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Mortality and morbidity in prisoners after release from prison in Western Australia 1995–2003

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Research and Public Policy Series

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Foreword

Prisoners, both in custody and after release, are widely recognised as having poorer health than members of the general community. Several previous studies have highlighted the greater risk of death after release, while others have described in detail the poor health often suffered by prisoners in custody, including cases of hepatitis C, HIV-AIDS and a significantly higher prevalence of mental disorders. The National Deaths in Custody Program annual report for 2004, produced by the Australian Institute of Criminology (Joudo & Veld 2005), and *Interventions for prisoners returning to the community* (Borzycki 2005) are recent Australian examples of such work, while another study from Finland has described increased rates of injury among male offenders and poisoning among female offenders after their release compared with non-offenders (Joukamaa 1998).

The Borzycki study documents a number of challenges that need to be met after a prisoner's release in order to minimise the risk of recidivism. Addictive behaviours, a lack of life and work experience outside the prison environment, and the absence of a supporting social network are all identified as factors that contribute to a much greater likelihood of reoffending. Poor health is another of these factors, and one that magnifies those alreadyin place. The released prisoner with hepatitis C may turn to drugs to ease their situation; one with tuberculosis may experience difficulty in finding work, while a prisoner with HIV-AIDS may find their old social support network no longer exists. A study that tracks released prisoners through the health and mental health system and identifies their service needs is therefore a first step in developing a program to dramatically reduce the incidence of recidivist behaviour.

This report has used data from the Western Australian Data Linkage System, which enables administrative records from organisations including prisons, police and hospitals to be linked to each other, to produce such a study. It is probably the first of its kind in Australia, and provides a study cohort of all persons who were in prison in Western Australia on 1 January 1995 or were imprisoned after that date up to and including 31 December 2001 by sex and Indigenous status. It draws on information from Western Australia's Department of Justice, Mental Health Service and hospital morbidity records with the aims of identifying the major risk factors for early death after release from prison and the use of hospital and mental health services following release.

This work adds to and expands on that produced under the AIC's National Deaths in Custody Program since 1993, and was funded by the Criminology Research Council and the Western Australian Department of Justice. It is a ground breaking project regarding its use of administrative data linking and is the most detailed yet concerning the health needs and challenges of released prisoners in Australia.

Toni Makkai
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We wish to thank the Department of Health and Department of Justice for allowing us access to the information required for the study. Data linkage for the study was undertaken by the Data Linkage Unit in the Health Information Centre in the Department of Health.

We also wish to thank the many people who provided us with helpful comments on the manuscript. The ideas expressed in the report are however, attributable entirely to the authors of the study.

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Disclaimer

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Summary

Background

Released prisoners are generally assumed to have poor health compared with members of the general population. Previous studies, including a recent study in Western Australia, have shown that released prisoners are at greater risk of death compared with the general population, particularly in the first few months after release. Other studies describing the health of prisoners during imprisonment have emphasised high prevalences of mental disorders, addictive behaviours and infectious diseases including HIV-AIDS and hepatitis C, all of which are likely to affect health after release. There have, however, been few systematic studies of general health problems in released prisoners, due to the difficulty in identifying prisoners in routinely collected health statistics. In Western Australia this has become possible through the development of the Western Australian Data Linkage System (WADLS) that enables data from statistical health collections, including hospital admissions, mental health services and deaths, to be linked to other administrative records.

Objectives

The objectives of the present study were to:

- compare mortality in released prisoners with the general population and identify factors associated with increased risk of deaths after release from prison
- compare patterns of use of hospital and mental health services (MHS) by released prisoners with the use of such services by the general population and identify factors associated with increased risk of use of services in released prisoners.

Methods

Selected information relating to individual prisoners released from prison in the period 1995–2001 was extracted from Department of Justice (DoJ) records and linked to health data for the same individuals accumulated over the period 1980–2003. From this, information was selected relating to hospital admissions or MHS contacts for each prisoner during the five years prior to the date of first release from prison and all hospital admissions, MHS contacts or deaths after the date of first release up to 31 December 2003, providing a minimum follow-up period of two years. The total number of days spent in the community by individual prisoners after first release (subtracting days of any subsequent imprisonments) until death or 31 December 2003 was determined.

Standard statistical methods were used to compare risks of death, hospital admission or MHS contact with those in the general population and to describe patterns of health service

use by prisoners before and after the date of first release from prison. Results were determined separately for Indigenous female and male prisoners and non-Indigenous female and male prisoners, and for principal disease conditions and causes of injury leading to death or hospital admission.

Results

The study cohort

The study cohort consisted of 13,667 persons released from prisons in Western Australia in the six years 1995–2001 inclusive. Subjects were followed for a minimum period of two years, to the end of 2003. The average time of follow-up in the community, excluding further spells in prison, was 4.61 years.

Male offenders (88.3%) greatly outnumbered female offenders. Indigenous prisoners accounted for 36.1 percent of the cohort. The age of subjects at the date of first release ranged from 16 years to 87 years, with a mean age of 30 years and median of 28 years. The median age of non-Indigenous prisoners was 29 years compared with 27 years in Indigenous prisoners.

During the study period, members of the study cohort were released from prison on 28,439 occasions. The number of times individual prisoners were released during the study period ranged from one to 20 with the majority (56.9%) of prisoners being released once only (73.0% in non-Indigenous female prisoners; 65.3% in non-Indigenous male prisoners; 56.0% in Indigenous female prisoners; 38.2% in Indigenous male prisoners). The mean number of releases in Indigenous prisoners (2.07 and 2.76 for females and males, respectively) was higher than in non-Indigenous (1.61 and 1.78 for females and males, respectively).

Mortality after release from prison

Ex-prisoners had substantially higher risks of death than the general population after adjustment for age. In those aged 20–39 years, mortality rates per 1,000 person-years were 4.5 in Indigenous female prisoners, 7.0 in non-Indigenous female prisoners, 7.9 in Indigenous male prisoners and 4.8 in non-Indigenous male prisoners. Compared with the corresponding group in the general population the relative risk of death (based on rate ratios) were 3.1 in Indigenous female prisoners, 14.0 in non-Indigenous female prisoners, 1.8 in Indigenous male prisoners and 4.0 in non-Indigenous male prisoners. These differences were particularly marked in those under 30 years of age.

Deaths due to injury or poisoning or acute and chronic effects of alcohol or drug addiction accounted for over 60 percent of all deaths and much of the excess risk in mortality in released prisoners. The risk of death was greatest soon after release from prison, with death rates in the first six months being four times greater than after one year. Deaths related to alcohol and drug addiction or from injury and poisoning were eleven and five times greater respectively in the first six months than after one year. This temporal relationship supports the suggestion that the excess mortality in prisoners is due principally to the effects of alcohol and drug addiction or injury and poisoning.

Multivariate analysis found that within the cohort, the risk of death increased with age, was 37 percent greater in Indigenous prisoners, and increased by 27 percent with each additional release from prison.

Morbidity after release from prison

After adjustment for age, released prisoners had substantially higher hospital admission rates or contacts with the MHS than the general population. As in the case of mortality, the relative differences in morbidity were present at all ages but especially large in those under 30 years of age.

Indigenous prisoners were between three and four times more likely to be admitted to hospital than persons in the general population of WA and between one and two times more likely than the general Indigenous population of WA. Non-Indigenous prisoners were between 1.5 and two times more likely to be admitted to hospital than the non-Indigenous population of WA.

The relative risk of hospitalisation in released prisoners was greatest for injury and poisoning, and mental disorders (including acute and chronic effects of alcohol and drug addiction). These disorders were also among the commonest conditions leading to hospitalisation with approximately 20 percent of all prisoners being admitted to hospital at least once for these conditions in the follow-up period.

In addition to admissions for injury and poisoning and mental disorders, Indigenous prisoners had high relative and absolute risks of hospitalisation for a wide range of health problems including infectious and parasitic disease, and endocrine, cardiovascular, respiratory and skin diseases.

Morbidity before imprisonment

The study found that levels and patterns of hospitalisation in the five years before the date of first release were similar to those after release over approximately the same time (average follow-up period of 4.61 years). The percentage of prisoners admitted for particular conditions before and after first release was similar, as were variations in admissions by gender and Indigenous status*.

It was further shown that morbidity before first release was strongly predictive of morbidity after release: prisoners who had hospital admissions or MHS contacts in the five years before release were nearly twice as likely to have such contacts after release. In the case of admissions for poisoning, the risk was five times greater, and over twice as great for injury or mental problems.

Multiple offenders had higher levels of morbidity prior to imprisonment. This was greater in non-Indigenous prisoners (both males and females) than in Indigenous prisoners and was particularly marked for injury and poisoning and mental disorders.

Conclusions

Released prisoners are at substantially greater risk of death and illness leading to hospitalisation or contact with MHS than members of the general population. They also have high levels of hospitalisation and contacts with MHS before imprisonment suggesting that their health problems are long-standing and related to long term social disadvantage. Prisoners in general have increased risks of mental disorders (including acute and chronic problems related to alcohol and drug addiction) and admissions for injury and poisoning. Such disorders are particularly prevalent in female prisoners. Indigenous prisoners have in addition, higher rates of hospital admission rates for a wide range of infective and chronic diseases, indicating poorer general standards of health.

The findings of the study indicate the need for careful release planning to ensure that released prisoners have easy access to appropriate health services and are encouraged to use them.

* Indigenous status means someone who self-identifies as being of Aboriginal or Torres Strait Islander origin.

Introduction

The difficulties facing ex-prisoners after release into the community are many. They include problems relating to housing, employment and gaining access to appropriate supportive services (Hammett, Roberts & Kennedy 2001). Released prisoners are widely recognised as having poor health compared with members of the general population. Access to health services in general and maintaining continuity with treatment programs that may have been initiated in prison may thus be particularly important. Several previous studies, including a recent study in Western Australia (Stewart et al. 2004), have shown that released prisoners or those serving community correction orders are at greater risk of death compared with the general population, particularly in the first few months after release (Biles, Harding & Walker 1999; Coffey et al. 2003; Davies 2000; Graham 2003; Harding-Pink 1990; Harding-Pink & Fryc 1988; Joukamaa 1988; Lattimore et al. 1970; Paanila, Hakola & Tiihonen 1999; Putkonen et al. 2001; Seaman, Brettle & Gore 1998).

Many have described the relatively poor health of prisoners during imprisonment. These have emphasised high prevalences of mental disorders, addictive behaviours and infectious diseases including HIV-AIDS, hepatitis C and tuberculosis (TB) (Feron et al. 2005; Hammett, Harmon & Rhodes 2002; Marshall, Simpson & Stevens 2001; Martin, Colebrook & Gray 1984; Mayetoke-Scrivner 2003; Novick 1977; White 2002). Studies have also described the difficulties in obtaining compliance with medication for long-term medical problems after release from prison (Brooke et al. 1998; Frost & Tchertkov 2002; Fry et al. 2005; Hammett, Roberts & Kennedy 2001).

Fewer studies have been able to examine the extent of non-fatal illness in prisoners following release into the community as there are few jurisdictions in which it is possible to link information from the criminal justice system to health records. One study in Finland, which linked information from the 1966 birth cohort to the Finnish National Hospital Discharge Register and the National Crime Register, demonstrated increased rates of injury in male offenders and of poisoning in female offenders compared with non-offenders. In Western Australia, linkage of Department of Justice data to the State Mental Health register has been used to study the relationship between drug abuse, schizophrenia and a history of offending (Jablensky 2004). We are unaware, however, of previous studies that have systematically documented use of the health services by representative cohorts of prisoners after release or factors that may influence this such as previous health status or recidivism.

In Western Australia this research is possible because of the development of the Western Australian Data Linkage Study (WADLS). The WADLS enables data extracted from the major statistical health collections in Western Australia, including hospital separation abstracts, the MHS Register and death records to be linked for approved studies (Holman et al. 1999). Providing relevant identifying information is available, additional information from other jurisdictions can be linked to core health data. We have used this facility previously to document excess mortality in released prisoners in Western Australia (Stewart et al 2004).

In this report we extend the analysis of mortality to define risk factors for death including the possible effects of recidivism, and examine rates of hospitalisation and contact with MHS in ex-prisoners.

The objectives of the present study were thus to:

- identify risk factors for early deaths after release from prison
- describe the use of hospital and MHS prior to and following release from prison.

Subjects and methods

The study cohort consisted of all persons who were in prisons in Western Australia on 1 January 1995 or were imprisoned after that date up to and including 31 December 2001. Persons with a prison release code of 'deportation', 'extradition', 'Australian Protective Services' or 'interstate transfer' were excluded from the study as they were not released into the Western Australian community.

Information relating to prisoners was extracted from the records of the Department of Justice (DoJ) of Western Australia and linked to selected health information extracted from the WADLS. The latter consisted of records of death, admission to general hospitals, admissions to MHS hospitals or attendances at MHS outpatient clinics occurring at any time from 1980 to the end of 2003. This enabled the creation of a cumulative record for each prisoner of all hospital admissions or MHS contacts for up to 15 years prior to 1995 and also provided a minimum follow-up period of two years for hospitalisation, MHS contacts or deaths for each member of the study cohort following their first release from prison.

Linkage between DoJ records and WADLS records was effected by the Data Linkage Unit (DLU) in the Health Information Centre in the Department of Health using a protocol designed to ensure protection of privacy (Kelman, Bass & Holman 2002). Under this protocol, the DoJ first provided the DLU with identifying information for each individual prisoner together with a DoJ unique identifier but no information relating to reasons for or other details of imprisonment. The DLU established a master linkage file (MLF) for the study containing a study specific personal identifying number (study PIN), and DoJ and Health Information Centre (HIC) unique identifying numbers but no other identifying information. This enabled the respective custodians of data in the DoJ and the Health Department to provide the study team with information relating to each prisoner identified by study PIN only. The study team then used the study PIN to merge data from the two jurisdictions for analysis.

Data items

The following information was extracted from the relevant record sources for each episode of imprisonment or health services contact for all persons in the study:

Department of Justice records

- Gender
- Date of birth
- Indigenous status
- Dates of imprisonment and release
- Place of release (metro / country)
- Flag for 'first-ever imprisonment'
- Mode of discharge (freedom, parole, extradition, deportation etc.)

Mortality data

- Date of death
- Indigenous status
- Coded cause of death (or death certificate free text of causes of death)

Hospital morbidity data

- Hospital admission and separation dates
- Sex
- Date of birth
- Indigenous status
- Hospital type
- Principal diagnosis
- Other diagnoses
- External cause of injury or poisoning (E-codes)

MHS data

- Dates of admission and separation from MHS hospitals
- Date of attendance at MHS clinics
- Sex
- Indigenous status
- Principal diagnosis (for both hospital admissions and out-patient clinic visits)

Statistical analyses

Mortality

Analysis of total mortality and broad causes of death in prisoners was undertaken separately for broad demographic groups defined by age, gender and Indigenous status. Prisoners were also classified as first offenders or reoffenders. First offenders, including those imprisoned before 1 January 1995, were defined as those whose first release in the study period followed an imprisonment for which the DoJ record contained a positive first-ever imprisonment identifier. All remaining prisoners were classified as reoffenders. First offenders who were subsequently re-imprisoned were included in both groups.

Person-years of follow-up

As the objective of the study was to examine the mortality and morbidity in prisoners while living in the community (i.e. excluding deaths in custody), the total days spent in the community by each prisoner was estimated from the total days from the date of first release from prison in the study period until date of death or the censoring date (1/1/2004), but excluding days for any subsequent periods of imprisonment. A time-dependent variable denoting the number of prior imprisonments was also created, allowing the total days in the community to be separated into episodes corresponding to the first and each subsequent period of release.

Standardised mortality ratios (SMRs)

In order to compare the risk of death in released prisoners with the general population, age and period standardised mortality ratios (SMRs) over the period of 1 January 1995 to 31 December 2003 were calculated for each of four demographic groups: Indigenous female, non-Indigenous female, Indigenous male and non-Indigenous male prisoners and three broad age groups: 20–39 and 40–59 and 20–59 years combined. Because of small numbers of deaths, SMRs for other age groups were not estimated.

Two sets of SMRs (SMR_1 and SMR_2) were calculated for all causes of mortality. SMR_1 compared observed mortality in both Indigenous female and male and non-Indigenous prisoners with expected deaths based on death rates in the total female and male population of Western Australia. SMR_2 compared observed deaths in Indigenous female and male and non-Indigenous prisoners with expected deaths based on mortality in the equivalent population sub-groups in WA. Separate calculations of SMR_1 and SMR_2 were also obtained for first offenders and reoffenders.

To estimate the expected numbers of deaths used in calculating SMRs, age and sex specific death rates in the Indigenous and non-Indigenous populations of Western Australia were first estimated for each year of the study, using the number of deaths in the state obtained from death registry data and equivalent population data provided by the Department of Health. Population death rates were then multiplied by person-years of exposure (that is, while living in the community) in each prisoner group by the mortality rate of the equivalent demographic group in the general population. Confidence intervals of 95 percent for SMRs were calculated using the formula

$$SMR \pm 1.96\sqrt{(SMR/exp)}$$

where 'exp' = the total number of expected deaths.

Deaths in custody and the person-years spent in prison were excluded from the calculation of SMRs.

Survival analysis

Time-dependent Cox regression analysis was used to identify risk factors associated with deaths in released prisoners while living in the community as described above. The endpoint was death by the end of follow-up while living in the community. In the case of prisoners who died in custody during the study period, the follow-up time was censored at the date of the re-imprisonment during which death occurred (the endpoint alive).

Two sets of time-dependent Cox analyses were conducted to identify risk factors for death in released prisoners including multiple imprisonments. The first was based on all prisoners in the study cohort and included age, gender, Indigenous status, place of release (metropolitan or country) and first or subsequent release from prison as explanatory variables. In this analysis the first or subsequent imprisonments were defined by a time-dependent variable based on the first release code in DoJ records. For example, in prisoners who had a first and a subsequent release, the value of the code changed on the date of the second release.

The second analysis was designed to determine if the risk of death changed as the number of releases increased. This was necessarily restricted to prisoners in whom the first release in the study period was also the first-ever release. The analysis was similar to the first except that the release variable assumed the value 1, 2, 3 or 4+ for each subsequent release.

The results were reported as hazard ratios, with 95 percent confidence intervals and p-values. The analyses were carried out using SPSS 11.0 for Windows.

Morbidity

Morbidity in released prisoners was assessed from records of general hospital admissions and Mental Health Service (MHS) hospital admissions or clinic attendances, which for the purpose of this study are termed collectively health service contacts (HSC). HSC before and after the date of first release were analysed separately for broad demographic groups defined by age, gender and Indigenous status and for first offenders and reoffenders as previously defined for the analysis of mortality.

Conditions leading to health service contacts

To determine the commonest conditions leading to HSC, the distributions of principal diagnoses leading to such contacts before or after the date of first release were first examined at the level of three digit diagnostic codes and external cause of injury or poisoning codes (E-codes) of the ninth revision of International Classification of Diseases Clinical Modification (ICD-9-CM). These were then aggregated into broad groups following the general structure of ICD-9-CM chapters. The major condition groups identified in this way were then examined in more detail using E-codes or principal diagnosis to define clinically meaningful sub-groups (as shown, for example, in Table 17).

As prisoners could have multiple contacts, we used record linkage to set flags in each prisoner record indicating the number and date of contacts for each of the specified conditions in the five years before the date of first release. Similar flags were set indicating the number of times and date of each type of HSC from the date of first release to the end of the follow-up period. In constructing the previous admission flags no account was undertaken of days spent in prison during the five years before release.

Standardised morbidity ratios

In order to compare morbidity in prisoners after release with that in the general population, age and period standardised morbidity ratios (SMbRs) for the period of 1 January 1995 and 31 December 2003 were calculated for each of four demographic groups (Indigenous female, non-Indigenous female, Indigenous male and non-Indigenous male) and three broad age groups: 20–39, 40–59, and 20–59 years combined. Two sets of SMbRs ($SMbR_1$ and $SMbR_2$) were calculated for all cause morbidity following the same methods used for estimating SMR_1 and SMR_2 in the analysis of mortality. $SMbR_1$ compared observed morbidity in both Indigenous female and male and non-Indigenous prisoners with expected hospital admission rates in the total female and male population of Western Australia. Similarly SMbR2 compared observed hospital admissions in Indigenous female and male and non-Indigenous prisoners with expected admissions based on rates in the respective Indigenous and non-Indigenous populations of Western Australia (Codde 2005).

Expected numbers of hospital admissions required for calculating SMbRs for each demographic group were estimated by multiplying person years of follow-up in each group by rates of hospital admission for broad chapters of the ICD as published by the Epidemiology Branch of the Health Department of Western Australia, which were available as age and sex specific rates for the Indigenous and non-Indigenous populations of Western Australia by calendar year. As in the case of mortality, SMbRs were estimated for three broad age groups, 20–39 and 40–59 and 20–59 years combined.

Survival analysis

Kaplin-Meier survival analysis was used to determine the cumulative probability of HSC for each of the four demographic groups of prisoners and each of five major condition groups:

- all conditions
- all conditions excluding admissions related to pregnancy and gynaecology
- injury and poisoning
- mental disorders including acute and chronic manifestations of alcohol or drug addiction
- all other conditions.

Analyses were also conducted for broad age categories within each of the above groups. As these demonstrated only minor differences with age that were similar for all major condition and demographic groups, formal age adjustment of the results was not undertaken. The results are presented as a series of charts and summary results for the probabilities of HSC at two years and five years and are also presented in tabular form.

Results

The study cohort

Demographic characteristics and summary imprisonment details of the study cohort are given in Table 1. Including those already in prison on 1 January 1995, there were 14,039 individuals in prison at some time in Western Australia between 1 January 1995 and 31 December 2001. Of these, 372 (2.6%) were not released during the study period, leaving 13,667 prisoners in the study.

Table 1: Demographics and basic imprisonment statistics of study cohort[(a)]

Characteristic	Indigenous female	Non-Indigenous female	Indigenous male	Non-Indigenous male	Total
WA population in 1999	31,576	892,403	31,623	898,907	**1,854,509**
Persons ever in prison 1995–2001	888	763	4,180	8,208	**14,039**
Released from prison in study period	887	740	4,149	7,891	**13,667**
First offenders	495	620	2,504	2,604	**8,374**
Percentage of first offenders	55.8	81.5	40.1	68.2	**59.7**
Mean age of first offenders	28.6	31.1	28.3	31.1	**30.1**
Median age of first offenders	27	29	27	29	**28**
Total releases 1995–2001	1,749	1,137	11,537	13,215	**26,674**
Percentage of releases from non-metro prisons	59.1	22.6	71.6	25.1	**44.8**
Percentage of times released within the study period					
Once	56.0	73.0	38.2	65.3	**56.9**
Twice	20.3	14.9	23.1	17.9	**19.5**
Three or more	23.7	12.2	38.6	16.8	**23.6**
Mean releases per prisoner	1.97	1.54	2.78	1.67	**1.95**
Total person-years of follow-up	4,323	3,596	21,737	40,058	**69,714**
Person-years of community follow-up	3,982	3,371	18,763	36,546	**62,662**
Percentage of follow-up time in the community	92.1	93.7	86.3	91.2	**89.9**
Mean years of community follow-up	4.49	4.42	4.49	4.63	**4.58**

(a) n = 13,667

Of the 13,667 released prisoners, 6.3 percent were Indigenous females, 5.4 percent non-Indigenous females, 29.8 percent Indigenous males and 58.5 percent non-Indigenous males. Age at the date of first release during the study period ranged from 16 years to 87 years, with mean age 30 years and median age 28 years. The median age at first release of non-Indigenous female and male prisoners was 29 years compared with 27 years in Indigenous female and male prisoners.

The number of times individual prisoners were released during the study period ranged from one to 20 times with the majority (56.9%) of prisoners being released once only. The percentage of prisoners released once only however, varied from 73.0 percent in non-Indigenous female prisoners, to 65.3 percent in non-Indigenous male prisoners, 56.0 percent in Indigenous female prisoners and 38.2 percent in Indigenous male prisoners. In total there were 28,439 imprisonments during the study period. The mean numbers of releases was 1.95 for all prisoners but was higher in Indigenous prisoners (1.97 and 2.78 for females and males, respectively) than in non-Indigenous (1.54 and 1.67 for females and males, respectively). Of the 28,439 imprisonments, 29.5 percent were first-time imprisonments and 70.5 percent were re-imprisonments. Indigenous prisoners accounted for 25.0 percent of first imprisonments and 54.4 percent of re-imprisonments.

Follow-up time

The mean and median follow-up times were 5.4 years and 5.3 years respectively. The total person-years of follow-up were 69,714, of which 62,662 (89.9%) were spent in the community. This was highest in non-Indigenous female prisoners (93.7%) and lowest in Indigenous male prisoners.

Mortality in released prisoners

Summary of deaths by demographic group

Table 2: Summary of deaths by gender and Indigenous status

Deaths	Indigenous female	Non-Indigenous female	Indigenous male	Non-Indigenous male	Total
Total number of deaths	31	24	201	275	531
Deaths in custody	1	2	12	35	50
Total deaths in the community	30	22	189	240	481
Community deaths in first offenders	7	14	31	129	181
Community deaths in reoffenders	23	8	158	111	300
Age standardised mortality rates per 1,000 person years					
Mortality rate in general population of Western Australia in 1999	11.1	4.6	14.3	7.3	–
Mortality rate in general population at 20–39 years	1.4	0.5	4.6	1.2	–
Mortality rate in prisoners in the community 20–39 years	4.5	7.0	7.9	4.8	–
Mortality rate ratios 20–39 years	3.07	14.00	1.77	4.00	–

During the study period, 531 prisoners died; 50 while in custody and 481 while living in the community (Table 2). Of the latter, 181 occurred in first offenders with 300 in reoffenders. The majority of deaths (317 or 66%) occurred in prisoners aged 20–39 years. Table 2 also shows age standardised mortality rates and rate ratios in prisoners and the general Indigenous and non-Indigenous populations in Western Australia aged 20–39 years. The latter indicate that the risk of death in prisoners is greatly increased, particularly in non-Indigenous female prisoners (rate ratio 14.0), non-Indigenous male prisoners (rate ratio 4.0) and Indigenous female prisoners (rate ratio 3.1).

Relative risk of death in prisoners compared with the general population

SMRs for total deaths in released prisoners compared with the general population of Western Australia by Indigenous status and broad age group are shown in Table 3.

Table 3: Age and period standardised mortality ratios comparing released prisoners cohort with the general population in Western Australia, 1995–2003

Demographic sub-group	Age	No. of deaths	SMR_1	95% CI	SMR_2	95% CI
Indigenous female	20–39	21	9.13	(5.22, 13.03)	2.25	(1.29, 3.21)
	40–59	8	8.40	(2.58, 14.21)	1.79	(0.55, 3.02)
Non-Indigenous female	20–39	15	10.98	(5.42, 16.54)	12.43	(6.14, 18.73)
	40–59	5	3.20	(0.40, 6.01)	3.46	(0.43, 6.49)
Indigenous male	20–39	126	5.12	(4.22, 6.01)	1.50	(1.24, 1.76)
	40–59	56	6.20	(4.61, 7.80)	1.23	(0.91, 1.55)
Non-Indigenous male	20–39	155	4.17	(3.52, 4.83)	4.55	(3.83, 5.26)
	40–59	55	2.20	(1.62, 2.78)	2.37	(1.75, 3.00)

SMR = standardised mortality ratio
SMR_1 compares mortality in Indigenous and non-Indigenous male and female released prisoners with the total male and female populations of Western Australia
SMR_2 compares mortality in Indigenous and non-Indigenous male and female prisoners with the respective Indigenous and non-Indigenous populations of Western Australia

When compared with the total population of Western Australia (SMR_1), the relative risk of death in all prisoner groups is grossly elevated, particularly in females, with the lower limit of the 95 percent confidence intervals exceeding unity in all groups except non-Indigenous female prisoners aged 40–59 years in whom there were only five deaths. In both Indigenous female and male prisoners, SMR_1 was roughly the same in both age groups (females 9.13 and 8.40; males 5.12 and 6.20, but in non-Indigenous prisoners SMRs were higher in those aged 20–39 than in those aged 40–49 years (females 10.98 and 3.20; males 4.17 and 2.20).

When observed deaths in Indigenous and non-Indigenous prisoners were compared with the expected numbers of deaths based on death rates in the Indigenous or non-Indigenous populations in Western Australia respectively (SMR_2), the relative risks in Indigenous female and male prisoners were substantially less elevated than suggested by SMR_1. This reflects the high mortality rates in the total Indigenous population of Western Australia compared with the non-Indigenous population. In non-Indigenous prisoners, the relative risks of death were slightly increased. Levels of SMR_2 were also lower in prisoners aged 40–59 than in those aged 20–39 with 95 percent confidence intervals including unity in all except non-Indigenous male prisoners.

Risk factors for mortality in released prisoners

SMRs were computed separately for first offenders and reoffenders aged 20–39 years. The results, shown in Table 4, indicate that reoffenders have a higher risk of death than first offenders, particularly in Indigenous prisoners.

Table 4: Age and period standardised mortality ratios comparing first offenders and reoffenders aged 20–39 years with the general population in Western Australia, 1995–2003

Demographic sub-group	No. of deaths	SMR_1	95% CI	SMR_2	95% CI
First offenders					
Indigenous female	5	5.61	(0.69, 10.52)	1.42	(0.18, 2.67)
Non-Indigenous female	9	10.71	(4.07, 17.34)	12.14	(4.62, 19.66)
Indigenous male	20	3.79	(2.31, 5.28)	1.47	(0.90, 2.05)
Non-Indigenous male	75	4.06	(3.18, 4.94)	4.37	(3.42, 5.33)
Reoffenders					
Indigenous female	18	11.35	(5.79, 16.91)	2.74	(1.40, 4.09)
Non-Indigenous female	5	11.58	(1.43, 21.73)	13.07	(1.61, 24.5)
Indigenous male	118	5.60	(4.51, 6.69)	1.51	(1.22, 1.80)
Non-Indigenous male	86	4.31	(3.33, 5.29)	4.75	(3.67, 5.83)

SMR = standardised mortality ratio
SMR_1 compares mortality in Indigenous and non-Indigenous male and female released prisoners with the total male and female populations of Western Australia
SMR_2 compares mortality in Indigenous and non-Indigenous male and female prisoners with the respective Indigenous and non-Indigenous populations of Western Australia

The risk of death after release was explored further in a series of time-dependent multivariate models using Cox regression, with the final model (Table 5) including age at first release during the study period, gender, Indigenous status, first or reoffender status and place of imprisonment at the time of release (metropolitan or country).

Table 5: Risk factors for death in released prisoners

Variables	Category	Hazard ratio	95% CI	P-value
Age at first release	Per year	1.03	(1.03, 1.04)	< 0.001
Gender	Males	1.08	(0.81, 1.44)	0.61
	Females	1.00		
Indigenous status	Indigenous	1.37	(1.13, 1.66)	< 0.001
	Non-Indigenous	1.00		
First-ever release[(a)]	No	1.92	(1.56, 2.27)	< 0.001
	Yes	1.00		
Location	Metro	1.03	(0.84, 1.26)	0.80
	Country	1.00		

(a) First-ever release was a time-dependent variable that changed after a second imprisonment

The hazard ratio (HR) increased significantly with age (p< 0.001) and Indigenous status (HR 1.37, 95% CI 1.13, 1.66) but not with gender or location of release. It was significantly higher in reoffenders than in first offenders (1.92, 95% CI 1.56, 2.27).

To explore the effect of increasing numbers of imprisonments on the risk of death, further models were developed for prisoners for whom the date of first release was known (the first offenders cohort) (Table 6). There was again a significantly increased risk of death with increasing age and with increasing numbers of releases, but not with gender, Indigenous status or location at release. With each additional release, the risk of death increased by 29 percent. The apparent reduction in risk in Indigenous prisoners in Table 6 compared with Table 5 is due to a high correlation between increasing numbers of releases and Indigenous status.

Table 6: Risk of death in the community after first release from prison, 1 January 1995 to 31 December 2003, adjusting for number of previous imprisonments

Variables	Category	Hazard ratio	95% CI	P-value
Age at first release	Per year	1.03	(1.02, 1.04)	< 0.001
Gender	Males	1.14	(0.72, 1.80)	0.59
	Females	1.00		
Indigenous status	Indigenous	1.04	(0.71, 1.53)	0.83
	Non-Indigenous	1.00		
Number of release[(a)]		1.29	(1.04, 1.59)	0.02
Location at release	Metro	1.23	(0.87, 1.75)	0.25
	Country	1.00		

(a) Number of release was a time-dependent variable that could take the value 1, 2, 3 or 4+

Causes of death in released prisoners

The main causes of deaths in released prisoners are shown in Table 7. Injury or poisoning accounted for 47.4 percent of deaths, all other specified causes for 48.0 percent and Coroner's verdict pending for 4.6 percent. Of the deaths not due to injury or poisoning, the leading causes of death were cardiovascular disease (12.7%) and acute and chronic effects of alcohol and drug addiction (9.6%). Among deaths due to injury or poisoning, 17.0 percent of (total) deaths were due to suicide and self inflicted injury, 11.6 percent to other poisoning, and 9.4 percent to transport related injuries. Homicide and purposely inflicted injury accounted for 2.5 percent of all deaths.

Table 7: Number and distribution of coded causes of death		
Coded cause of death (ICD-9)	**Number**	**% of total**
Infectious and communicable diseases	7	1.5
Neoplasms	26	5.4
Diabetes	11	2.3
Alcohol and drug dependence	46	9.6
Cardiovascular disease	61	12.7
Respiratory	22	4.6
Diseases of the liver or pancreas	21	4.4
Renal failure	4	0.8
Other specified	16	3.3
Diseases of uncertain origin	17	3.5
All not due to injury or poisoning	**231**	**48.0**
Transport related	45	9.4
Accidental poisoning by drugs, medicinal substances, and other solids, liquids and gases	56	11.6
Suicide and self inflicted injury	82	17.0
Homicide and purposely inflicted injury	12	2.5
All other causes of injury or poisoning	33	6.9
All external causes of injury and poisoning	**228**	**47.4**
Coroner's verdict pending	22	4.6
All deaths	**481**	**100.0**

ICD = International Classification of Diseases

In Table 8 the leading causes of death described above are shown for individual demographic groups.

Table 8: Principal causes of death, by demographic group

Cause of death	Indigenous female %	Non-Indigenous female %	Indigenous male %	Non-Indigenous male %	Total %
Cardiovascular disease, diabetes, renal failure	13.3	9.1	23.3	10.8	15.8
Effects of alcohol and other drug dependence	20.0	22.7	9.0	16.3	13.9
Other specified, not injury or poisoning	23.3	13.6	21.7	15.4	18.3
All not injury or poisoning	56.7	45.5	54.0	42.5	48.0
Transport related	20.0	0.0	10.6	7.9	9.4
Accidental poisoning, other exposures	3.3	22.7	4.2	17.5	11.6
Suicide, self-inflicted harm, homicide	3.3	18.2	19.0	22.1	19.5
All other injury and poisoning	6.7	13.6	8.5	5.0	6.9
All injury and poisoning and Coroner pending	43.3	54.5	46.0	57.5	52.0
Total number of deaths	**30**	**22**	**189**	**240**	**481**

There was considerable variation in the principal causes of death within the demographic sub-groups. In Indigenous male and female prisoners, approximately 45 percent of deaths were due to injury or poisoning compared with 55 percent in non-Indigenous prisoners.

In Indigenous female prisoners in whom there were 30 deaths, the leading causes of death were effects of alcohol and drug dependence (six deaths each) and transport related accidents (four deaths). In non-Indigenous female prisoners, in whom there were 22 deaths, the leading causes were effects of alcohol and drug dependence and accidental poisoning and other exposures (five deaths each) and suicide and self-harm (four deaths). In Indigenous male prisoners (189 deaths) the leading causes were cardiovascular disease, diabetes and renal failure combined (23.3%), followed by suicide and self-harm (19.4%) and transport related deaths (10.6%). In non-Indigenous male prisoners (240 deaths), the leading groups were suicide and self-harm (22.1%), followed by accidental poisoning and other exposures (17.5%), and effects of alcohol and drug dependence (16.3%).

The risk of death by time from release from prison

The relationship between the risk of death and time from release is examined in Table 9, which shows the number of deaths and crude death rates for the three major cause of death groups within six months, six months to less than one year and over one year. Rate ratios are also shown comparing rates of death within six months and from six months to one year with rates after one year.

Table 9: Principal cause of death, groups by time from date of release from prison

	0 to 6 months	6 months to 1 year	> 1 year	All intervals
Numbers of deaths				
Alcohol and drug dependence	25	5	16	46
Injury and poisoning	77	39	112	228
All other conditions	34	28	145	207
Total	**136**	**72**	**273**	**481**
Person years of follow-up	**6,834**	**6,834**	**48,995**	**62,662**
Rates per 1,000 person years				
Alcohol and drug dependence	3.7	0.7	0.3	0.7
Injury and poisoning	11.3	5.7	2.3	3.6
All other conditions	5.0	4.1	3.0	3.3
Total	**19.9**	**10.5**	**5.6**	**7.7**
Rate ratios				
Alcohol and drug dependence related	11.2	2.2	1.0	–
Injury and poisoning	4.9	2.5	1.0	–
All other conditions	1.7	1.4	1.0	–
Total	**3.6**	**1.9**	**1.0**	**–**

Crude death rates after release vary inversely with time from release. The death rates from all causes in the first and second six months after release were respectively 3.6 and 1.9 times greater than the rate after one year. This inverse relationship is particularly marked in deaths related to alcohol and drug-dependence in which the rate ratio for the first six months is 11.2 times greater than after one year. In the case of injury and poisoning, there was a nearly five-fold risk of death in the first six months compared with after one year. In contrast, the death rate in the first six months for all other conditions is only 1.7 times greater than the rate after one year.

Table 10 shows the risk of death by time from release by demographic sub-group. In all sub-groups the risk of death is greatest in the first six months after release. Compared with the risk of death after one year, the risk of death in the first six months after release is nearly four-fold in non-Indigenous male prisoners, approximately three-fold in Indigenous male prisoners and non-Indigenous female prisoners, and twice as great in Indigenous female prisoners.

Table 10: Relative risk of death, by interval from release from prison, by demographic group

	0 to 6 months	6 months to 1 year	> 1 year	All intervals
Numbers				
Indigenous female	6	4	20	30
Non-Indigenous female	6	1	15	22
Indigenous male	47	39	103	189
Non-Indigenous male	77	28	135	240
Total	**136**	**72**	**273**	**481**
Rates per 1,000 person years				
Indigenous female	13.53	9.02	6.46	7.53
Non-Indigenous female	16.22	2.70	5.70	6.53
Indigenous male	22.66	18.80	7.05	10.07
Non-Indigenous male	18.76	6.82	4.76	6.57
Total	**19.90**	**10.54**	**5.57**	**7.68**
Rate ratios				
Indigenous female	2.09	1.40	1.00	–
Non-Indigenous female	2.84	0.47	1.00	–
Indigenous male	3.21	2.67	1.00	–
Non-Indigenous male	3.94	1.43	1.00	–
Total	**3.57**	**1.89**	**1.00**	**–**

Hospitalisation and contact with Mental Health Services in released prisoners

Overview of hospital admissions and MHS contacts

Table 11 shows the numbers of prisoners having general hospital (GH) or Mental Health Service hospital (MHH) admissions or contacts with MHS clinics within five years prior to the first release date or following first release. Overall 56.1 percent of prisoners had a pre-imprisonment GH or MHS contact, 52.5 percent had a post-release contact and 72.1 percent had both pre- and post-imprisonment contacts. The great majority of contacts were general hospital admissions. Of the prisoners having any health service contact, 97.6 percent had either a pre- or post-imprisonment hospital admission. While 18.5 percent of prisoners had at least one MHS contact, only 2.3 percent had MHS contacts alone.

Table 11: Released prisoners with general hospital admissions or mental health service contacts before and after date of first release from prison

	GH		MHH		MH clinic		Any MHS		Any HS	
	No.	%[(a)]	No.	%	No.	%	No.	%	No.	%
Previous 5 years	7,358	53.8	611	4.5	1,263	9.2	1,446	10.6	7,659	56.1
After release	6,907	50.5	236	1.7	1,662	12.1	1,719	12.5	7,175	52.5
Ever	9,624	70.4	755	5.5	2,366	17.4	2,538	18.5	9,858	72.1
Never	4,416	32.4	944	97.2	11,672	85.4	11,511	84.2	4,181	30.1

GH = general hospital; MHS = Mental Health Service; MHH = Mental Health Service hospital; MH = mental health; HS = health service
(a) Percentage of total released prisoners
n = 13,667

Of the 7,659 prisoners who had pre-release health service contacts, 65.0 percent also had a post-release contact, compared with 34.5 percent of those who had no pre-release contacts. In the case of MHS contacts, 44 percent of prisoners with pre-release contacts had post-release contacts, compared with 8.6 percent of those who had no pre-release MHS contacts. Those with pre-release contacts thus had a nearly two-fold risk of having a post-release contact.

Table 12: Health services contact, by demographic sub-group										
	Indigenous female		Non-Indigenous female		Indigenous male		Non-Indigenous male		All prisoners	
	No.	%[(a)]	No.	%	No.	%	No.	%	No.	%
Five years prior to first release	713	80.1	569	77.3	2,202	53.4	4,175	53.0	7,659	56.5
Post first release	682	77.0	499	67.0	2,249	54.4	3,745	47.8	7,175	52.4
Pre and post release	630	71.0	413	55.7	1,574	38.3	2,359	30.2	4,976	36.0
Any admission	765	86.0	655	88.7	2,877	69.5	5,561	70.7	9,858	71.9
Total prisoners	**887**		**740**		**4,419**		**7,891**		**13,667**	

(a) Percentage of sub-group total

Table 12 shows the distribution of total HSC within each of the four major demographic sub-groups of prisoners. The frequency of any hospital admission or contact with MHS facilities either before or after first release was greater in female prisoners (86%) than in male prisoners (approximately 70%). Indigenous female prisoners had the highest frequency of HSC after release (77%) followed by non-Indigenous female prisoners (67%), Indigenous male prisoners (54%) and non-Indigenous male prisoners (48%).

Of the Indigenous female prisoners, 71 percent had both pre- and post-release HSC, followed by non-Indigenous female prisoners (56%), Indigenous male prisoners (38%) and non-Indigenous male prisoners (30%). Prisoners with any hospital admission or MHS contact in the five years before first release had a nearly two-fold risk (1.89) of contacts after first release. This varied from 2.97 in Indigenous female prisoners, and 2.01 in Indigenous male prisoners to 1.64 in both non-Indigenous female and male prisoners.

Table 13 shows the number of admissions to general hospitals by ex-prisoners in the five years prior to and following date of first release by principal demographic sub-group.

Table 13: Hospital admissions before and after date of first release					
	Indigenous female	Non-Indigenous female	Indigenous male	Non-Indigenous male	All prisoners
Before first release					
Admissions	5,775	2,300	7,964	11,178	27,217
Mean per prisoner	6.5	3.1	1.9	1.5	2.0
Mean per admitted prisoner	8.1	4.1	3.7	2.8	3.7
After first release					
Admissions	7,114	2,002	14,241	12,960	36,317
Mean per prisoner	8.0	2.7	3.4	1.7	2.7
Mean per admitted prisoner	10.5	4.1	6.5	3.3	5.0

In the five years prior to their date of first release, prisoners collectively had 27,217 hospital admissions, an average of 2.0 per prisoner or 3.7 per admitted prisoner. This varied from 6.5 (8.1) for Indigenous female prisoners, 3.1 (4.1) for non-Indigenous female prisoners, 1.9 (3.7) for Indigenous male prisoners and 1.5 (2.8) for non-Indigenous male prisoners. Following first release, the ex-prisoners had between them 36,317 hospital admissions, with an average of 2.7 per prisoner or 5.0 per admitted prisoner. The variation between demographic sub-groups followed the same pattern as admissions prior to release with the exception that Indigenous male prisoners had nearly twice as many admissions per prisoner as before release. As in the case of pre-release admissions, Indigenous female prisoners had very high numbers of repeat admissions (8.0 per prisoner or 10.5 per admitted prisoner).

Table 14: Admissions to mental hospitals before and after first release					
	Indigenous female	Non-Indigenous female	Indigenous male	Non-Indigenous male	All prisoners
Before first release					
Admissions	53	88	221	866	1,228
Affected prisoners	27	46	136	402	611
Mean per prisoner	0.03	0.06	0.03	0.05	0.04
Mean per affected prisoner	2.00	1.90	1.60	2.20	2.00
After first release					
Admissions	29	61	99	232	421
Affected prisoners	19	11	69	137	236
Mean per prisoner	0.02	0.01	0.02	0.02	0.02
Mean per affected prisoner	1.50	5.50	1.40	1.70	1.80

The number of admissions to mental hospitals before and after the date of first release is shown in Table 14. There were 1,228 admissions before and 421 following release. There was little variation between demographic sub-groups, with the exception of non-Indigenous female prisoners in whom the average number of admissions per admitted prisoner (5.5) was substantially greater than the average of 1.8 for all admitted prisoners.

The numbers of MHS clinic attendances before and after date of first release are shown in Table 15.

Study subjects made a total 20,380 visits before their first release, an average of only 1.5 per prisoner but 16.1 per affected prisoner. The highest average attendance per prisoner or per affected prisoner occurred in non-Indigenous male prisoners. Following release, ex-prisoners made 41,235 visits during the study period. Again the highest number occurred among non-Indigenous male prisoners. The higher number of post-release MHS clinic visits compared with pre-release visits is in contrast to MHS admissions in which pre-release admissions outnumbered post-release admissions.

Table 15: Number of mental outpatient visits before and after first release					
	Indigenous female	Non-Indigenous female	Indigenous male	Non-Indigenous male	All prisoners
Before first release					
Visits	725	1,187	2,379	16,089	20,380
Mean per prisoner	0.82	1.60	0.57	2.04	1.49
Mean per affected prisoner	9.40	12.40	9.90	18.90	16.10
After first release					
Visits	2,289	2,797	8,618	27,531	41,235
Mean per prisoner	2.60	3.80	2.10	3.50	3.00
Mean per affected prisoner	13.50	22.90	21.80	28.30	24.80

Principal conditions leading to hospital admission or MHS contacts before and after first release

The most common conditions leading to health services contact before the date of first release are shown in descending order of frequency in Table 16.

Table 16: Conditions leading to hospital admissions and mental health service contacts in the five years before date of first release					
Diagnosis	Indigenous female %	Non-Indigenous female %	Indigenous male %	Non-Indigenous male %	All prisoners %
Female reproductive	51.0	44.4	NA	NA	48.0
Injury	43.8	14.2	30.4	20.5	24.7
Mental (GH or MHS)	19.7	30.4	12.6	17.5	16.8
Digestive	14.1	10.8	8.8	8.3	8.9
Genitourinary	14.1	10.8	8.8	8.3	8.9
Other health care	31.3	11.7	5.7	4.5	7.0
Ill-defined symptoms	16.9	8.7	7.2	5.4	6.9
Respiratory	16.2	5.3	8.8	4.1	6.4
Joint disorders	7.0	5.3	4.3	6.6	5.9
Poisoning	7.5	15.8	3.1	5.7	5.6
Skin	12.4	4.0	8.0	3.4	5.4
Infections	9.0	4.2	3.0	1.9	2.8
Other injury, poisoning	4.3	3.2	2.1	2.0	2.3

Table 16 continued

Diagnosis	Indigenous female %	Non-Indigenous female %	Indigenous male %	Non-Indigenous male %	All prisoners %
Nervous system disease	4.1	3.0	2.6	1.6	2.1
CVD (not veins)	2.4	1.4	1.8	1.8	1.8
Total number of prisoners	**887**	**740**	**4,149**	**7,891**	**13,667**

GH = General Hospital; MHS = Mental Health Service; NA = not available; CVD = cardiovascular disease

Apart from admissions for conditions relating to pregnancy (48.0% of all women), the most common conditions leading to admission before first release were for injury (24.7% of prisoners), mental health problems (16.8%), digestive system disorders (8.9%), genitourinary problems (8.9%), respiratory problems (6.4%), disorders of joints (5.9%), poisoning (5.6%) and skin diseases (5.4%). This ordering tended to be the same for each of the demographic sub-groups, but notable exceptions were the very high prevalence of previous admissions or MHS contacts for mental disorders (30.4%) and poisoning (15.8%) in non-Indigenous women. In general, a greater percentage of female prisoners had previous hospital admissions than male prisoners and Indigenous prisoners had more admissions than non-Indigenous prisoners of the same sex.

Admissions for injury were particularly high in Indigenous prisoners (43.8% and 30.4% in females and males respectively) compared with 20.5 percent in non-Indigenous male prisoners and 14.2 percent in non-Indigenous female prisoners. Previous admissions or MHS contacts for mental problems was highest in non-Indigenous female prisoners (30.4%), followed by Indigenous female prisoners (19.7%), non-Indigenous male prisoners (17.5%) and Indigenous male prisoners (12.6%).

Admissions for respiratory problems were notably higher in Indigenous prisoners (16.2% in females, 8.8% in males) than non-Indigenous prisoners (5.3% and 4.1% respectively). Prior hospital admissions for skin conditions were also notably higher in Indigenous women and men (12.4% and 8.0%) than in non-Indigenous women and men (4.0% and 3.4%).

Table 17 shows equivalent data for hospital admissions or MHS contacts after first release from prison. The general pattern is similar to that shown for pre-release health service contacts, with female reproductive disorders, injury and poisoning, mental health problems and digestive system disorders again the predominating conditions. The principal exception is genitourinary disease, which occurred in only 2.7 percent of prisoners following release compared with 8.9 percent before first release.

Table 17: Summary of principal conditions leading to hospital admission of prisoners following first release

	Indigenous female %	Non-Indigenous female %	Indigenous male %	Non-Indigenous male %	All prisoners %
Female reproductive	38.5	36.5	NA	NA	37.6
Injury	38.2	11.9	31.3	16.5	22.3
Mental – GH or MHS	31.0	24.3	17.9	17.1	18.8
Mental – GH	17.2	14.4	8.8	11.4	11.2
Digestive	14.0	11.4	10.5	8.4	9.7
Other health care	28.7	11.3	8.3	5.9	8.4
Respiratory	17.2	4.2	10.7	3.4	6.6
Ill-defined symptoms	13.3	6.9	8.2	4.9	6.6
Skin	12.8	3.8	9.3	3.6	6.0
Musculoskeletal	5.6	5.3	4.1	6.5	5.8
Poisoning	7.8	11.0	3.2	5.2	5.1
CVD (not veins)	3.7	1.4	3.9	2.2	2.8
Genitourinary	9.6	3.0	2.2	2.0	2.7
Other injury/poison	3.5	2.1	2.9	2.2	2.5
Infections	5.4	2.5	2.7	1.9	2.4
Nervous system disease	4.4	3.2	3.4	1.5	2.4
Total number of released prisoners	**887**	**740**	**4,419**	**7,891**	**13,667**

GH = General Hospital; MHS = Mental Health Service; NA = not available; CVD = cardiovascular disease

Apart from admissions for conditions relating to pregnancy (37.6% of all women), the most common conditions leading to admission or MHS contacts were for injury (22.3% of prisoners), mental health problems (18.8%), digestive system disorders (9.7%), respiratory problems (6.6%), skin diseases (6.0%), disorders of joints (5.8%) and poisoning (5.1%).

In general, a greater percentage of female prisoners had admissions than male prisoners and Indigenous prisoners had more admissions than non-Indigenous prisoners of the same sex. Admissions for injury were particularly high in Indigenous prisoners (38.2% and 31.3% in females and males respectively compared with 11.9% and 16.5% respectively in non-Indigenous prisoners). Admissions for poisoning were, however, higher in female prisoners (11.0% in non-Indigenous and 7.8% in Indigenous prisoners), than in males (5.2% in non-Indigenous and 3.2% in Indigenous prisoners).

Hospital admissions for mental disorders or MHS contacts were also notably higher in Indigenous women (31.0%) followed by non-Indigenous women (24.3%), Indigenous men (17.9%) and non-Indigenous men (17.1%).

Admissions for respiratory problems were also higher in Indigenous prisoners (17.2% in females, 10.7% in males) than non-Indigenous prisoners (4.2% and 3.4%).

External causes of injury and poisoning

In Table 18 selected causes of admission for injury and poisoning are shown before and after date of first release.

Table 18: Principal external causes of injury and poisoning in hospital admissions before and after date of first release from prison: percentage of prisoners with health service contact

Cause of injury or poisoning	Period	Indigenous female %	Non-Indigenous female %	Indigenous male %	Non-Indigenous male %	All prisoners %
Transport related	Before	5.4	4.6	6.1	5.5	5.6
	After	3.6	3.1	5.6	4.2	4.5
Accidental poisoning (medicinal)	Before	2.3	4.2	0.6	1.5	1.4
	After	2.6	4.8	1.2	2.1	2.1
Falls	Before	9.5	1.9	5.6	3.1	4.2
	After	7.8	1.0	5.9	2.9	4.0
Sports related	Before	2.0	0.5	2.7	1.8	2.1
	After	2.5	0.1	3.3	1.2	2.0
Other specified	Before	13.1	3.8	10.1	6.1	7.6
	After	10.8	4.7	10.1	5.8	7.4
Self-harm						
Medicinal	Before	5.7	13.0	2.1	4.5	4.3
	After	5.5	7.9	1.6	3.5	3.4
Other	Before	5.0	2.9	2.0	1.9	2.2
	After	4.8	1.4	3.0	1.6	2.3
Victim of assault	Before	36.7	6.5	17.3	7.4	12.2
	After	32.8	4.7	21.3	6.6	12.6
Total number of prisoners		**887**	**740**	**4,419**	**7,891**	**13,667**

Overall, the percentages of total prisoners admitted to hospital before and after release for each cause of admission were similar but there was considerable variation between demographic sub-groups. The largest single cause of admissions was assault which occurred in approximately 12 percent of prisoners before and after first release. It was particularly high in Indigenous women (37% and 33% respectively) and Indigenous men (17% and 21%), but much less in non-Indigenous men and women. Other specified causes of injury, which includes injury due to machinery, cutting or piercing instruments, occurred in just over seven percent of all prisoners but over 10 percent of Indigenous prisoners.

Transport related injuries occurred in about five percent of prisoners before and after release but without great variation between the demographic groups.

Self-harm due to medicinal agents occurred in four percent of prisoners before release and three percent after release but was particularly high in non-Indigenous female prisoners (13.0% and 7.9%) followed by Indigenous female prisoners (5.7% and 5.5%). Self-harm due to other means was highest in Indigenous female prisoners (5%). Injuries due to falls were more frequent in Indigenous women (9.5% and 7.8%) and Indigenous men (5.6% and 5.9%) compared with non-Indigenous prisoners of either sex.

Contacts with MHS

Table 19 shows the place of treatment of prisoners with mental disorders before and after first release.

Table 19: Place of treatment of mental disorders before and after date of first release from prison: percentage of prisoners with health service contact

Place of treatment	Period	Indigenous female %	Non-Indigenous female %	Indigenous male %	Non-Indigenous male %	All prisoners %
GH	Before	16.0	24.3	9.7	11.8	12.1
	After	25.7	17.5	14.9	12.5	14.4
MHS outpatient	Before	7.4	10.9	4.9	9.5	8.0
	After	17.2	14.4	8.8	11.5	11.2
MHS hospital	Before	3.0	5.8	3.1	4.8	4.2
	After	2.1	1.4	1.5	1.7	1.6
Any GH + MHS[a]	Before	19.7	30.4	12.6	17.5	16.8
	After	31.0	24.3	17.9	17.3	18.8
Total number of prisoners		**887**	**740**	**4,419**	**7,891**	**13,667**

GH = General Hospital; MHS = Mental Health Service
(a) places or treatment are not mutually exclusive

Overall, 16.8 percent of prisoners had admissions to general hospitals or contacts with the MHS before first release compared with 18.8 percent after release. Admission to general hospitals was the most common type of service received (14% of all released prisoners), followed by attendances at MHS clinics (11%) and admissions to MHS hospitals (less than 2%). Female prisoners were much more likely to have such contacts than men. Hospital admission or MHS contacts occurred in 30 percent of non-Indigenous female prisoners before release and 24 percent after release, while in Indigenous women the respective figures were 20 percent and 31 percent. Overall, admissions to MHS hospitals

were lower after first release than before, but attendance at MHS clinics increased after release, particularly in Indigenous women (from 7% to 17%).

Nature of mental health problems

The nature of mental health problems leading to hospital admission or MHS contacts before and after first-ever release is examined in more detail in Table 20.

Table 20: Principal diagnostic groups in mental health patients with health service contact in the five years before and after first release from prison: percentage of prisoners with health service contact

Principal condition	HSC	Indigenous female %	Non-Indigenous female %	Indigenous male %	Non-Indigenous male %	All prisoners %
Alcohol, drug related psychosis	Before	5.4	5.3	3.7	2.8	3.4
	After	7.3	4.2	5.7	4.0	4.7
Other psychosis	Before	4.5	4.0	3.2	4.4	4.0
	After	10.7	6.0	5.8	5.5	6.1
Other drug and alcohol related	Before	9.7	18.4	7.2	7.6	8.2
	After	15.4	11.2	9.7	7.5	8.9
All other mental conditions	Before	9.5	14.0	4.0	9.5	8.0
	After	15.5	12.7	5.7	8.8	8.5
All mental conditions	Before	19.7	30.4	12.6	17.5	16.8
	After	31.0	24.3	17.9	17.3	18.8
Total number of prisoners		**887**	**740**	**4,419**	**7,891**	**13,667**

HSC = health service contact

Approximately eight percent of all prisoners had services for Other (non-psychotic) drug and alcohol related problems and Other mental health problems. Such problems were more common in female prisoners. Overall, 4.7 percent of prisoners had admissions for alcohol or drug related psychoses after release and 6.1 percent had admissions for other psychoses. These diagnostic groups are not mutually exclusive and there was considerable cross-over between groups. Within each of these categories, the highest frequency of contacts occurred in Indigenous female prisoners, followed by non-Indigenous female prisoners, with approximately equal frequencies of admissions.

The relationship between hospital admissions or MHS contact before and after release for selected conditions

Previous tables have indicated that the major causes of admission to hospital both before and after date of first release are injury and poisoning, and mental disorders, which include problems related to acute and chronic alcohol and drug addiction. Table 21 shows the relative risk of admission following first date of release in prisoners who had previous admissions for each of these conditions compared with those without previous admissions. Prisoners who had previous admissions were twice as likely to have them after release than those with no previous admissions.

In the case of poisoning, while the numbers are much smaller, prisoners with admissions before first release were five times more likely to have admissions after release than those with no previous admissions. This increased risk was greatest in Indigenous male prisoners (RR 7.58) but was also more than three times greater in all groups.

Admission for mental health problems after first release was twice as likely in those with such admissions before release and is again greatest in Indigenous male prisoners (RR 3.43).

Table 21: Relative risk of health service contact after release if health service contact before release

	Indigenous female	Non-Indigenous female	Indigenous male	Non-Indigenous male	All prisoners
Injury					
Before	389	105	1,262	1,617	3,373
After	339	88	1,301	1,315	3,043
Before and after	225	21	584	424	1,254
Relative risk[(a)]	2.53	1.49	1.86	1.85	2.14
Poisoning					
Before	67	117	130	455	769
After	69	82	132	418	701
Before and after	15	39	26	93	173
Relative risk[(a)]	3.40	4.83	7.58	4.68	5.50
Mental illness					
Before	175	225	524	1,381	2,305
After	230	157	573	1,273	2,233
Before and after	75	69	190	349	683
Relative risk[(a)]	1.97	1.79	3.43	1.78	2.17
Total number of prisoners	**887**	**740**	**4,149**	**7,891**	**13,667**

HSC = health service contact

(a) Relative risk = (% HSC after release if HSC before) / (% HSC after release but no HSC before)

The relative risk of hospitalisation in released prisoners compared with the general population

The relative risk of hospital admission compared with expected rates of hospital admission in the general population after adjustment for age, gender and race is shown in Table 22. The table shows standardised morbidity ratios ($SMbR_1$) as described in the Subjects and methods section.

Table 22: Risk of hospital admission in released prisoners compared with the population of Western Australia relative to standard morbidity ratios ($SMbR_1$)

Principal diagnosis	Age 20–39				Age 40–49			
	Indigenous		Non-Indigenous		Indigenous		Non-Indigenous	
	Male	Female	Male	Female	Male	Female	Male	Female
Infectious, parasitic disease	**3.4**	**6.2**	**2.3**	2.8	**5.7**	**16.5**	**2.4**	3.2
Cancer	**3.8**	**2.5**	0.9	0.6	**2.6**	1.5	0.4	0.8
Endocrine and nutrition	**7.7**	**5.4**	1.7	1.4	**9.7**	**6.4**	1.4	3.4
Blood disease	0.8	2.0	0.8	0.4	1.8	2.4	1.5	0.4
Mental disorder	**5.6**	**6.6**	**4.6**	**5.8**	**6.9**	**6.5**	**4.8**	**2.6**
Nervous system disease	**5.1**	2.5	1.4	1.7	**9.1**	**3.9**	1.2	2.3
Circulatory disease	**3.2**	3.2	1.0	0.6	**4.0**	**7.4**	1.3	1.5
Respiratory disease	**5.2**	**7.7**	1.0	0.9	**15.5**	**11.1**	**1.8**	1.7
Digestive disease	**2.2**	**2.1**	0.9	1.0	**2.0**	**2.6**	1.0	1.4
Genitourinary disease	1.3	**1.7**	1.0	1.2	1.5	1.5	1.0	1.0
Pregnancy related	0.0	**1.9**	0.0	**1.4**	0.0	1.0	0.0	0.8
Skin disease	**4.7**	**11.4**	**1.8**	3.2	**7.0**	**5.1**	**2.2**	2.9
Musculoskeletal disease	0.6	1.3	0.9	1.2	0.9	0.9	1.0	2.6
Congenital anomaly	0.7	0.0	1.1	0.0	0.0	0.0	0.3	0.0
Perinatal condition	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ill-defined condition	**3.1**	**2.6**	1.5	1.5	**3.6**	**5.2**	1.6	1.5
Injury and poisoning	**5.6**	**16.6**	**3.0**	**7.0**	**8.8**	**21.1**	**3.0**	**4.2**
Other affecting health status	0.9	4.9	0.5	1.2	1.0	1.1	0.6	0.5
All causes	**3.1**	**3.5**	**1.7**	**1.9**	**3.5**	**3.7**	**1.4**	**1.5**

Note: Table 22 summarises $SMbR_1$ for ages 20–39 and 40–49 by main chapters of ICD-9-CM, omitting chapters based on small numbers of admissions. Figures shown in bold are instances in which 95 percent confidence intervals around the estimated SMbR do not include unity and are therefore statistically significant at the five percent level or less

In Indigenous prisoners there is a greater than three-fold risk of hospital admissions for all causes compared with the general population in both males and females and in both age groups. In non-Indigenous prisoners, SMbRs are also significantly increased but to a lesser extent than in Indigenous prisoners, varying from 1.9 in females aged 20–39 to 1.4 in males aged 40–49 years.

When examined by principal condition leading to admission, the greatest and most consistent increases in SMbRs are seen in admissions for injury and poisoning, mental disorders, infectious and communicable diseases, and skin diseases. In all of these, the increases are greater in Indigenous than in non-Indigenous prisoners and tend to be greater in females than males. Particularly notable is the very high relative risk (16.5) of admission for infectious and communicable disease in Indigenous female prisoners aged from 40–49 years.

In Table 23, relative risks of hospital admission are shown for Indigenous and non-Indigenous prisons with comparisons based on respective rates for the total Indigenous and non-Indigenous populations ($SMbR_2$).

Table 23: Risk of hospital admission relative to equivalent demographic sub-groups in the population of Western Australia, standard morbidity ratios ($SMbR_2$)

Principal diagnosis	Age 20–39				Age 40–49			
	Indigenous		Non-Indigenous		Indigenous		Non-Indigenous	
	Male	Female	Male	Female	Male	Female	Male	Female
Infectious, parasitic disease	1.1	1.5	**2.4**	3.1	1.5	2.6	**2.4**	3.8
Cancer	**6.5**	3.6	0.8	0.6	**4.6**	**2.4**	0.3	0.7
Endocrine and nutritional	2.1	2.6	2.0	1.5	1.0	1.2	1.7	3.8
Blood disease	0.6	1.1	0.8	0.4	0.9	1.1	1.5	0.4
Mental disorder	**2.3**	**3.8**	**4.9**	**6.1**	**2.7**	**3.8**	**5.0**	**2.6**
Nervous system disease	1.3	0.9	1.5	1.8	**2.1**	**2.0**	1.2	2.4
Circulatory disease	1.2	1.3	1.0	0.7	1.2	**2.1**	1.3	1.6
Respiratory disease	1.3	**1.8**	1.1	1.1	**2.2**	1.3	**2.1**	2.0
Digestive disease	**1.4**	**1.8**	0.9	1.0	**1.4**	**1.9**	1.0	1.4
Genitourinary disease	0.9	1.3	1.0	1.2	0.8	1.3	1.0	1.0
Pregnancy related	0.0	**1.3**	0.0	**1.4**	0.0	1.3	0.0	0.8
Skin diseases	1.3	**2.3**	**2.0**	3.8	**1.5**	1.2	**2.3**	3.2
Musculoskeletal disease	0.9	1.4	0.9	1.1	1.4	1.0	1.0	**2.6**
Congenital anomaly	2.1	0.0	1.1	0.0	0.0	0.0	0.3	0.0
Perinatal condition	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ill-defined conditions	1.2	1.3	**1.5**	1.6	**1.5**	**2.1**	**1.7**	1.5
Injury and poisoning	**1.8**	**2.7**	**3.2**	**8.6**	**2.2**	**4.0**	**3.2**	**4.6**
Other affecting health	0.2	1.1	0.5	1.4	0.2	0.1	0.7	0.7
All causes	**1.2**	**1.7**	**1.8**	**1.9**	1.0	1.0	**1.5**	**1.6**

Note: Table 23 summarises $SMbR_2$ for ages 20–39 and 40–49 by main chapters of ICD-9-CM, omitting chapters based on small numbers of admissions. Figures shown in bold are instances in which 95 percent confidence intervals around the estimated SMbR do not include unity and are therefore statistically significant at the five percent level or less

The magnitude of the increase in risk for Indigenous prisoners in Table 23, while significantly increased for all causes, injury and poisoning, and mental disorders, is much less than in Table 22. This is because of higher hospital admission rates in the Indigenous population compared with the non-Indigenous population. Conversely, the relative risks of admission in non-Indigenous prisoners tend to be marginally higher in Table 23 than in Table 22 because hospital admission rates in the non-Indigenous population tend to be lower than in the total population of Western Australia with the Indigenous population included. For example, in Table 23, All causes SMbRs in Indigenous male and female prisoners aged 20–39 years are 1.2 and 1.7 respectively, compared with 3.1 and 3.5 in Table 22, while in non-Indigenous prisoners the equivalent figures in Table 23 are 1.8 and 1.9 compared with 1.7 and 1.9 in Table 22. As in Table 22, the most consistent increases in risk across all prisoner groups were seen in injuries and poisoning and in mental disorders due to the relatively large numbers of admissions that occurred for these conditions. While based on relatively small numbers, significant and greater than two-fold increases in risk were seen for cancer admissions in both Indigenous male and female prisoners from 40–49 years, in central nervous system diseases in Indigenous prisoners (40–49 years), in circulatory disease in Indigenous female prisoners (40–49 years), and respiratory disease in both Indigenous and non-Indigenous males 40–49 years.

Time to admission

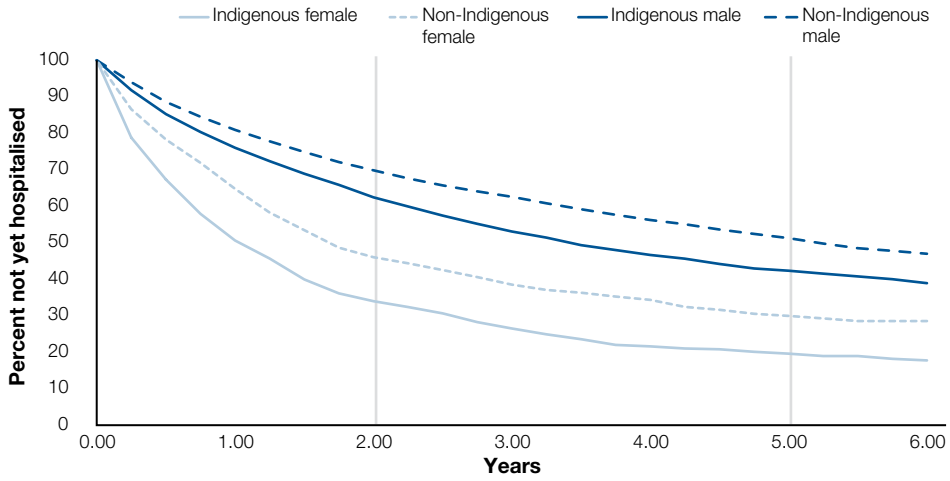
In this section we examine the cumulative probability of admission to hospital from the date of first release for all causes and for injury and poisoning, mental disorders, and all remaining conditions combined. In the following Figures 1–5, the survival function shows the percentage of persons in each demographic group not yet admitted to hospital or having a MHS contact after the date of first release. The converse of this, the cumulative percentage having hospital admission or HSC over time is summarised from Figures 1–5 in Table 24.

Table 24: Hospitalisation or mental health service contact at one, two and five years

Condition	Percentage with health service contact by:		
Demographic group	One year %	Two years %	Five years %
Any condition (see also Figure 1)			
Indigenous female	49.4	66.0	80.4
Non-Indigenous female	35.2	54.0	70.0
Indigenous male	24.0	37.6	57.7
Non-Indigenous male	19.1	30.1	48.8
Any condition (non-gynaecological) (see also Figure 2)			
Indigenous female	40.8	57.3	74.1
Non-Indigenous female	25.8	39.1	56.1
Indigenous male	24.0	37.5	57.7
Non-Indigenous male	19.0	30.1	48.7
Injury or poisoning (see also Figure 3)			
Indigenous female	17.3	29.6	45.4
Non-Indigenous female	9.8	14.8	21.0
Indigenous male	11.4	20.0	36.5
Non-Indigenous male	7.0	12.0	22.2
Mental problems (see also Figure 4)			
Indigenous female	10.4	17.7	33.1
Non-Indigenous female	10.2	16.4	25.9
Indigenous male	5.7	10.4	19.3
Non-Indigenous male	6.8	11.3	18.7
Other conditions (see also Figure 5)			
Indigenous female	29.1	41.8	61.2
Non-Indigenous female	14.4	22.2	40.6
Indigenous male	17.7	22.6	40.6
Non-Indigenous male	10.1	17.3	33.0

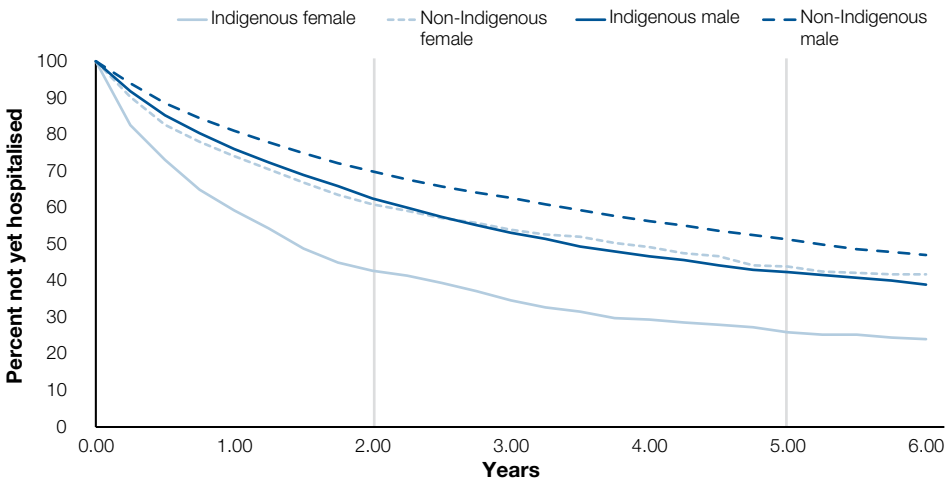
From Figure 1, which shows time to first HSC for any condition, it is apparent that the probability of HSC is clearly greater and occurs more rapidly in Indigenous women, of whom 67 percent had admissions by two years. This is followed by 54 percent in non-Indigenous women, 38 percent in Indigenous men and 30 percent in non-Indigenous men.

Figure 1: Prisoners – time to first hospitalisation after release, percent



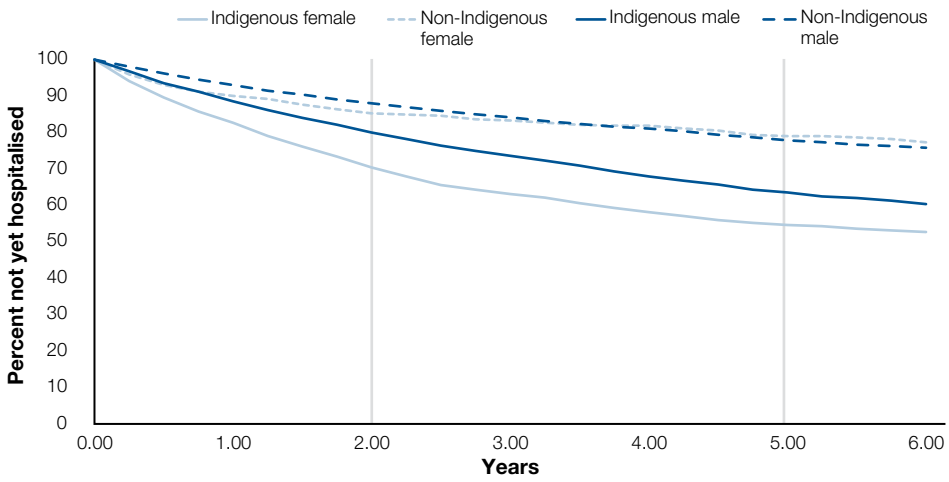
The high percentage of female prisoners who had hospital admissions for obstetric and gynaecological conditions after first release was noted in Table 17. Admissions for these conditions have been excluded in Figure 2, with a consequent reduction in the two year probability of admission to 57 percent (from 66%) in Indigenous women and 39% (from 54%) in non-Indigenous women (see Table 24). In both Figures 1 and 2, the greatest separation between groups occurs in the first two years and thereafter remains relatively unchanged.

Figure 2: Prisoners – time to first (non-gynae) hospitalisation after release, percent



The time to first admission for injury and poisoning is shown by demographic sub-group in Figure 3.

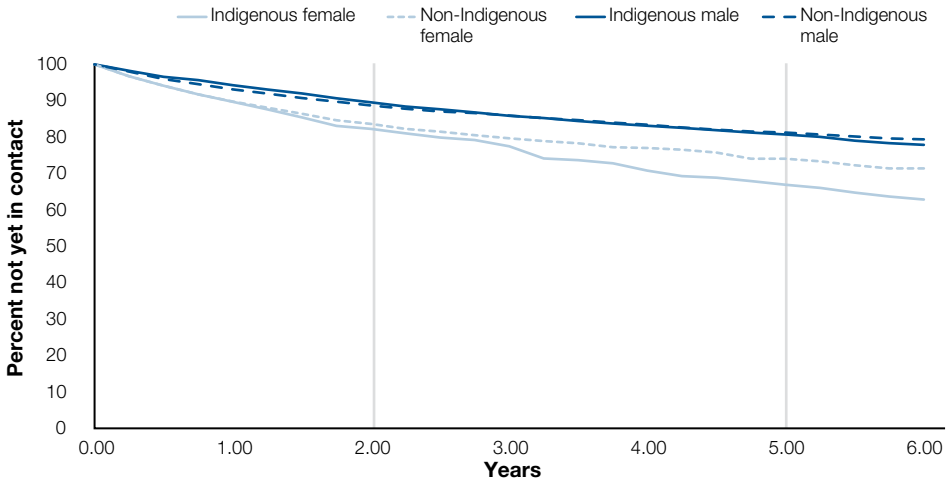
Figure 3: Prisoners – time to first hospitalisation for injury/poisoning after release, percent



The probability of admission for injury and poisoning is again highest in Indigenous women (30% at two years) followed by non-Indigenous women (20%), Indigenous men (15%) and non-Indigenous men (12%). As in Figures 1 and 2, the risk of admission is greatest in the first two years after release, particularly for Indigenous women.

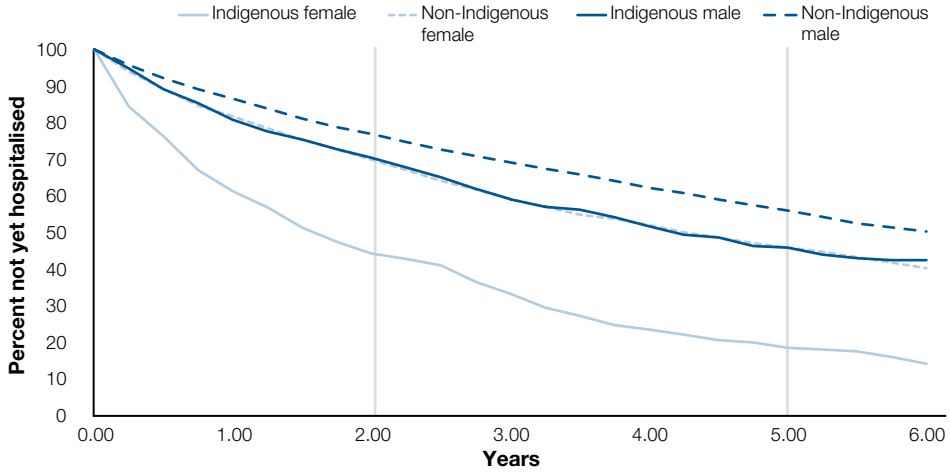
The cumulative probability of admission or MHS contact for mental disorders is shown in Figure 4.

Figure 4: Prisoners – time to contact with MHS after release, percent



Indigenous female prisoners and non-Indigenous female prisoners have approximately the same probability of admission or MHS contact at two years (17%) but thereafter it increases more rapidly in Indigenous women (to 33% at five years compared with 26% in non-Indigenous women). In males, the probability of contact at two years is 10 percent in both Indigenous and non-Indigenous men, gradually increasing to approximately 20 percent at six years.

Figure 5: Prisoners – time to first Other hospitalisation after release, percent



Finally, Figure 5 shows the cumulative probability of admission for all remaining conditions. This is again notable for a rapid increase in cumulative admission in Indigenous women to over 40 percent at two years and nearly 65 percent at six years. In non-Indigenous women and Indigenous men, the probability of admission is about 22 percent at two years and nearly 45 percent at six years. In non-Indigenous men the respective figures are 17 percent and 37 percent.

The extent to which the probability of admission varies with age was determined for each of the above conditions and demographic sub-groups separately, but differences with age were found to be small in virtually all instances. We have therefore not attempted to make adjustments for age.

The relationship between morbidity and reoffending

In this section we examine the relationship between a previous history of HSC contact and subsequent reoffending and the relationship between reoffending and HSC following release from prison. We initially compared HSC in known first offenders who did not reoffend within two years of first release with known first offenders who reoffended within two years and multiple reoffenders. As there was little difference between HSC in the latter two groups they have been combined in the tables that follow.

Table 25: Hospital admission or mental health service contact in the five years before first release in reoffenders and prisoners who did not reoffend within two years of first release

Reoffender status	Indigenous female	Non-Indigenous female	Indigenous male	Non-Indigenous male	All prisoners
Number of prisoners					
Did not reoffend	346	506	902	4,329	6,083
Did reoffend	542	257	3,278	3,879	7,956
Health service contacts in five years before release					
Any condition					
Percentage who did not reoffend	69.1	56.7	45.9	43.4	46.3
Percentage who did reoffend	76.2	70.3	53.3	54.4	55.8
Prevalence ratio	1.10	1.24	1.16	1.26	1.20
Mental health problem					
Percentage who did not reoffend	15.9	24.9	10.1	13.1	13.8
Percentage who did reoffend	22.1	38.5	13.2	21.0	18.4
Prevalence ratio	1.39	1.55	1.31	1.61	1.34
Injury or poisoning					
Percentage who did not reoffend	43.9	20.6	27.7	19.1	21.9
Percentage who did reoffend	48.7	34.6	32.7	28.4	31.8
Prevalence ratio	1.11	1.68	1.18	1.49	1.45

Table 25 compares the prevalence of a history of HSC in the five years before first release in known first offenders who did not reoffend within two years with that in all reoffenders. Reoffenders were 20 percent more likely to have such a history than non-reoffenders. This trend was present in all demographic groups but was greater in both non-Indigenous male and female prisoners than Indigenous prisoners.

The prevalence of previous HSC for mental problems was 34 percent greater in reoffenders than non-reoffenders. This trend was also present in all demographic groups but was again greater in non-Indigenous prisoners (61% greater in males; 55% greater in females).

The prevalence of previous admission for injury or poisoning was 45 percent greater in reoffenders than non-reoffenders. As in the case of mental problems, this propensity was again greater in non-Indigenous female prisoners (68%) and non-Indigenous male prisoners (49%) than in Indigenous female prisoners (39%) and Indigenous male prisoners (18%).

The probability of HSC contact in the two years after the first release during the study period is shown for non-reoffenders and reoffenders in Table 26.

Table 26: Hospital admission or mental health service contact in the two years after first release in the study period in reoffenders and prisoners who did not reoffend within two years of first release

Reoffender status within two years of release	Indigenous female	Non-Indigenous female	Indigenous male	Non-Indigenous male	All prisoners
Number of prisoners					
Did not reoffend	346	506	902	4,329	6,083
Did reoffend	542	257	3,278	3,879	7,956
Health service contact within two years of release					
Any condition					
Percentage who did not reoffend	52.6	30.8	28.2	22.9	26.0
Percentage who did reoffend	55.5	44.7	33.0	29.0	33.0
Prevalence ratio	1.06	1.45	1.17	1.27	1.27
Mental health problem					
Percentage who did not reoffend	14.2	12.6	8.0	6.8	7.9
Percentage who did reoffend	18.3	19.5	9.1	13.4	12.2
Prevalence ratio	1.29	1.54	1.14	1.97	1.54
Injury or poisoning					
Percentage who did not reoffend	22.8	9.3	12.3	7.4	9.2
Percentage who did reoffend	29.5	21.0	17.4	12.5	16.0
Prevalence ratio	1.29	2.26	1.41	1.68	1.74

The pattern is similar to that shown in Table 25. Reoffenders had a 27 percent greater probability of admission for all conditions than those who did not reoffend but this was much greater in non-Indigenous women in whom health service contact was 45 percent more likely than in those who did not reoffend and in non-Indigenous men who reoffended (27% greater). In the case of mental health problems, admissions were 54 percent more likely in reoffenders than non-reoffenders. This trend was present for all groups but greater in non-Indigenous men (97%) and women (54%). Finally, it is seen that admissions for injuries or poisoning are 74 percent more likely in reoffenders than non-reoffenders. This excess risk in reoffenders was again more marked in non-Indigenous prisoners (126% greater in women and 68% more likely in men).

Synthesis of results

In this section we examine the similarities of factors associated with excess deaths and high use of hospital and MHS. As these factors vary with gender and Indigenous status we have brought together information relating to death and morbidity for each of the sub-groups of prisoners separately.

Indigenous female prisoners

The risk of death in released Indigenous female prisoners is eight to nine times higher than in women in the general population of Western Australia of the same age and approximately twice that of Indigenous women in the general population. In the age group 20–39 years, the risk of death in Indigenous female and non-Indigenous prisoners is approximately the same but in the age group 40–59 years the risk is substantially higher in Indigenous female prisoners than in non-Indigenous prisoners. It is likely that this difference is due to higher death rates from chronic diseases in older Indigenous prisoners. Approximately three quarters of the 30 deaths in Indigenous female prisoners were due to the effects of alcohol and drug addiction, or to injury and poisoning. The majority of the latter, amounting to one-fifth of all deaths, were related to transport accidents with few attributed to suicide, self-harm or homicide.

Indigenous female prisoners also had higher relative and absolute risks of hospital admission or contacts with MHS than all other demographic groups. Compared with all women in Western Australia, Indigenous female prisoners were three to four times more likely to be admitted to hospital or have MHS contacts and over 60 percent more likely than Indigenous women in the general population to receive such services. Approximately 80 percent had at least one admission or MHS contact both before and after the date of first release. Moreover, Indigenous female prisoners had an average of 6.5 admissions per person before

and 8.0 admissions after release, which is more than three times the average number of admissions for all prisoners.

With the exception of admissions for poisoning, which were highest in non-Indigenous female prisoners, Indigenous female prisoners had the highest level of admission or MHS contact for all major conditions investigated. While levels of hospitalisation were particularly high for pregnancy and gynaecological conditions as well as mental disorders and injury, levels of admission were also relatively high for respiratory, digestive, genitourinary, skin conditions and infectious and parasitic diseases, indicating that Indigenous female prisoners suffer from a broad range of health problems, many of which may have an infectious aetiology.

Indigenous female prisoners had particularly high levels of admission for injury, with approximately 40 percent having at least one such admission both before and after the date of first release, but with many having multiple admissions. The largest single cause of admission was injury due to assault (approximately 35%), followed by falls (nearly 10%), self-harm due to medicinal agents (over 5%), other forms of self-harm (5%), and transport related injury (nearly 5%). It should be noted that these categories are not mutually exclusive because of the high proportion of subjects who had multiple admissions for injury or poisoning.

Non-Indigenous female prisoners

Non-Indigenous female prisoners aged 20–39 years had a risk of death approximately 10 times greater than women in the general population of the same age, while for those aged 40–59 years the risk was three times greater. The very high risk of death in younger women was greater than the risk of any of the other groups of prisoners of the same age. While there were only 22 deaths in non-Indigenous female prisoners, it is nevertheless clear that their excess mortality was due largely to deaths related to injury or poisoning, or alcohol or drug addiction, which collectively accounted for three quarters of the deaths. External cause of injury and poisoning codes (E-codes) indicated that self-harm (mainly by poisoning) or accidental poisoning were the main individual causes of death.

This pattern of causes of death was paralleled by high relative and absolute risks of hospitalisation or contact with MHS for the same conditions. The overall risk for all conditions after release compared with all non-Indigenous women in Western Australia was 1.9 times greater in those aged 20–39 years and 1.6 times greater in those aged 40–59 years. In the case of services for mental disorders (including acute and chronic effects of alcohol and drug addiction), the respective relative risks were considerably higher (6.1 and 2.6 respectively) and higher again for injury and poisoning (8.6 and 4.6 respectively). These conditions were also among the commonest reasons for admission to hospital or MHS contacts in this group of ex-prisoners. For example, the percentages of women who received such services for mental disorders in the five years before and following the date of

first release were 30 percent and 24 percent respectively. For poisoning the respective figures were 15 percent and 11 percent, and for physical injury 15 percent and 11 percent respectively. When external cause of injury and poisoning codes were examined, 13 percent and eight percent respectively were coded as self-harm due to medicinal agents while approximately five percent had admissions for accidental poisoning before and after release.

There is thus close agreement between the major causes of morbidity and mortality, with evidence of long-standing mental problems including alcohol and drug addiction, in non-Indigenous female prisoners.

Indigenous male prisoners

Indigenous male prisoners had five times the risk of death than males of the same age in the general population of Western Australia. Unlike non-Indigenous male prisoners, the risk of death in those aged 40–59 years is higher than in those aged 20–39 years. It is likely that this was due to higher rates of death from chronic disease. For example, deaths due to cardiovascular disease, diabetes and renal failure together accounted for 23 percent of deaths in Indigenous male prisoners compared with 11 percent of deaths in non-Indigenous male prisoners, despite the younger average age of Indigenous male prisoners. While injury and poisoning are major causes of death in Indigenous male prisoners, they accounted for only 46 percent of deaths in this group compared with 58 percent in non-Indigenous males. Deaths due to self-harm accounted for 19 percent of total deaths, while over 10 percent were related to transport accidents.

Indigenous male prisoners had over three times the risk of hospital admission than the male population of Western Australia and over six times greater risks of admission for mental disorders (including acute and chronic effects of alcohol) and for injury and poisoning, over three times the risk of admission for circulatory diseases, seven times for endocrine diseases, and five times for respiratory and skin diseases. Thus, as in the case of Indigenous female prisoners, Indigenous male prisoners are subject to a broad range of medical problems that pre-date first imprisonment. When the same comparisons were made with the general Indigenous male population, the relative risks of both mortality and hospital admission were less, but still at least twice as great for mental disorders and injury and poisoning, both or which were major causes of hospital admission. Over 30 percent of subjects had at least one admission for injury and poisoning before and after date of first release and 13 percent and 18 percent respectively having admissions or MHS contacts for mental disorders. Assault was the most common cause of admission for injury for which approximately 20 percent had admissions before or after release, followed by transport related injuries (approximately 6%).

Non-Indigenous male prisoners

Non-Indigenous male prisoners aged 20–39 years had four times the risk of death of males in the general population of Western Australia. In those aged 40–59 years the risk was twice as great. Deaths due to effects of alcohol and drug addiction or injury and poisoning accounted for approximately three quarters of all deaths and were therefore likely to account for a major part of the excess of deaths in this group. The largest single cause of death was in the category of suicide, self inflicted harm and homicide which accounted for 22 percent of total deaths, followed by acute and chronic effects of alcohol and drug addiction (16%). Transport related deaths accounted for a further eight percent of total deaths.

Compared with males in the general population of Western Australia, non-Indigenous male prisoners had between 1.5 and two times the risk of hospitalisation or contact with MHS after release from prison. In the case of mental disorder however, the risk was five times greater and for injury and poisoning it was approximately three times greater.

Approximately 50 percent of non-Indigenous male prisoners had at least one hospital admission or MHS contact both before and after the date of first release. Admission for injury was the largest single reason for admission to hospital, occurring in approximately 20 percent of prisoners, both before and after the date of first release, followed by admission for mental disorders (17%). About five percent were admitted because of poisoning before and after release. The largest single reason for admission for injury or poisoning was assault (approximately 7%), followed by transport related accidents (5%) and self-harm (5%).

In summary, the excess mortality and morbidity in non-Indigenous male prisoners is predominately due to mental disorders (including addiction to alcohol and drugs) or injury and poisoning which may also often be associated with the use of alcohol or illicit drugs.

Time to death or hospitalisation following release

The results of the study suggest that prisoners were particularly vulnerable to death or hospitalisation in the period immediately after release. This was most apparent for deaths. The crude death rate for all causes of death in the six months after release was nearly four times higher than after one year, while in the second six months it was twice as great. This pattern was similar for all demographic sub-groups, but the gradient with time from release was particularly marked for deaths related to addiction to alcohol and drugs, and deaths due to injury and poisoning. The numbers of deaths were too small (particularly in women) to analyse time to death for specific causes of death in demographic sub-groups. Nevertheless, it is reasonable to assume from these results that problems related to alcohol and drug addiction, and injury and poisoning account for much of the excess risk of deaths in

individual groups of prisoners, including non-Indigenous female prisoners in whom the risk of death after release is particularly high. It suggests the possibility that some deaths are due to increased sensitivity to drugs after a period of abstinence.

Kaplin-Meier survival analysis for time to first hospital admission following release demonstrated that the probability of admission was much higher in the first year after release and appeared to decline exponentially with time up to six years from date of release. This was particularly apparent for Indigenous and non-Indigenous female prisoners and least apparent for non-Indigenous male prisoners.

The results from both the mortality and morbidity studies suggest the need to facilitate access to health care in the period immediately after release.

The risk of mortality and morbidity in repeat offenders

The risks of both death and hospitalisation are higher in reoffenders than in first offenders. From the information on hospital admissions or MHS contacts before date of first release, it was seen that prisoners who ultimately became reoffenders had higher levels of service use before imprisonment as well as after the period of first release. This trend was particularly strong for mental disorders and injury and poisoning in both non-Indigenous male and female prisoners. It suggests that behaviours leading to use of health services for mental disorders or injury and poisoning, particularly alcohol or drug abuse, may also be associated with reoffending.

Discussion

Our study has shown that released prisoners have higher risks of death and hospital admission than the general population after adjustment for age, gender and Indigenous status. Released prisoners also have a higher prevalence of hospital admission and contacts with MHS before imprisonment, suggesting that many of their health problems are long-standing. There are, moreover, strong similarities between risk factors and causes of death and hospitalisation both before and after imprisonment. For example, mental disorders, including problems related to the effects of alcohol and drug addiction, and injury and poisoning account for much of the excess mortality and morbidity in released prisoners. Moreover, a history of hospital admission or MHS contacts before imprisonment is strongly predictive of the use of the same services after release. Suicide, drug and alcohol related death, accidental poisoning and transport related deaths were the leading causes of death, while injury and poisoning and problems associated with alcohol and drug abuse were the principal conditions leading to hospital admission or contact with MHS. It is likely that many deaths and episodes of hospital admission attributed to physical injury are associated with alcohol or drug abuse, even if not coded as such.

The findings above are consistent with studies of causes of death in released prisoners conducted elsewhere. Harding-Pink and Fryc (1988) found an increased risk of sudden death in released prisoners in Geneva and noted, as in the present study, that the risk of death was particularly high in the weeks soon after release. Early deaths were more likely to occur in prisoners with a record of substance abuse and were often attributed to opiates, including methadone. The authors concluded loss of tolerance to opiates while in prison may have led to death in prisoners who resumed pre-imprisonment drug practices. A study of injecting drug users in the UK found an eight-fold risk of death in the first two weeks after release from prison compared with the following 10 weeks (Seaman, Brettle & Gore 1998). In the state of Victoria in Australia a retrospective cohort study of young offenders found the risk of death from all causes and from drug-related causes to be nine times and 25.7 greater respectively than in the general population. Davies and Cook also examined mortality in released female prisoners in Victoria and found that 45 of 62 deaths were due to drug-related causes (Davies & Cook 2000). In a further study of unnatural deaths in people released from prisons in Victoria, Graham (2003) also found a relative risk of death that was ten times greater than in the general population, with the greatest risk occurring in the first few weeks after release. Over half of unnatural deaths were related to the use of heroin, while heroin-related deaths in released prisoners accounted for 25 percent of all such deaths in Victoria. A study of deaths of prisoners serving community correction orders in Victoria found that of 198 deaths, 62 were related to use of drugs or alcohol and a further 29 were due to suicide (Biles, Harding & Walker 1999: 104). In Finland, Joukamaa found a nearly four-fold risk of all cause mortality in a representative sample of 900 released male prisoners compared with age-matched community controls. For ‘natural’ diseases (predominantly cardiovascular disease) the risk was nearly three times greater, and for deaths due to injury or poisoning (including suicide and homicide) it was more than five times greater (Joukamaa 1998).

Other studies in Finland of violent offenders found a five-fold risk of death in males and 17 times greater risk in females compared with the general population after adjustment for age (Paanila, Hakola & Tiihonen 1999; Putkonen et al. 2001). Lattimore, Linster and MacDonald (1997) examined mortality in two cohorts of young Californian males paroled during the 1980s, and found a particularly high rate of death due to homicide. Alcohol and illicit drug abuse is thus a likely link between poor health outcomes and offending behaviour.

Reoffenders have notably higher risks of death and hospital admission than first offenders, particularly for mental problems and injury and poisoning as noted in other studies (Lovell, Gagliardi & Peterson 2002). The higher risk of hospital admission in reoffenders is particularly noticeable in non-Indigenous prisoners in whom the relative risk of admission for mental health problems within two years was 1.97 in males and over 1.54 in females. With Indigenous prisoners who reoffended, the relative risks were 1.14 and 1.30 in males and females respectively. In the case of injury and poisoning, the relative risks in non-Indigenous reoffenders were 1.68 in males and 2.26 in females, compared with 1.41 in Indigenous male prisoners and 1.29 in Indigenous female prisoners.

The high prevalence of mental problems both before imprisonment and after release demonstrated in this study, are consistent with studies of prisoners in the UK. For example, a survey of mental health in prisoners conducted by the Office of National Statistics on behalf of the Department of Health and Social Security found that 14 percent of women and 10 percent of men on remand had experienced psychotic episodes in the previous year, while 39 percent of men and 75 percent of women had significant neurotic symptoms, which the authors noted, was well above the prevalence found in similar household surveys. Even larger proportions (69% of women and 85% of men) admitted to ever-using illicit drugs. Moreover approximately 40 percent of women and 20 percent of men on remand reported receiving medical help for mental problems in the previous year. This investigation was consistent with previous studies in representative samples of prisoners carried out in the UK in the early 1990s, and is cited as a major reason for the subsequent transfer of responsibility for prisoner health from the Prison Service to the National Health Service, to ensure equal standards of care in prisons and the general community.

The new arrangements in the UK should improve the prospects of continuity of treatment after release. A study of mental problems and drug abuse in remand prisoners noted that while important opportunities existed for the treatment and rehabilitation of prisoners, the possibility of early release meant that particular efforts were required to ensure continuity of care in the community. (Brooke et al. 1998, Glaser et al. 1993) The problems in ensuring continuity of care and compliance with medication in prisoners with other chronic diseases such as tuberculosis (TB) and HIV-AIDS after release have been noted by other research workers (Fry et al. 2005). Hammett, Roberts and Kennedy (2001) have identified five requirements to help prisoners with mental conditions make a successful transition to community living which may well apply to the majority of prisoners. They include: effective

discharge planning to ensure community linkage and continuity of care; adherence to treatment regimes; availability of appropriate transitional and permanent housing; quick access to other benefit programs; and recognition of the particular needs of prisoners with multiple problems.

The inclusion of ongoing health care as one facet of release planning can only be relevant if adequate resources exist in the community to meet assessed health needs. For example, a study of the use of community MHS following release in mentally ill offenders in Washington State found that while over 70 percent of prisoners received social or MHS after release, few received these at a meaningful level. Charges for new crimes or supervision violations were common (70%).

A major finding of the present study is the greater risk of both death and hospitalisation in Indigenous prisoners than in non-Indigenous prisoners when both are compared with the general population of Western Australia. These differences are reduced when Indigenous prisoners are compared with the Indigenous population of Western Australia, indicating that Indigenous prisoners share the same health disadvantages as Indigenous people generally. Evidence for excess mortality in Indigenous people in Western Australia compared with the general population has been well documented. In the age groups 15–29 years and 30–49 years, corresponding to the age of the majority of prisoners included in the study, the relative risks of death in Indigenous males compared with the general population were 3.3 and 6.4 respectively and in females 3.4 and 5.5 respectively (Gracey, Williams & Smith 2000). Similar relative risks for death in Indigenous infants and children in the same study are indicative of the social deprivation that affects the health of Indigenous people throughout life. Studies elsewhere have stressed the importance of social disadvantage in early life on both ill-health and offending behaviour (Galea & Vlahov 2002). Notwithstanding these results, Indigenous prisoners are at greater risk of death than other members of the general Indigenous population. Similarly, part of the increased risk of hospitalisation in Indigenous prisoners is due to the greater risk of hospitalisation in Indigenous people in the general population as demonstrated in a recent comparative study of hospitalisation for five major health problems (Watson, Ejueyitsi & Coddle 2001). Even allowing for this, Indigenous prisoners had higher risks of hospital admission for a wide range of disease conditions in addition to mental disorders and injury and poisoning, including infectious and parasitic diseases, cancer, endocrine and nutritional diseases, circulatory disease, respiratory disease, digestive disease, and skin conditions, most of which are associated with social disadvantage. As noted previously, Indigenous prisoners were more likely to be reimprisoned than non-Indigenous prisoners and it is possible that their poor health outcomes may be related to greater levels of social disadvantage that also predispose prisoners to multiple offending.

The present study found that all female prisoners are at substantially greater risk of death and hospitalisation than male prisoners. Not only were female prisoners more likely than male prisoners to have multiple hospital admissions, they were also are admitted to hospital

much sooner after release than male prisoners, with 66 percent of Indigenous women and 54 percent of non-Indigenous women being admitted to hospital within two years after first release compared with 38 percent of Indigenous males and 30 percent of non-Indigenous males. Non-Indigenous female prisoners had the highest rate of hospital admission for mental disorders and poisoning, while Indigenous female prisoners had the highest rates of admission for all other conditions. Of particular concern is that over 40 percent of Indigenous female prisoners had hospital admissions for injury with over one-third having admissions for injury due to assault. This finding is consistent with a national study that compared hospital admissions for injury in Indigenous people and Torres Strait Islanders with non-Indigenous people and found that interpersonal violence accounted for 31 percent of admissions for injury in Indigenous women and 50 percent in men. Compared with the non-Indigenous population, age standardised rate ratios for admissions due to interpersonal violence were 11 times greater in Indigenous male prisoners and probably many times greater in females although the authors note that this is difficult to determine precisely because of possible under-reporting of domestic violence in Indigenous women (Moller, Dolinus & Cripps 1996). In addition, female prisoners have rates of hospital admission for pregnancy and other conditions related to reproduction that are probably substantially higher than in women of the same age in the general population.

While women constitute only 11 percent of released prisoners, the extent of their health problems is of particular concern, particularly in view of the high prevalence of mental illness and attempted self-harm reported in female prisoners elsewhere (Anderson 2002; White 2002). Anderson (2002) in particular has drawn attention to historical neglect of the health of female prisoners. She emphasises their special health needs, including physical and mental problems related to drug dependence such as HIV-AIDS and hepatitis, and a high prevalence of gynaecological problems.

Implications for policy

The current study has several implications for preventive and clinical services for released prisoners. Four points stand out:

- First, the study provides evidence that prisoners have long-term health problems that pre-date imprisonment and probably originate in early life. This is consistent with the evidence linking both poor health status and criminal behaviour to social disadvantage. Success in tackling ill-health in prisoners will ultimately depend on reducing the same social inequalities that lead to offending behaviour.

- The second issue is the importance of mental problems, including addictive behaviour and injury and poisoning, as causes of both death and morbidity and the strong link between these conditions and reoffending, as noted in other studies (e.g. Hartwell 2003). The successful management of such medical problems, which requires long-term treatment and counselling, is difficult even under ideal conditions, but even more so in the uncertain social circumstances that many released prisoners find themselves in.
- The third issue is the seriousness of the extent of higher risks of death and hospitalisation in Indigenous prisoners. In the long-term these can only be reduced by addressing social disadvantage that leads to chronic ill health. In the interim, health problems need to be addressed through culturally appropriate health services. These need to be structured to ensure continuity of care on reentry into the community, and, as recommended by the Royal Commission on Indigenous Deaths in Custody, should involve Indigenous medical services in locations wherever this is possible (Johnston 1991).
- Finally, while female prisoners account for only 11 percent of all prisoners, they have extensive health problems that warrant special attention, but it is important to recognise the different needs of Indigenous and non-Indigenous women.

These issues raise a number of questions that must be considered by policy-makers if the health problems of released prisoners are to be addressed:

- Are the present structural arrangements between prison health services and other parts of the health care system, including Indigenous medical services, appropriate for meeting the long-term health care needs of released prisoners?
- Do existing prison health services have sufficient resources for the assessment of health needs and risk factors for acute and chronic health problems after release as well as management of current health problems while in prison?
- Is there adequate communication between prison and general health services to ensure continuity of health care, particularly in prisoners with mental problems, those with addiction to alcohol and illicit drugs or infections such as HIV-AIDS and hepatitis-C? Are sufficient resources available for adequate pre-release planning to connect prisoners to appropriate health care and supportive services after release, having particular regard to the needs of Indigenous and female prisoners?
- Are the ongoing health needs of prisoners adequately recognised in pre-release planning and the parole process?

Limitations and scope for further study

We acknowledge that our study has several limitations and also poses questions that can only be answered by further studies.

One of the most important concerns is that of possible errors in estimating relative risks of death or health service contact in Indigenous prisoners relative to the general Indigenous population. For the purpose of the national quinquennial census, enumeration of the Indigenous population is based on the principles of self-identification and acceptance by the Indigenous community. The extent to which the same criteria are used to identify persons of Indigenous origin in various health records, death records or the criminal justice system is uncertain. Lack of consistency in this regard could lead to numerator–denominator mismatch leading to unpredictable errors in rates. In this study, Indigenous status is based on Department of Justice records. While misclassification of Indigenous status may have occurred, this is unlikely to greatly affect comparisons of health outcomes within the prisoner cohort. On the other hand, comparisons of health measures in Indigenous prisoners and the general Indigenous population in Western Australia may be inaccurate. Because of the relatively small size of the Indigenous population, comparisons between non-Indigenous prisoners and the non-Indigenous population of Western Australia are unlikely to be affected to the same extent.

A further limitation is that our study does not take into account differences in the health of prisoners from different communities. For example, a comparative study of Indigenous health by regions of Western Australia found marked regional differences in mortality and hospitalisation for the five most important health problems (cancer, diabetes, cardiovascular disease, respiratory disease and injury and poisoning). For all conditions except cancer, both mortality and hospital admissions tend be highest in the North West and lowest in the Perth metropolitan area. By not recognising this heterogeneity, our study may have over-generalised the health problems of released Indigenous prisoners. To be of practical value, further studies of the existing data should examine the extent to which there are particular health issues in released prisoners who come from different regions of the state.

To determine the relative risk of death between prisoners and the general population, we estimated age, sex and cause-specific death rates for the total population from coded death data provided by the Health Department or, for later years, from monthly, free-text abstracts of death, which were then coded by the study team. The latter may differ from the eventual official coded causes of death. In approximately six percent of records, the coroner's verdict on the final cause of death was pending. It is likely that the majority of these will eventually be coded as injury or poisoning so that deaths due to these causes may have been underestimated.

To compare the risk of hospitalisation in prisoners compared with the general population, we were dependent on routine tabulations of hospital admission rates produced by the

Epidemiology Department of the Department of Health of Western Australia. Age and sex specific rates were available for broad chapters of the ICD for the Indigenous and non-Indigenous populations of Western Australia (Codde 2005). Unfortunately, more detailed population data relating to specific causes of hospitalisation that may have provided greater insights into the health problems leading to hospitalisation in prisoners were not available. Such an analysis would involve detailed analysis of causes of hospital admission for a major proportion of the population of Western Australia which, while feasible, was beyond the scope of this research study. Nor did we have access to population data relating to use of MHS. Finally, the available data on hospitalisation were based on total admissions rather than persons, which would have provided a more satisfactory basis for comparison. For example, if ex-prisoners are more likely to have multiple admissions to hospital for the same conditions, their risk of such admissions relative to the general population will have been overestimated.

The study has shown that released prisoners have hospital admissions and contacts with MHS in the five years prior to the date of first release with about the same frequency as in the approximately five years (on average) following first release. While this is strong evidence that ex-prisoners have long-standing health problems before imprisonment, we have not made a direct comparison between rates of hospitalisation in prisoners before release and rates in the general population. Nor did we take into account days spent in prison during the five years prior to date of first release. As hospitalisation for particular conditions, particularly injury and poisoning, is probably less likely to occur while in prison than in the community, the frequency of hospitalisation prior to imprisonment may have been underestimated. The comparison between pre- and post-release hospitalisation has also not taken account of the fact that the members of the study cohort would have been on average five years younger in the period prior to first release, which may have led to further bias. As the study has shown that pre-imprisonment health status of prisoners is an important issue, a more detailed study that recognises imprisonment time and age differences is required. This should also take advantage of the opportunity that exists in Western Australia of extending the study backwards in time for a minimum of fifteen years prior to the date of first release.

The diagnostic groups used to study the causes of death and hospitalisation were very broad and more detailed analysis is required, particularly of mental disorders and admissions for injury and poisoning which accounted for much of the excess mortality and morbidity in prisoners. The accuracy of diagnostic coding of mental disorders in particular needs to be verified, so that a more accurate picture can be given of the nature and severity of mental problems experienced by prisoners. Closer examination should also be made of the reasons for admissions to MHS hospitals and attendances at clinics. An attempt should be made to distinguish between admissions to psychiatric units in general hospitals from admissions to general wards in cases coded as having mental illness.

Finally, our study has not attempted to relate mortality or morbidity to the nature of offending behaviours that led to imprisonment although such information is available. For example, it would be logical to look more specifically at health outcomes in persons who had drug related offences or those imprisoned because of violent behaviour. Nor have we taken into account the effects of duration of imprisonment on health outcomes. Further studies integrating imprisonment details as explanatory variables for health status should be undertaken.

To conclude, further research is required using the current linked data set and the most important are to:

- describe in more detail the spectrum of mental health problems in prisoners and hence assess requirements for formal management by MHS
- undertake regional studies to assess in greater detail the nature of medical problems in Indigenous prisoners released in different locations
- describe more fully patterns of illness in prisoners in early life
- examine the extent of discrepancies in assigning Indigenous status in Health Department and Department of Justice records.

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All URLs were correct at 13 March 2006

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This report presents the findings from the first study in Australia to use linkages between administrative records to identify the risk factors for mortality and morbidity among released prisoners and to accurately predict usage of hospital and mental health services. The study used information from the Western Australian Data Linkage System to track the use of health and mental health services by a cohort of prisoners released in that state between 1995 and 2001 before and after imprisonment. Analysis of these data sought to determine the risk of death, injury or mental disorder compared with the general population. Separate results are given for male and female, Indigenous and non-Indigenous prisoners.