

Trends & issues

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Foreword | *Prisoners experience high rates of drug dependence, health problems and premature mortality. Without intervention, they often come into further contact with the criminal justice system, creating further health risk. Opioid dependence is common among prisoners, yet treatment with opioid substitution therapy (OST) may reduce or prevent morbidity, mortality and offending.*

Using retrospective data linkage, this study evaluated engagement with treatment, patterns of offending, incarceration and mortality among opioid-dependent people who received OST in New South Wales, Australia between 1985 and 2010.

The results highlight that the prison setting provides an important opportunity to engage people in OST. Notably, OST treatment in prison and immediately post-release was found to be highly protective against mortality both while incarcerated and after release. Considering some of the known benefits of OST, this study provides strong evidence to support the value of OST programs within the criminal justice system.

Adam Tomison
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Determining the impact of opioid substitution therapy upon mortality and recidivism among prisoners: A 22 year data linkage study

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Prisoners are one of the most vulnerable groups in the community, experiencing high rates of mental illness, drug and alcohol dependence, chronic health conditions, exposure to violence, stigmatisation, social isolation and mortality (Kariminia et al. 2007). The World Health Organization (WHO 2010: np) states that

[p]risoners are members of the general population: they come from and usually return to the community. The relation between the health of prisoners, their families and the wider community is thus an acute concern.

Crime also carries costs to the wider community—impacts upon public amenity, financial loss, personal/property damage and the public health burden associated with premature morbidity and mortality of prisoners.

Prisoners have elevated rates of heroin dependence relative to the general population (Butler et al. 2004). Heroin dependence significantly impacts public health and public order, and has the greatest impact of all illicit drugs in Australia and globally (Begg et al. 2007; Degenhardt et al. 2013b).

Opioid dependence is commonly managed through the use of opioid substitution therapy (OST—methadone or buprenorphine maintenance), which is effective in achieving a number of positive treatment outcomes (Mattick et al. 2014)

Using a population of opioid-dependent people in New South Wales, Australia, the aims of the current study were to examine the:

- natural history of criminal justice system involvement among opioid dependent people, 1993–2011;



- extent of imprisonment of opioid dependent people, 2000–12;
- potential differences in the impacts of buprenorphine and methadone on treatment retention and mortality;
- differences in OST engagement and crime among Aboriginal and Torres Strait Islanders;
- gender differences in OST engagement;
- association between retention in OST and crime among opioid-dependent people;
- impact of OST provision in prison on in-prison mortality;
- impact of OST on mortality following release from prison; and
- cost effectiveness of OST in reducing mortality post-release among this group.

Many of these results have already been published, or are currently in the process of being peer-reviewed for publication. For that reason, the key findings from each piece of work are summarised here and interested readers are directed to full details in the published works.

Methods

Datasets

This study involved the linkage of four datasets:

- Pharmaceutical Drugs of Addiction System (PHDAS) at the NSW Department of Health.
- National Death Index (NDI) at the Australian Institute of Health and Welfare.
- Offender Integrated Management System at the NSW Department of Corrective Services.
- Reoffending Database (ROD) at the Bureau of Crime Statistics and Research (BOCSAR).

The Pharmaceutical Drugs of Addiction System

PHDAS is a database of all methadone and buprenorphine recipients in New South Wales, as notified to the NSW Pharmaceutical Services Branch since 1985. Clients in the PHDAS are fully

identified and the database records each client's full name, date of birth, sex, treatment entry and exit dates, the type of OST medicine received, the approved prescriber, the treatment setting (community or prison) and the reason for exiting treatment.

National Death Index

The NDI is a database held by the Australian Institute of Health and Welfare and contains fully identified mortality data collected from each of the state and territory Births, Deaths and Marriage Registers. It collects information including date, state and causes of death (primary causes for all records, secondary causes for deaths occurring 1997 and later).

Offender Integrated Management System

The Offender Integrated Management System is an administrative database of the NSW Department of Corrective Services. An extract from this system's fully identified 'Prisoner database' was used to obtain demographic and criminographic information about all adults in full-time custody in New South Wales.

Reoffending Database

ROD was developed by BOCSAR to investigate reoffending. It is an identified, internally linked dataset of court records and contains records of all finalised court appearances in the Local, District and Supreme Courts of New South Wales since 1993.

Results

The natural history of criminal justice system involvement among opioid-dependent people, 1993–2011

Studies of offending among people who use drugs typically focus on small and potentially unrepresentative samples. In this study, opioid-dependent NSW clients' contact with the criminal justice system was examined to develop population-wide measures of offending among opioid-dependent people (Degenhardt et al. 2013a).

Data on all entrants to OST for opioid dependence between 1985 and 2010

(n=48,069) were linked to data on court appearances from 1 December 1993 to 31 March 2011. Person years (PY) of observation and charge rates for major crime categories estimated by sex, age and time were calculated.

A total of 638,545 charges were laid against cohort members during the follow-up period. Eight in 10 males (79.7%) and 67.9 percent of females had at least one charge; rates were 94.15 per 100 PY (95% CI 93.89–94.41) among males and 53.19 per 100 PY (95% CI 52.91–53.46) among females, and highest at 15–19 years (175.74 per 100 PY males (95% CI 174.45–177.03), 75.60 per 100 PY females (95% CI 74.46–76.76)) and 20–24 years (144.61 per 100 PY males (95% CI 143.70–145.53), 84.50 per 100 PY females (95% CI 83.53–85.48)).

The most frequent charges were theft (24.5% of all charges), traffic/vehicle offences (16.3%), offences against justice procedures (10.5%), illicit drug offences (10.0%), intentional injury offences (9.9%) and public order offences (8.9%).

Overall, 20.8 percent of the cohort accounted for 67.4 percent of charges. The top most frequently appearing 5.6 percent of the cohort accounted for 24.3 percent of costs (\$75.5m). Among opioid-dependent people in Australia, a minority account for the majority of the criminal justice contact and levels of offending are not consistent over time, sex or age.

The extent of imprisonment of opioid-dependent people, 2000–12

There are few data about the incarceration of opioid-dependent people involving large representative cohorts. This study aimed to determine the prevalence and duration of incarceration in a large cohort of opioid-dependent people and estimate the costs associated with their incarceration (Degenhardt et al. 2014a).

All entrants to OST in New South Wales, 1985–2010 were linked to incarceration records, 2000–12 (n=47,196). The number and duration of incarcerations were calculated. The average daily cost of incarceration was applied to days of incarceration in the cohort to examine the

costs associated with incarceration of this cohort across the observation period.

Almost four in 10 of the cohort (37%; 43% of men and 24% of women) had at least one episode of incarceration. Men had a median of three (ranging between 1–47) incarcerations and women had two (ranging between 1–35). Indigenous men spent 23 percent of their follow-up time incarcerated, compared with eight percent for non-Indigenous men. Similarly, Indigenous women spent a substantially greater proportion of time incarcerated than non-Indigenous women (8% vs 2%).

Costs of incarceration of this cohort between 2000 and 2012 totalled nearly A\$3b. These findings suggest that a substantial minority of opioid-dependent people experience incarceration, usually on multiple occasions and at significant cost.

Potential differences in the impacts of buprenorphine and methadone on treatment retention and mortality

Research suggests methadone and buprenorphine may be differentially suited to particular groups of people and particular settings (Mattick et al. 2014). The aims of this study were to compare the characteristics of first-time methadone and buprenorphine treatment entrants, track treatment discontinuation and re-entry with methadone and buprenorphine, and examine the factors associated with an individual's risk of leaving their first OST treatment episode (Burns et al. 2014).

Records for all OST entrants in New South Wales between August 2001 and December 2010 (N=32,033) were linked to records of custody episodes (2000–12).

There were 15,600 first time OST entrants—7,183 (46%) commenced buprenorphine and 8,417 (54%) methadone. Fifty-six percent of those who commenced buprenorphine spent fewer than three months in treatment, compared with 30 percent who commenced methadone. Retention in treatment at 12 months was higher among those commencing methadone (44%) compared with buprenorphine (25%). However, 12 month buprenorphine retention increased

by 10 percent from 2001–10, whereas methadone retention decreased by three percent. Multivariable Cox models indicated that in addition to sex, age, treatment setting and criminographic variables, risk of leaving a first treatment episode was greater on any given day for those receiving buprenorphine and was dependent on the year treatment was initiated.

It was concluded that individuals commencing methadone are retained longer in treatment than those commencing on buprenorphine, although buprenorphine retention has improved over time.

Differences in engagement with opioid substitution therapy and crime among Aboriginal and Torres Strait Islanders

Although Indigenous Australians are overrepresented among heroin users, no study has examined offending, time in custody and OST treatment utilisation among Indigenous opioid-dependent people at the population level, nor compared these with non-Indigenous opioid-dependent people. The aims of this study were to compare the nature and types of offences, time in custody and OST treatment utilisation between opioid-dependent Indigenous and non-Indigenous Australians in contact with the criminal justice system (Gisev et al. 2014b).

Using linked records of OST entrants in New South Wales (1985–2010), court appearances (1993–2011) and custody episodes (2000–12), rates of criminal charges per 100 person-years were compared between Indigenous and non-Indigenous Australians. Comparisons were also made between Indigenous and non-Indigenous Australians for time spent in custody, as well as characteristics of OST utilisation.

Of the 34,962 people in the cohort, 6,830 were Indigenous and 28,132 were non-Indigenous. Among the 6,830 Indigenous people, 4,615 (67.6%) were male and 2,215 (32.4%) female. The median number of charges against Indigenous people (25, IQR 31) was significantly greater than for non-Indigenous people (9, IQR 16) ($p<0.001$). Overall, Indigenous people were charged with 33.2 percent of the total number

of offences against the cohort and 44.0 percent of all violent offences. The median proportion of follow-up time that Indigenous males and females spent in custody was twice that of non-Indigenous males (21.6% vs 10.1%; $p<0.001$) and females (6.1% vs 2.9%; $p<0.001$). The proportion of Indigenous people who first commenced OST in prison (30.2%) was three times that of non-Indigenous people (11.2%; $p<0.001$). Indigenous males spent less time in OST compared with non-Indigenous males (median proportion of follow-up time in treatment: 40.5% vs 43.1%; $p<0.001$).

Indigenous opioid-dependent people in contact with the criminal justice system are therefore charged with a greater number of offences, spend longer in custody and commonly initiate OST in prison. Criminal justice system contact is an important opportunity to engage Indigenous people in OST.

Gender differences in opioid substitution therapy engagement

Few population-based studies have examined differences in OST treatment utilisation between men and women. This study compared first episode and long-term OST treatment utilisation profiles between men and women, differentiating between treatment initiation in the community and in custody (Gisev et al. 2014a).

Records of new OST entrants (2001–10) were linked to custody episodes (2000–12). First OST treatment episode and overall treatment utilisation characteristics were compared between men and women initiating treatment in the community or in custody. Treatment retention was evaluated at three, six, nine and 12 months after first commencing OST and overall as the median proportion of follow-up time spent in treatment.

There were 15,600 first-time OST entrants in the cohort during the follow-up period. This included 10,930 men (70.1%) and 4,670 women (29.9%). A substantial minority initiated treatment in custody ($n=3,016$, 19.3%). More men than women began OST in custody (24.0% vs 8.3%; $p<0.001$) and only ever received OST in custody (57.5% vs 41.8%; $p<0.001$). Women were retained longer in their first OST treatment episode

at three, six, nine and 12 months post-entry into treatment. They also spent more of their overall follow-up time in treatment. The median proportion of follow-up time spent in treatment was higher among women than men initiating treatment in both the community (46.6% (IQR 74.9) vs 39.1% (IQR 72.4)) and custody (41.3% (IQR 61.4) vs 30.8% (IQR 55.1)).

It was concluded that there are a number of key differences in OST treatment utilisation profiles between men and women. Whereas men commonly initiate and only receive OST in custody, treatment retention is higher among women, independent of the setting treatment is initiated.

The association between retention in opioid substitution therapy and crime among opioid-dependent people

Following on from the study of patterns of offending among opioid-dependent people, the effect of OST treatment and retention on crime rates among 10,744 opioid-dependent people who first entered OST on or after 1 January 2004 was also examined. This allowed a comparison of crime rates in the four years immediately prior to treatment entry (the average time before an individual enters treatment after becoming opioid dependent), as well as periods in and out of OST after initiating treatment. Time spent in custody over this period was adjusted for.

The crude crime rate (CCR) per 100 PY for the total number of offences that individuals were charged with prior to treatment entry was 130.78 (95% CI 129.65–131.91). A 32 percent reduction was observed in the CCR while individuals were in OST (CCR 88.29, 95% CI 86.96–89.63) and a 20 percent reduction was observed while individuals were out of OST (CCR 101.67, 95% CI 100.35–102.99). When comparing the crime rates after treatment entry only, a 15 percent increase in the CCR was observed over the period individuals were not receiving OST.

The effect of treatment retention on crime rates was evaluated for individuals who were in OST for at least three months (n=7,546), six months (n=6,685), nine months (n=6,072) and 12 months (n=5,586). There was a clear reduction in

the total CCR the longer individuals were in treatment—85.72 (95% CI 84.40–87.05) at three months, 82.78 (95% CI 81.48–84.10) at six months, 79.20 (95% CI 77.91–80.50) at nine months and 76.50 (95% CI 75.22–77.80) at 12 months.

Overall, entry into OST had a positive effect on reducing crime rates among people with established opioid dependence. Lower crime rates were observed during periods in OST and greatest reductions were observed among people who were retained longer in treatment.

The impact of opioid substitution therapy provision in prison upon in-prison mortality

Deaths in prison are a significant concern and correctional authorities have a responsibility to ensure that such deaths are kept to a minimum. Opioid-dependent people commonly experience imprisonment (as documented earlier in this cohort) and may be at particular risk of death in prison. OST reduces mortality among opioid-dependent people residing in the community, but it is unclear if this is also the case in prison. This study aimed to describe deaths in prison among opioid-dependent people and examine associations between receipt of OST and risk of death in prison (Larney et al. 2014).

The cohort in this analysis included all opioid-dependent people who entered prison at least once (n=16,715) in New South Wales between 2000 and 2012. Rates of mortality during different periods in prison were examined, as were both natural and unnatural (suicide, drug-induced, violent and other injury) deaths in prison.

Cohort members were in prison for 30,998 PY, during which time there were 51 deaths. The all-cause crude mortality rate (CMR) in prison was 1.6 per 1,000 PY (95% CI: 1.2, 2.2 per 1,000 PY) and the unnatural death CMR was 1.1 per 1,000 PY (95% CI: 0.8, 1.6 per 1,000 PY).

Compared with time out of OST, the hazard of all-cause death was 74 percent lower while in OST (adjusted hazard ratio; AHR): 0.26; 95% CI: 0.13 to 0.50) and the hazard of unnatural death was 87 percent

lower while in OST (AHR: 0.13; 95% CI: 0.05 to 0.35). The all-cause and unnatural death CMRs during the first four weeks of incarceration were 6.6 per 1,000 PY (95% CI: 3.8, 10.6 per 1,000 PY) and 5.5 per 1,000 PY (95% CI: 2.9, 9.4 per 1,000 PY), respectively. Compared with periods not in OST, the hazard of all-cause death during the first four weeks of incarceration was 94 percent lower while in OST (AHR: 0.06; 95% CI: 0.01 to 0.48) and the hazard of unnatural death was 93 percent lower while in OST (AHR: 0.07; 95% CI: 0.01 to 0.53).

Mortality of opioid-dependent prisoners was significantly lower while in receipt of OST. In addition to other known benefits of OST in prison (eg reduced opioid use and injecting drug use), to-scale provision of OST in prisons will dramatically reduce unnatural deaths among opioid-dependent prisoners.

The impact of opioid substitution therapy on mortality following release from prison

The immediate period post-release from prison carries a high risk of mortality for ex-prisoners, particularly among those who use (and return to) drugs (Merrall et al. 2010). There has been little evaluation of interventions to reduce this mortality risk. No study to date has reported the impact of OST treatment provided during and after incarceration on mortality in the high-risk first month post-release (Degenhardt et al. 2014b).

A cohort was formed of all opioid-dependent people who entered OST in New South Wales between 1985–2010 and who following OST entry were released from prison at least once between 2000–12 (n=16,453 individuals, who were released 60,161 times across this period). Data on OST history, court and prison records, and deaths were linked. CMRs were calculated according to OST retention; multivariable Cox regressions for post-release periods were undertaken to examine the association between OST exposure (a time dependent variable) and mortality post-release, for which covariates were updated per-release.

There were 100,978 PY of follow-up post-release, during which time 1,050 deaths occurred for a CMR of 10.4 per 1,000

PY (95% CI: 9.8–11.0). Accidental drug-induced deaths were the most common cause of death.

Most individuals had received OST at some point while incarcerated (76.5%) and individuals were receiving OST in around half (51%) of prison releases. Lowest post-release mortality was among those continuously retained in OST post-release (CMR 4 weeks post-release: 6.4 per 1,000 PY; 95% CI: 5.2, 7.8) and highest among those with no OST (CMR: 36.7 per 1,000 PY; 95% CI: 28.8, 45.9).

Multivariable Cox regression models showed that OST exposure in the four weeks post-release reduced the hazard of death by 75 percent (adjusted hazard ratio 0.25; 95%CI: 0.15, 0.52); OST receipt in prison had a short-term protective effect that decayed quickly across time.

This study provides persuasive evidence that OST provision in prison and post-release reduces mortality risk in the immediate post-release period. It was concluded that OST in prison and post-release reduces mortality risk in the immediate post-release period. OST in prison should be scaled up and post-release OST continuation maximised.

Cost effectiveness of opioid substitution therapy in reducing mortality post-release among this group

Based on the previous cohort, this study aimed to undertake a cost-effectiveness analysis of the immediate uptake of OST post-release from prison relative to not receiving OST immediately upon release in saving lives in the first six months post-release (Gisev et al. forthcoming).

To allow for each person to have six months of follow-up, the cost-effectiveness analysis focused on those 16,073 people who were released on or before 30 June 2011.

Using information from each individual's first recorded prison release after commencing treatment, two groups of people were identified—those who were released onto OST (n=7,892) and those who were not released onto OST (n=8,181). Mortality was evaluated at six months after the first prison release.

Costs and resources included were all OST received by both groups in the six months follow-up (as measured in AUD2012), costs to the criminal justice system (proven charges processed by the court, police, penalties, prison) as well as the social costs of crime from the first day post-release to death, or 180 days post-release (whichever occurred first).

The crude average costs incurred per person for the first six months post release were estimated for the two groups. These were \$14,962 per person for those released onto OST and \$11,878 for those not released onto OST. In total across the six month period, there were 35 fewer deaths observed among those released onto OST. This equates to a cost of about \$88.14 per death prevented.

Discussion

This study has elucidated the patterns of offending, engagement with treatment and incarceration of opioid-dependent people in New South Wales across more than two decades.

Most cohort members (75.8%) had appeared before court for criminal charges, with men more likely to do so and on a larger number of occasions than women.

During 2000–12, over one-third of the cohort was incarcerated at least once, often on more than one occasion, and the costs associated with this are considerable. In any given year, around one in seven was incarcerated, with some variation across calendar years in these levels. The cumulative incidence of incarceration in the cohort is lower than has previously been reported in studies using smaller or convenience samples of opioid users or people who inject drugs (Kirby Institute 2012; Phillips & Burns 2012). The findings clearly suggest that care should be taken in extrapolating incarceration prevalence from selected samples of opioid users, given the lower levels determined in this cohort.

Through the use of a population-wide linkage, the limitations of small, selective, and possibly unrepresentative samples, were able to be avoided. Although it is possible that opioid-dependent people who seek treatment differ from those who do

not, the representativeness of this cohort is likely to be high as studies in New South Wales consistently find that the majority of heroin users have received OST at some point in their lives (Kirby Institute 2012; Phillips & Burns 2012).

This large-scale linked data study has also demonstrated the high mortality risk that opioid-dependent prisoners face after prison release, particularly from accidental drug-induced deaths, suicide, accidental injury and violence. This is not unexpected considering that upon release, these people often experience poor social support, isolation, medical comorbidities, financial stress, debts and continued exposure to drugs in the communities to which they return (Binswanger et al. 2012).

This study provides unequivocal evidence of the significant benefit of OST on post-release mortality of opioid dependent people leaving prison. Post-release OST exposure was highly effective in reducing the mortality risk in the first month at liberty. The lowest mortality rates were seen in those persons who were continuously retained in OST after release, whereas the highest mortality rates were seen in those opioid dependent persons with no OST in the post-release period.

OST provision in prison and post-release independently reduce mortality in the immediate post-release period. Prison OST is also effective in reducing drug-related HIV risk behaviours (Larney 2010), and significantly increases the probability that someone will enter OST in the days after release (Kinlock et al. 2007); there are also impacts of prison-based and post-release OST on risk of reincarceration (Larney et al. 2012). Despite these benefits, considerable inequities remain in the provision of care for opioid-dependent people in prisons compared with those in the community (Harm Reduction International 2012; Nunn et al. 2009). Although international agencies have emphasised its effectiveness (Jürgens, Ball & Verster 2009; Stallwitz & Stover 2007), policymakers in many countries are resistant to calls for OST in prison settings (McKenzie et al. 2009). In light of the increasingly robust scientific evidence demonstrating the benefits of prison OST, continued resistance to implementing and

expanding OST in correctional settings seems unwarranted.

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