hospital or killed as a result of an injury inflicted by others was identified using the Data Linkage System, and this information linked to any past admission for a mental illness. This report presents the findings from research which documents the demographic characteristics and prevalence of mental illness in victims admitted to hospital in WA due to interpersonal violence, the health care costs of interpersonal violence, and the share accounted for by people with and without mental illness.

It is anticipated that the findings will provide information, to strengthen the rationale for prioritising this issue and providing a baseline for subsequent monitoring and evaluation. It will also provide a basis for making informed decisions on the allocation of resources to intervene in this issue.

Methods

Research design

A population-based, retrospective study of interpersonal violence in Western Australia was undertaken using linked data from the Western Australian Mortality Database, the Hospital Morbidity Data System (HMDS) and the Western Australian Mental Health Information System (MHIS) from 1990 to 2004. These data are currently held at the Western Australian Department of Health.

Quantification of interpersonal violence and mental illness

The Data Linkage Unit retrieved de-identified data between 1990 and 2004. Hospital records in which the primary diagnosis was an 'injury' and the external cause was 'injury inflicted by another' were extracted from the HMDS for the study period. This dataset was linked to the Western Australian Mortality Database to identify deaths for the study period, and to the MHIS to identify all mental health service contacts from 1966 onwards.

VICTIM OF VIOLENCE ADMITTED TO HOSPITAL

A case was defined as a 'victim of violence' if the principal diagnosis for at least one hospital separation in the case's record was an 'injury' as designated by a diagnosis code between 800.00 and 999.99 (Chapter 17, ICD-9-CM), or between S00.0 and T98.3 (Chapter XIX, ICD-10-AM), and a primary external cause indicating that at least one injury in the case record was 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 case was defined as a 'victim of violence with a mental illness' if the case met the criteria for 'victim of violence' and the case's record included at least one hospital separation for which any diagnosis is a mental or behavioural disorder, as designated by a diagnosis code between 290 and 319 (Chapter V, ICD-9-AM), or F00 and F99 (Chapter V, ICD-10-AM). Cases with mental illness were categorised according to type of mental illness using ICD-9-CM and ICD-10-AM chapter sub-headings (e.g. mood (affective) disorders).

Statistical analysis

Plausibility checks were conducted and inconsistent data cleaned prior to statistical analysis. Descriptive statistics were used to describe the trends in hospital admissions and demographic characteristics of the sample including age, gender, residential location and Indigenous status. Population rates, such as crude rates and age-standardised rates per 100,000 population, were calculated based on the relevant (mid-year) Western Australian population data for 1990 to 2004 obtained from the Australian Bureau of Statistics.

Indigenous status was defined as being Indigenous and/or Torres Strait Islander or not. Residential location using patients' postcodes was categorised into metropolitan, rural or remote using the Western Australian Department of Health's zones classification.

Economic analysis

The linked data were used to calculate the health system costs of interpersonal violence and the share of these costs attributable to patients with mental illness. Only the cost of hospital inpatient episodes were included in the economic analysis, which account for the major share of health system costs (Mathers & Penm 1999). The Australian Related–Diagnostic Related Group (AR–DRG) cost weights give the relative cost of a hospital admission for each AR–DRG, and these cost weights were multiplied by the average cost of a hospital admission to estimate the cost of each hospital admission. The cost weights for the AR–DRGs were obtained from the annual national hospital costing study (Australian Government Department of Health and Ageing (AGDHA) 2003; AGDHA 2004; AGDHA 2005; AGDHA 2006). Unit cost data for earlier years were converted to 2004 Australian dollars based on the hospital price index published by the Australian Institute of Health and Welfare (AIHW 2006). The economic analysis was conducted for the three-year period from 2002 to 2004. Unit cost data for AR–DRGs were not available for the full period of the study, which prevented a trend analysis over the entire period to be conducted. Given that the mean cost per hospital admission did not vary much on a year-to-year basis, a three-year period

was considered sufficient to examine the cost characteristics of hospital admissions due to interpersonal violence.

Ethical issues

Ethical approval was obtained from both the Human Research Ethics Committee at Curtin University of Technology and The Confidentiality of Health Information Committee (CHIC), an independent committee appointed by the Minister for Health in Western Australia.

Results

The total number of hospital admissions for interpersonal violence between 1990 and 2004 was 36,934, with 63 percent of victims being male. The average age among the cohort was 30.0 (SD=12.2) years with the average age similar for males (29.6, SD=12.2) and females (30.7, SD=12.2). Overall, 72 percent (n= 26,439) of hospitalisations were for people between the ages of 15 and 44 years. Within this age range, those between the ages of 20 and 29 years were at greatest risk, comprising over half (52%, n=13,704) of all hospitalisations. Indigenous people were overrepresented among the victims of interpersonal violence, accounting for 47.1 percent (n=17,384) of hospitalisations.

Western Australian Mortality Database

There were 425 deaths due to interpersonal violence during the study period, with males accounting for 57 percent (n=271). Indigenous people represented 20 percent (n=83) and non-Indigenous people 73 percent (n=342) of deaths due to interpersonal violence. Both Indigenous and non-Indigenous people aged 25 to 39 years had the greatest proportion of deaths (35%, n=149). The highest proportion among Indigenous people were aged 30 to 34 years (19%, n=16) compared with non-Indigenous people who were aged 35 to 39 years (15%, n=48).

Table 1: Number and rate of hospitalisations for interpersonal violence victimisation for individuals with and without a mental illness, Western Australia, 1990–2004

	Mental illness		No mental illness	
Year	Number	Rate[a]	Number	Rate[a]
1990	322	19.9	1,298	80.4
1991	354	21.6	1,407	85.9
1992	419	25.2	1,517	91.4
1993	571	34.0	1,748	104.1
1994	650	38.1	1,817	106.6
1995	747	43.0	1,800	103.8
1996	760	43.0	1,912	108.3
1997	768	42.7	1,812	100.9
1998	828	45.4	2,023	110.9
1999	772	41.7	1,855	100.2
2000	738	39.3	1,808	96.4
2001	741	38.9	1,991	104.7
2002	702	36.4	2,145	111.2
2003	745	38.2	2,016	103.3
2004	729	36.8	1,939	98.0
Total	9,846	36.6	27,088	100.7

a: per 100,000 population

Victims of violence and a mental illness

Of the 36,934 hospitalisations due to interpersonal violence, 9,846 (27%) had a mental health admission in their hospital records during the study period. Table 1 presents the number and crude rate of admissions to hospital for interpersonal violence victimisation for those with and without a mental illness (a hospital admission for a diagnosed mental illness during the study period). The overall rate of hospital admissions due to interpersonal violence from 1990 to 2004 for those with a mental illness was 36.6 per 100,000 population compared with 100.7 per 100,000 population for those without a mental illness. The rate decreased between 2003 and 2004 for those with a mental illness (4%), and for those without a mental illness (5%).

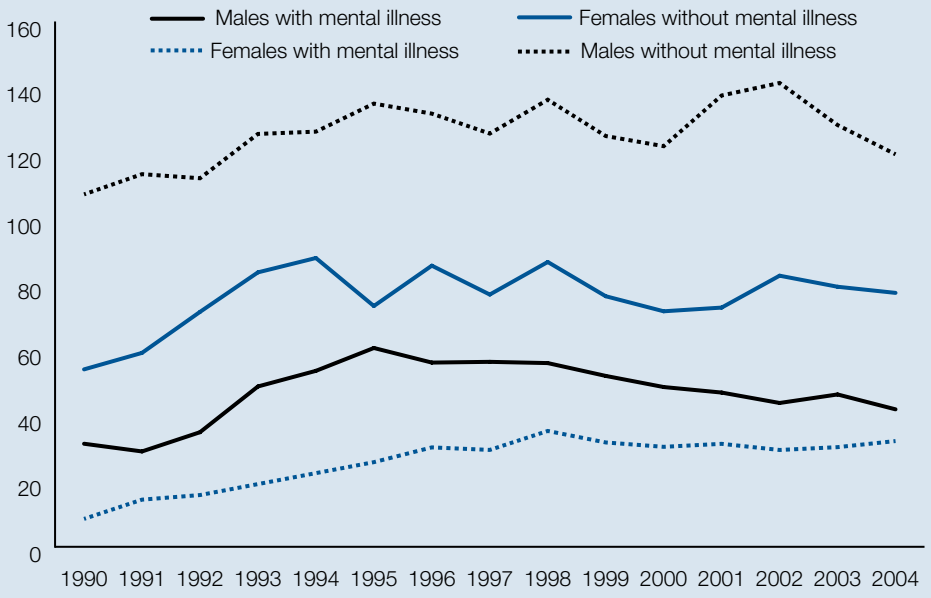
Figure 1 shows gender differences in the rate of hospital admission for interpersonal violence for those with and without a mental illness. The rate of hospital admissions for males with and without a mental illness decreased in 2004 compared to 2003. While the rate of hospitalisations also decreased for females without a mental illness, an increasing trend was evident for females with a mental illness in 2004 compared with 2003.

Fifty-three percent of the 9,846 hospitalisations due to interpersonal violence and a hospital admission for a mental illness were for Indigenous people (n=5,201). The overall rate of hospitalisations for Indigenous people with a mental illness and a violent altercation was 574.5 per 100,000 population during the study period. In particular, the rate of hospitalisations for Indigenous females showed an increasing trend, and was consistently higher than Indigenous males since 1998.

Cost to health care system

The cost of interpersonal violence to the hospital system in Western Australia fell from $9.7 million in 2002 to $9.0 million

Figure 1: Rate of hospitalisation for interpersonal violence victimisation with and without a mental illness by gender, Western Australia, 1990–2004[a]



a: per 100,000 population

Table 2: Mean cost per hospital admission and annual total hospital costs due to interpersonal violence by year, 2002–04, constant 2004 dollars

Year	Number	Mean cost per hospital admission ($)	Annual total hospital costs ($000)
2002	2,847	3,417	9,728
2003	2,761	3,358	9,272
2004	2,668	3,383	9,026
Total	8,276	3,386	28,026

in 2004, due largely to the decrease in the total number of admissions from interpersonal violence (Table 2). The mean cost per hospital admission for these years, expressed in constant 2004 dollars, was $3,387, with little year-to-year variation.

Males accounted for approximately two-thirds of the total cost of hospital admissions due to interpersonal violence in Western Australia, above their share of hospital admissions during the period (62%) (Table 3). This was a consequence of their higher mean cost per admission, which was statistically significantly above ($3,707) the mean cost per admission for females ($2,874) ($p < 0.001$).

Two age groups, the 15 to 29-year-olds and the 30 to 44-year-olds, accounted for over 80 percent of the total cost of hospital admissions. No significant differences were evident in the mean cost per admission by age group, although when gender was taken into account some groups had considerably higher than average costs per admission. In particular, young females in the 0 to 14 year age group had a very high mean cost per admission ($4,872), and males in the 30 to 44 year age group and females over 60 years also had higher than average admission costs.

Evidence of cost differences based on Indigenous status was found (Table 4). Given their higher overrepresentation among victims of interpersonal violence, Indigenous people accounted for a substantially higher share of hospital costs (41%) than their share of approximately 3 to 4 percent of the Western Australian population. However, their mean cost per admission was significantly below that for non-Indigenous people ($p<0.001$).

No statistically significant differences were found in the mean cost per hospital admission of victims of interpersonal violence with and without a mental illness. Victims of interpersonal violence with a mental illness accounted for 38 percent of the total hospital costs of interpersonal violence, similar to their share of hospital admissions (40%).

Discussion

The research indicated the number of hospital admissions for interpersonal violence victimisation and a hospital admission for a mental illness which occurred in Western Australia from 1990 to 2004. The study found that one in four hospital admissions for interpersonal violence also had a mental health admission in their hospital records during the study period. While the overall hospitalisation rate for victims of violence with a mental illness showed a small, steady decrease since 1998, there was an increase in the rate of hospitalisation for females with a mental illness, particularly Indigenous females. However, the results do not indicate the specific psychiatric condition that could manifest as a result of victimisation. The linked data provide an opportunity for future research to examine in greater detail the psychological harm outcomes that might arise from each type of assault or maltreatment (i.e. physical or sexual) in childhood or adulthood. To date, there has been minimal research in this area.

Interpersonal violence prevention programs and the provision of services should be focused on those that are more likely to be involved in these situations. Indigenous people were

Table 3: Mean cost per hospital admission and total hospital costs due to interpersonal violence by age and gender, 2002–04, expressed in constant 2004 dollars

Gender	Age group (years)	Number	Mean cost per hospital admission ($)	Total hospital costs ($000)	Total hospital costs (%)
Male	0–14	209	2,639	552	2.0
	15–29	2,529	3,552	8,983	32.1
	30–44	1,709	4,070	6,956	24.8
	45–60	519	3,771	1,957	7.0
	>60	124	3,405	422	1.5
	All ages	5,090	3,707	18,870	67.3
Female	0–14	141	4,872	687	2.5
	15–29	1,266	2,697	3,414	12.2
	30–44	1,379	2,780	3,834	13.7
	45–60	320	2,826	904	3.2
	>60	80	3,960	317	1.1
	All ages	3,186	2,874	9,156	32.7
Total	0–14	350	3,539	1,239	4.4
	15–29	3,795	3,267	12,397	44.3
	30–44	3,088	3,494	10,790	38.5
	45–60	839	3,410	2,861	10.2
	>60	204	3,622	739	2.6
	All ages	8,276	3,387	28,026	100.0

Table 4: Mean cost per hospital admission and total hospital costs due to interpersonal violence by selected characteristics, constant 2004 dollars

Variables	Number	Mean cost per hospital admission ($)	Total hospital costs ($000)	Total hospital costs (%)
Indigenous status				
Indigenous	4,098	2,805	11,495	41.0
Non-Indigenous	4,178	3,957	16,532	59.0
Mental health status				
Mental illness	3,282	3,274	10,745	38.3
No mental illness	4,994	3,461	17,284	61.7

considerably overrepresented in this study, which is consistent with previous research (Gavin & Gillam 2005; Ferrante et al. 1996). Females, particularly Indigenous females, adolescents and young adults, were at an increased risk for hospital admissions for interpersonal violence, so these groups should be targeted for specific attention. However, this study is limited in terms of identifying the victim–perpetrator relationship and the type of violent incident, which is crucial to understanding and providing a more accurate picture of interpersonal violence. Recording the victim–perpetrator relationship needs to be improved in the hospital records so that the comparisons of specific types of interpersonal violence – such as intimate partner violence, which is highly prevalent – can be compared with other types of violence and examined in greater detail.

Interpersonal violence was also a considerable burden on the health system, costing between $9 million and $10 million annually. Some groups were found to be particularly disadvantaged due to interpersonal violence. In some cases, this finding reflected the overrepresentation of these groups as victims of interpersonal violence, such as the Indigenous population. Some groups also had a significantly higher mean cost per hospital admission than others. For example, young females had a mean cost per admission that was 40 percent above the mean cost across all admissions for interpersonal violence. While the data analysis does not enable the causes of these higher than average costs to be determined, this finding may suggest these groups are at particularly high risk of more severe injury or do not have access to adequate health care services, and warrant greater attention with regards to preventive action.

The hospital costs of interpersonal violence reported in this study represent only a small share of the overall burden of interpersonal violence. The full economic effects of interpersonal violence include a much broader range of cost categories, including other direct costs such as to the judicial and penal systems, policing and incarceration, and the indirect or longer term costs of acts of violence on perpetrators and victims including lost wages, psychological effects, and the impact on children and families.

The record linkage methodology is powerful in that it makes available comprehensive information on a total population. However, there are several limitations when using the linked data. The databases used in this study cover only those who seek treatment at a hospital. Clearly, there are individuals who have been involved in a violent altercation and do not seek treatment as a result of an injury. Also, the MHIS does not cover all patients who have a mental illness.

Many victims of violence with a mental illness do not seek treatment and some may be treated only by general practitioners or by private psychiatrists on an outpatient basis. Since these patients may have less severe injuries as a result of interpersonal violence or less severe forms of a mental illness, these cases would not be captured by the HMDS or the MHIS databases. It is well known that underreporting tends to occur particularly among Indigenous people and incidents involving domestic violence (Gavin & Gillam 2005). Limited access to hospitals in some areas, particularly rural and remote areas, may also result in underreporting (Gillam et al. 2003). Therefore, the true number of cases involving interpersonal violence hospitalisation rates may actually be higher than what has been found in this study. Finally, no information was available on lifestyle factors such as smoking status, alcohol and drug usage, living conditions or individual measures of socioeconomic status other than those using area-based measures.

Some limitations relate to the economic analysis. Only hospital costs were included in the analysis of the costs of interpersonal data due to lack of data availability for resource use and unit cost of most other health services. National hospital unit cost data were used to cost all hospital admissions relating to interpersonal violence in Western Australia during the study period. In reality, the cost of hospital admissions will vary by type of hospital (for example, teaching versus non-teaching, metropolitan versus non-metropolitan, public versus private), but the data were not available to cost every hospital type separately. While some of these unit cost data were available (for example, public versus private hospitals), the task of adjusting unit costs for hospital type was beyond the scope of this project.

Conclusions

Despite these limitations, the results of this study have provided some useful findings relating to interpersonal violence and mental illness. In conclusion, future research should also be conducted to determine the reasons why some groups such as Indigenous people and young females who are victims of interpersonal violence have significantly higher mean costs per hospital admission. This information is required to ensure that future policy development to address interpersonal violence is correctly targeted at areas that are causing the greatest problem and disadvantage.

References

All URLs were correct at 28 March 2007

Australian Government Department of Health and Ageing 2003. *Round 6 (2001–2002) cost report*. National Hospital Cost Data Collection. http://www.health.gov.au/internet/wcms/publishing.nsf/Content/health-casemix-costing-fc_r6.htm

Australian Government Department of Health and Ageing 2004. *Round 7 (2002–2003) cost report*. National Hospital Cost Data Collection. http://www.health.gov.au/internet/wcms/publishing.nsf/Content/health-casemix-costing-fc_r7.htm

Australian Government Department of Health and Ageing 2005. *Round 8 (2003–2004) cost report*. National Hospital Cost Data Collection. http://www.health.gov.au/internet/wcms/publishing.nsf/Content/health-casemix-costing-fc_r8.htm

Australian Government Department of Health and Ageing 2006 *Round 9 (2004–2005) cost report*. National Hospital Cost Data Collection. http://www.health.gov.au/internet/wcms/publishing.nsf/Content/health-casemix-costing-fc_r9.htm

Australian Institute of Health and Welfare 2006. *Health Expenditure Australia 2004–05*. Health and welfare expenditure series no. 28. Canberra: AIHW

Briere J & Elliott DM 2003. Prevalence and psychological sequelae of self-reported childhood physical and sexual abuse in a general population sample of men and women. *Child abuse & neglect* 27: 1205–1222

Coid J, Petruckentch A, Chung WS, Richardson J, Moorey S & Feder G 2003. Abusive experiences and psychiatric morbidity in women primary care attenders, *The British journal of psychiatry* 183: 332–339

Coker AL, Davis KE, Arias I, Desai S, Sanderson M, Brandt HM & Smith PH 2002. Physical and mental health effects of intimate partner violence for men and women. *American journal of preventive medicine* 23(4): 260–268

Ferrante A, Morgan F, Indermaur D & Harding R 1996. *Measuring the extent of domestic violence*. Sydney: Hawkins Press

Fergusson DM & Lynskey MT 1997. Physical punishment/maltreatment during childhood and adjustment in young adulthood. *Journal of child psychology and psychiatry* 38(6): 633–644

Gavin A & Gillam C 2005. *Hospital admissions due to intimate partner violence in Western Australia 1994–2003*. Report prepared for Department of Health, Western Australia

Gillam C, Legge M, Stevenson M & Gavin A 2003. *Injury in Western Australia: an epidemiology of injury 1989 to 2000*. Department of Health, Western Australia

Krug EG, Dahlberg LL, Mercy JA, Zwu AB & Lozano R (eds) 2002. *World report on violence and health*. Geneva: World Health Organization

Lau AS, Litrownik AJ, Newton RR & Landsverk J 2003. Going home: the complex effects of reunification on internalizing problems among children in foster care. *Journal of abnormal child psychology* 31(4): 345–358

Mathers C & Penm R 1999. *Health system costs of injury, poisoning and musculoskeletal disorders in Australia 1993–94*. Health and welfare expenditure series no. 6. Canberra: Australian Institute of Institute and Welfare

Roberts GL, Williams GM, Lawrence JM & Raphael B 1998. How does domestic violence affect women's mental health? *Women & health* 28(1): 117–129

Taft A 2003. *Promoting women's mental health: the challenges of intimate/domestic violence against women*. Paper no. 8. Australian Domestic and Family Violence Clearinghouse, New South Wales

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