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Preventing overdose deaths in the criminal-justice system

Preventing overdose deaths in the criminal-justice system

ABSTRACT

The rate of overdose deaths among prisoners in the immediate post-release period is unacceptably high. Overdose deaths result from many factors, including decreased tolerance after a period of relative abstinence during imprisonment and the concurrent use of multiple drugs which, with every additional illicit drug consumed in combination with opioids, nearly doubles the risk of death from opioids. Other important factors are the lack of pre-release counselling and post-release follow-up, and the failure to identify those at risk. Substance dependence is a chronic disorder with high relapse rates and often requires long-term continuous treatment. There is good evidence from trials and cohort studies that opioid substitution treatment reduces the risk of overdose among opioid users.

This report updates the information contained in *Prevention of acute drug-related mortality in prison populations during the immediate post-release period* (2010), identifying the main areas that need to be improved to reduce the risk of death. Linking prison-health and public-health systems closely is essential to mitigating this risk. Preventive responses are considered across all levels of the justice system. The report includes a literature review that identifies a substantial body of research from various countries, which supports the finding that there is a significantly heightened risk of overdose death during the initial post-release period.

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Acknowledgements

Abbreviations

CI	confidence interval
HR	hazard ratio
MMT	methadone maintenance therapy
ND	not determined
OR	odds ratio
RR	relative risk
SMR	standardized mortality ratio

Foreword

In recent years, there has been increasing recognition that prison health is inseparable from public health and, accordingly, that the links between prison- and public-health systems should be strengthened, not only to enhance the well-being of prisoners but also to benefit the whole community. This is particularly relevant in connection with the prevention of drug-related mortality among recently released prisoners. As this report highlights, ex-prisoners have a higher risk of overdose death than the general population, particularly in the first two weeks following release. Although several factors contribute to overdose deaths, decreased tolerance resulting from abstinence during incarceration is believed to be especially important. Most overdose deaths are related to the use of illicit drugs, and most are accidental and, therefore, preventable. Ensuring the right treatment for drug dependence in prison, including opioid-substitution therapy, the right information and training for prisoners and staff, close collaboration between the prison services and the community drug services before release, and the right follow-up after release can reduce the

number of deaths. These preventive measures are closely tied to ensuring equity of care (the availability to prison populations of the treatments offered in the community) and continuity of care (comprehensive and uninterrupted drug services from the individual's first contact with the criminal-justice system through subsequent community reintegration).

In 2010, the WHO Regional Office for Europe published the report "Prevention of acute drug-related mortality in prison populations during the immediate post-release period", which drew attention to the alarmingly high rate of overdose deaths among recently released prisoners. This report provides updated information on the rates of and risk factors for drug-related mortality in the criminal-justice system and discusses possible preventive responses.

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Summary of evidence on overdose deaths in the criminal-justice system

The rate of overdose deaths in prison populations in the immediate post-release period is unacceptably high. This is due to many factors, including decreased tolerance after a period of relative abstinence during imprisonment and the concurrent use of multiple drugs which, with every additional illicit drug consumed in combination with opioids, nearly doubles the risk of death from opioids. Other important factors are the lack of pre-release counselling, post-release follow-up and failure to identify those at risk. Opioid dependence is a chronic disorder with high relapse rates and often requires long-term continuous treatment. There is good evidence from trials and cohort studies that opioid substitution therapy reduces the risk of overdose among opioid users.

Key conclusions

The close linkage of prison health and public health systems is essential for improving the health of prisoners *(1)* and reducing overdose deaths in the post-release period. The following conclusions should be considered jointly by the health ministry, the ministry responsible for prison health services and the ministry responsible for prison services.

Service delivery and programmes

System-wide service delivery of drug-treatment protocols and programmes for prison populations should adhere to the following principles.

Equity of care

Drug-treatment services provided in prison should be equivalent to those provided in the community. This includes staff training, therapeutic quality, coverage rates and treatment alternatives. Ensuring homogeneity of drug treatment across prison jurisdictions and prison and community settings is necessary to ensure therapeutic consistency and optimal outcomes.

Evidence-based practice

Opioid substitution therapy has been demonstrated to be an effective treatment option for opioid-dependent people. Opioid-dependent prisoners should be given the opportunity to commence or continue opioid substitution therapy if this is available in the community. Psychotherapeutic or psychosocial interventions and drug education should be available in prisons as essential components of drug-treatment programmes.

Continuity of care and treatment stability

Due to the long persistence of substance-use disorders and the severity associated with lack of treatment for this illness or therapeutic disruption, continuity of care and treatment stability are paramount. The comprehensive provision of health care services for drug-dependent prisoners is necessary throughout both the period in the care of the criminal-justice system and during subsequent community reintegration. Individuals should be linked to appropriate drug or support services on first contact with the criminal-justice system or when targeted as being at risk of becoming a drug offender. Services for drug-dependent people must be available while they are in police custody, pre-trial detention and prison. Furthermore, pre-release drug services are to be coordinated with and linked to appropriate after-care, to ensure uninterrupted service delivery, making it possible to offer substance-dependent prisoners continuity of care.

Building partnerships and networks

Interagency partnerships between corrections-based and external service providers are essential to the establishment of effective and continuous services for prisoners. When correctly managed, the processes of government and nongovernmental agencies and community support can be integrated and coordinated, with appropriate referral systems. Formal and informal community interactions, especially social support structures, are of significant importance to prisoners and provide a post-release psychological buffer. Effective programmes depend on government officials, policy-makers, nongovernmental organizations, programme managers, researchers, prison staff and external stakeholders, as well as on the prisoners themselves and their supporters. To be effective, all interventions must address the specific post-release needs of and risks to drug dependent prisoners. Programmes need to focus on building capacity by utilizing integrated care models that incorporate psychosocial, pharmacotherapeutic and educational aspects of best practices.

At the prison level

At the prison level, services must include building healthy therapeutic relationships. This requires a range of needs-based, client-centred treatment modalities. Also, building multifaceted case-management partnerships is a good practice. Treatment plans and service options

need to be designed in consultation with service users to facilitate a culture of mutual respect, active participation, increased motivation and empowerment. Also at this level, education is needed for all stakeholders. Prison staff, prisoners, the people that support them and external service providers (such as community-care workers and nongovernmental organizations) are to be made aware of the risk of overdose deaths. Prisoners and the people that support them are to receive pre-release public health education in the areas of:

- drug use prevention where various methods exist to educate people about drugs, including the dissemination of information, peer support, and group or individual drug counselling;
- risk behaviour in connection with which the acute risks associated with decreased tolerance and the concurrent use of multiple drugs should be explained in detail; and
- overdose prevention.

Drug-dependent prisoners and their family and community supporters are to be taught to recognize and respond to the symptoms of an overdose. The emerging evidence points towards considering teaching first aid – including the emergency use of naloxone – to those with an addiction, their social network and their family and community supporters. Further research in this area is urgently needed. Moreover, at this level, post-release vulnerability needs to be decreased. To do so, holistic programmes are needed that meet the physical and/or practical and psychosocial needs of released prisoners. The period after prison release may represent a time of uncertainty and instability for ex-prisoners, which can increase the likelihood of drug relapse and subsequent overdose mortality. It is necessary to ensure effective support to address unmet:

- physical and practical needs, such as securing an accommodation and employment, managing domestic and financial affairs, and acquiring education and training in practical skills;
- psychological needs, such as deinstitutionalization, issues of traumatization and marginalization, psychiatric co-morbidity, resilience and self-esteem; and
- social needs, such as familial or community reintegration, and social and parenting skills.

At the national level

At the national level, key structures and services must:

- provide a comprehensive, countrywide framework of drug treatment
- determine which service or agency must take responsibility
- recognize and address the specific needs of particular subgroups
- include risk assessment and monitoring and evaluation of interventions.

Providing a comprehensive, countrywide framework of drug treatment

A comprehensive, countrywide framework of drug treatment needs to be incorporated into all levels of the criminal-justice system. This strategy should be integrated or consolidated with community drug-treatment efforts within the national public health system. The main principle is that, whenever possible, it is preferable for individuals with a substance-use disorder to be diverted to an appropriate community treatment facility rather than sent to prison. In cases where prison is deemed necessary, drug treatment should be provided, based on formalized end-to-end strategies of throughcare and after-care.[1]

Determining the responsible service or agency

Determining which service or agency should take responsibility for and address the needs of vulnerable subgroups at risk of overdose deaths after release from prison requires the conceptual reframing of prison-health mandates to incorporate post-release well-being. This may necessitate:

- evaluating data collection, to continually monitor post-release outcomes in prison health data and so adequately identify service gaps;
- analysing the legal frameworks and extent of duty of care and accountability for the health of people after their release from prison; and
- including, under the jurisdiction of this national structure, individuals serving community sentences, on home leave and on parole.

These processes should begin prior to release and should be integrated into drug-treatment programmes to ensure holistic needs-based programmes.

Recognizing and addressing the specific needs of particular subgroups

Programme design should target the assessed needs of vulnerable subgroups at increased risk, including women, sex workers, migrants and foreign nationals. Also,

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[1] Fox et al. *(2)* give these definitions: "The term 'throughcare' refers to arrangements for managing the continuity of care which begin at an offender's first point of contact with the criminal justice system through custody, court, sentence, and beyond into resettlement. 'Aftercare' is the package of support that needs to be in place after a drug-misusing offender reaches the end of a prison-based treatment programme, completes a community sentence or leaves treatment. It is not one simple, discrete process involving only treatment but includes access to additional support for issues which may include mental health, housing, managing finance, family problems, learning new skills and employment".

standardized risk assessment and screening are useful in identifying prisoners who are at an increased risk of drug-related post-release mortality and who would benefit from specialized programmes and support.

Monitoring, risk assessment and evaluation of interventions

Monitoring, risk assessment and evaluation of interventions includes the implementation of a standardized monitoring protocol to:

- determine baseline mortality rates;
- assess prisoner needs, inside prison and upon release;
- document implementation of interventions and the success of these measures;
- identify gaps in service provision.

Also, research is important to evaluate interventions to reduce post-release mortality, and specific indicators should be developed.

Overdose deaths of people recently released from prisons: background

The problem

The lifetime prevalence of illicit drug use is overrepresented among prisoners. While this rate differs extensively by country, between 2000 and 2011, many of the studies on imprisoned populations in the European Union and Norway documented a lifetime prevalence of over 50% *(3)*. In some of the countries examined, 50–60% of prisoners recalled ever having used heroin, amphetamines or cocaine, and over a third recalled ever having injected drugs. In Asia, Europe and North America, opioid dependence is disproportionately high among prisoners, affecting as much as 80% in central Asia, while the drug of choice among prisoners in Latin America is cocaine *(4)*. Also, considering the high turnover rate in prisons *(5,6)*, large numbers of prisoners with a history of drug use are incarcerated and then released into the community annually.

This report examines the effect of the prison experience on post-release drug-related outcomes. Specifically, it presents a literature review of the risk of overdose deaths in prison populations in the immediate post-release period. This is followed by a discussion about possible preventive responses.

People who have served a prison sentence are often characterized by a poorer general health status than individuals within the general community, with ex-prisoners having significantly raised rates of natural and unnatural mortality. Hobbs et al. *(7)* conducted a data-linkage cohort study of all 13 667 prisoners in Western Australia discharged between 1995 and 2001 (a total of 26 674 discharges). Deaths due to the acute or chronic effects of drugs, injury or poisoning accounted for about three quarters of indigenous female, non-indigenous female and non-indigenous male deaths and a large proportion of prisoner excess mortality. Also, research from several countries or areas reveals increased drug-related mortality rates in people released from prison, compared with the general population: Australia *(8–11)*, Denmark *(12)*, France *(13)*, Switzerland *(14)*, Taiwan, China *(15)*, United Kingdom (England and Wales *(16,17)*, Scotland *(18,19)*), United States of America *(20–23)*.

Table 1 summarizes the findings of studies that document the drug-related standardized mortality ratios (SMRs) of ex-prisoners compared to a reference population. There is a vast disparity in SMRs between these studies.

However, the data presented consistently show that post-release drug-related mortality rates greatly surpassed the adjusted rates of the respective general populations from which the prisoner cohorts were drawn. Cumulatively, the findings support the hypothesis that released prisoners are at a significantly heightened risk of drug-related death relative to other residents in the general population.

Also, while there is a tendency towards elevated drug-related mortality of ex-prisoners in the community, this is most salient in the immediate post-release period *(24)*. In a sample of 12 438 traceable prisoners discharged from prisons in the United Kingdom (England and Wales) in June or December 1999, Singleton et al. *(16)* established 137 deaths over the study period. Of these deaths, 79 were drug-related. Significantly, in the first week after discharge, there were 13 recorded deaths, 12 of which were attributable to drugs (representing an equivalent death rate of 50.4 deaths per 1000 ex-prisoners per year). In the following week, there were 6 deaths, 4 of them drug related (16.8 deaths per 1000 ex-prisoners per year). The mortality rate then decreased rapidly and, from week five, levelled off at about 2 deaths a week. The decline in all-cause mortality was primarily due to decreased drug-related deaths in the two-week period after release. Relative to the general population, ex-prisoners were 40.2 times more likely to die in the first week after discharge, with 92% of deaths credited to drug-related causes, and 18.6 times more likely to die (67% due to drugs) in the second week after discharge.

Of a retrospective Danish cohort of 15 885 registered drug users, 6019 had at least one prison discharge during the study period, 1996–2001 *(12)*. During this period, 145 post-release drug-related deaths were observed (11.9 deaths per 1000 person-years), of which 24 occurred in the first 2 weeks of liberation (117.7 deaths per 1000 person-years). The latter category exceeds the mortality of the general population (1.9 deaths per 1000 person-years) by a factor of 62 and accounted for 92% of all deaths in the two-week period after release. Similarly, from a sample of 501 Norwegian drug users treated in the period 1981–1991, Ødegård et al. *(25)* identified 338 participants who had received at least one prison sentence during the observation period (from study enrollment through 2003) using linkage with national registers. Deaths were also identified using national register data. During the observation period, which averaged 17.2 years for females

Table 1. Drug-related SMRs of ex-prisoners and a reference population

Study	SMR (95% CI) of post-release drug-related mortality	Time frame (post-release)	Reference population	SMR adjustments (original study)
Binswanger et al. (20)	Males and females = 129.0	First 2 weeks	Residents of Washington State, USA	Age, sex and race
Binswanger et al. (21)[a]	Males and females = 10.33	Not time limited (median = 4.4 years)	Residents of Washington State, USA	Age, sex and race
Chen et al. (15)[b]	Total = 29.33 Schedule I users = 76.27 Schedule II users = 16.41 (males and females)	3 years	General population of Taiwan, China	Age and sex
Christensen et al. (12)	Males and females = 61.9[c]	First 2 weeks	General population of Denmark	Age and gender
Farrell & Marsden (17)	Males, first week after release = 28.3 Males, second week after release = 15.8 Females, first week after release = 68.9 Females, second week after release = 56.3	First and second weeks (calculated separately)	General population of United Kingdom (England and Wales)	Age and gender
Harding-Pink (14)	Males and females = 50.0[c]	First 45 days	Population of Geneva, Switzerland	Age and sex
Kariminia et al. (11)	Males = 14.5 Females = 50.3	Not time limited, follow-up ranged from 1 day to 15 years (median = 7.7 years)	Population of New South Wales, Australia	Age and sex
Lim et al. (23)[d]	Males and females = 8.0 Males and females = 2.2	First 2 weeks Follow-up ranged during study period of 2001–2004	General population of New York City, USA	Age, sex, race and neighborhood
Singleton et al. (16)	First week after release = 37.1 Second week after release = 12.4 (males and females combined)[e]	First and second weeks (calculated separately)	General population of United Kingdom (England and Wales)	Age and gender
Spaulding et al. (22)	Males and females = 3.48[f]	Up to 15.5 years	General population of New York City, USA	Age, sex, race and educational level

Table 1 contd

Study	SMR (95% CI) of post-release drug-related mortality	Time frame (post-release)	Reference population	SMR adjustments (original study)
Stewart et al. *(10)*	Female Aboriginal = 3.3 Female non-Aboriginal = 115.9 Male Aboriginal = 2.9 Male non-Aboriginal = 20.1	Not time limited, follow-up ranged from 0 to 2160 days (median = 1223 days)	Aboriginal and non-Aboriginal populations of Western Australia aged 20–40 years	Ethnicity, age and gender
Verger et al. *(13)*	15–34 years = 124.1 35–54 years = 274.2 (male only)	First year	General population of France	Age and gender

a Participants included the cohort studied by Binswanger et al. *(20)*, with additional follow-up time through 2009, as well as participants released from 2004 to 2009.
b Study participants: first-time drug offenders.
c Authors' calculations: the estimate was based on deaths per 1000 person-years of reference population and discharged prisoners. No confidence interval (CI) was obtained.
d Study on people released from New York City jails.
e CI not specified.
f Accidental poisoning.

and 15.7 years for males, there were 55 overdose deaths, one occurring during a prison term, seven during the first two weeks after release, and four two to four weeks after release. After adjusting for possible confounders, the risk of overdose death was found to be 10 times higher (10.2, 95% CI: 4.37–23.9) during the first two weeks after release from prison than during any other period in the first year after release.

A retrospective cohort analysis of 48 771 prisoners released in England and Wales between 1998 and 2000 identified 442 deaths during the study period, 59% ascribed to drugs *(17)*. In the first week after release, male prisoners were 29.4 times more likely to die than their male counterparts in the community, and female prisoners were 68.9 times more likely to die than women in the community; 96% of male and 100% of female deaths were attributed to drugs. In the second week, this mortality ratio (and percentage attributed to drug-related causes) was 20.4 (78%) and 56.3 (100%) for male and female ex-prisoners, respectively.

A comparable data-linkage study of 30 237 ex-prisoners from the Washington State Department of Corrections, United States of America, discharged between July 1999 and December 2003, documented 443 deaths during the study period (7.8 deaths per 1000 person-years) *(20)*. Of these deaths, 23% were attributed to drugs. Within the first two weeks after discharge, 27 of the 38 deaths were drug-related – that is, a death rate of 18.4 deaths per 1000 person-years. Also, during this immediate post-

release period, the acute relative risk of drug-related mortality was 129 when examined against the general population. Thus, a marked elevation in mortality among ex-prisoners may be observed during the two weeks directly after release, due largely to drug-related causes. All-cause mortality then stabilizes in subsequent weeks, reflecting diminished drug-related mortality. In another study involving this cohort, as well as individuals released from prison between January 2004 and December 2009, Binswanger et al. *(21)* identified 2462 deaths among 76 208 participants during the study period, which extended through 31 December 2009 (7.37 deaths per 1000 person-years). Of the 558 overdose deaths, opioids were implicated in 59% of the cases. Compared to the general population, the risk of overdose death among ex-prisoners was 10 times higher (SMR = 10.33, 95% CI: 9.61–11.10). These analyses included the deaths recorded in the prior study *(20)*.

In a prospective follow-up study conducted in Sweden among 4081 ex-prisoners who were assessed as having substance-use problems before their imprisonment, Hakansson and Berglund *(26)* identified 166 deaths during the follow-up period (an average of 3.64 years) based on national register data. Analysis showed that the ex-prisoners (aged 20–64 years) were approximately 7–8 times more likely to die than their counterparts in the general population (SMR for males = 7.7, 95% CI: 5.6–9.0; SMR for females = 7.0, 95% CI: 3.6–12.2). Eighty-four per cent of the deaths were attributed to unnatural causes or alcohol- or drug-related diseases. Three of the 166

deaths identified were due to substance-use disorders, 20 to injury/intoxication with undetermined intent, and 44 to accidental overdose. Although other studies have shown that criminal-justice populations are particularly vulnerable to overdose during the first two weeks after release from prison, the mean time from release to accidental overdose death in this study was 743 days.

Based on the analysis of data from a cohort of 155 272 individuals (aged 16–89) who were incarcerated in New York City jails between 2001 and 2005, Lim et al. *(23)* found that the risk of death from drug-related causes in released inmates (adjusted for age, sex, race and neighborhood) was 2.2 times (95% CI: 1.9–2.5) higher than for the general population of the city, and 8.0 times higher (95% CI: 5.2–11.8) during the first two weeks following release. This study differs from much of the previously published work on risk of death among criminal-justice populations in that the participants in this study were former inmates of jails, which are characterized by shorter sentences for less severe crimes, compared to prisons where longer sentences for more severe crimes are served. Consistent with studies on former prison inmates, Lim et al. *(23)* found that those who had served sentences in jails had a higher risk of dying from drug-related causes during the first two weeks after release than during other time periods after release.

Dirkzwager et al. *(27)* investigated the mortality rates of 2297 offenders convicted of crimes in the Netherlands in 1977 who had not previously received prison sentences; 597 received prison sentences and 1700 received noncustodial sentences. Most of the imprisoned offenders (72%) served sentences of six months or less. Compared to the general population (adjusted for age and gender), the offenders who served time in prison had three times the odds of dying from all causes during the 25-year follow-up period (odds ratio [OR] = 3.21. 95% CI: 2.60–3.95) and nearly eight times the odds of dying from unnatural causes (OR = 7.98, 95% CI: 5.53–11.52). However, acknowledging that inmates and the general population differ with regard to a number of characteristics other than imprisonment history that are relevant for risk of death, Dirkzwager et al. *(27)* also compared the mortality rates of 408 ex-prisoners (using matching by variable and propensity-score matching methods) with those of 408 offenders who received noncustodial sentences (using matching by demographic, health, and criminal-justice-related characteristics). The investigators found no significant differences between the two groups of offenders as regards all-cause mortality rates (OR = 1.40, 95% CI: 0.95–2.07) or risk of death from unnatural causes (OR = 1.73, 95% CI: 0.86–3.49). Dirkzwager et al. *(27)* noted some limitations of the study, including concerns regarding the generalizability

of the findings to general prison populations, given that 189 (32%) of the ex-prisoners (convicted of the most severe offences) were excluded from the latter analysis because appropriate matches were not found. Another issue was the failure to account for time spent in prison (reincarceration) during the follow-up period as some offenders who received noncustodial sentences in 1977 may have experienced periods of imprisonment during that time. As described by Kinner et al. *(28)*, it is important for researchers to identify and exclude or adjust for time spent in prison during the follow-up period, as failure to do so may result in an underestimation of the mortality risk among ex-prisoners since they have been shown to have a lower risk of dying in prison than in the community setting.

Discrete lifestyle factors, such as quantity of drugs used and levels of risk-taking behaviour, may be controlled by temporal matching. In this manner, the disproportionately high mortality observed within the first two weeks after release may be appraised within this high-risk population. Table 2 collates literature that examines the relative risk of drug-related mortality among ex-prisoners in the first two weeks after release against a specified period thereafter.

The data presented illustrate that, in all studies, the prospect of ex-prisoners dying from drugs in the first two weeks after discharge exceeds that of drug-related death during a subsequent post-release period (Table 2). This finding supports the growing body of literature that substantiates the acute risk of drug-related mortality encountered by newly released prisoners.

Furthermore, drug-related mortality in the first two weeks after release surpasses both in-prison suicides *(29–31)* and in-prison drug-related deaths *(31)*. Drug-related ex-prisoner mortality, as a percentage of all-cause mortality, more closely resembles drug-related deaths among prisoners serving community correctional orders, in contrast to drug-related prisoner deaths *(32)*. Significantly, individuals sentenced to post-prison parole orders have considerably larger all-cause mortality rates than prisoners serving other community supervision classifications, with drugs being the most common cause of mortality *(32,33)*.

The results of Spaulding et al. *(22)* are an exception to the trend of considerably elevated SMRs in the immediate post-release period. In a data-linkage study on mortality among a cohort of inmates (N = 23 510) of a Georgia state prison both during incarceration and after release, Spaulding et al. *(22)* identified 2650 deaths over a period of 15.5-years (ending on 31 December 2006), of which 2244 occurred

after release. In this period, the ex-prisoners' mortality risk (SMR = 1.54, 95% CI: 1.48–1.61) was higher than that of the general population. The all-cause SMRs at $0 \leq 1$ month, $1 \leq 6$ months, and 6–12 months post-release were 1.90 (95% CI: 1.18–2.91), 1.67 (95% CI: 1.36–2.03) and 1.64 (95% CI: 1.33–1.99), respectively. Eighty post-release deaths were due to accidental poisoning. The SMR for accidental poisoning was 3.48 (95% CI: 2.76–4.33).

Chen et al. *(15)* found that, contrary to other studies showing risk of death to be highest within the first few weeks following release, the mortality risk for former inmates who were not reimprisoned during follow-up peaked at 9–10 months. However, as in the study conducted by Spaulding et al. *(22)*, the temporal matching reflects all-cause mortality, not just drug-related deaths. Chen et al. *(15)* studied 26 668 first-time adult drug offenders who had been imprisoned in correctional facilities in Taiwan, China in 1998–2001 to assess their mortality rates over a three-year period following release. Using judiciary and death-registration records, the investigators identified a total of 533 deaths, of which 68 were due to overdose. Compared to the general population, offenders convicted

of crimes related to Schedule I substances (most often heroin) were 6.75 times (95% CI: 5.84–7.76) more likely to die during the three years following release, and offenders convicted of crimes related to Schedule II substances (most often (meth)amphetamine) were 3.36 times more likely to die (95% CI: 3.01–3.74). In terms of overdose deaths, Schedule I offenders had an SMR of 76.27 (95% CI: 53.97–104.69) while that for Schedule II offenders was 16.41 (95% CI: 11.07–23.42).

Kariminia et al. *(11)* investigated the long-term cause-specific mortality of all 85 203 adults incarcerated in New South Wales, Australia, from 1988 to 2002. The investigation established 5137 deaths (4714 men, 423 women) of which drug-related mortality accounted for 31% (SMR 12.8) and 47% (SMR 50.3) in men and women, respectively. This constituted about a quarter (26%) of all drug-related deaths in New South Wales during the fifteen-year period. This figure is consistent with other studies of prisoners in Australia *(8,9)* and the United Kingdom (Scotland) *(19)* that examine cohorts that differ by age and sex.

Table 2. Temporal matching in studies assessing the relative risk (RR) of drug-related death in the first two weeks after release, compared with other post-release periods

Study	Country	RR (temporal matching)	Temporal comparison
Bird & Hutchinson *(30)*	United Kingdom (Scotland)	7.4	Subsequent 10 weeks (3–12 weeks)
Christensen et al. *(12)*	Denmark	4.6[a]	Subsequent 10 weeks (3–12 weeks)
Farrell & Marsden *(17)*	United Kingdom (England and Wales)	Male = 8.3 Female = 10.6	At 52 weeks
Kariminia et al. *(31)*	Australia (New South Wales)	Male = 9.3 Female = 6.4	At 26 weeks
Lim et al. *(23)*	USA	3.8	5 weeks or more after release
Ødegård et al. *(25)*	Norway	10.2[b]	Up to 52 weeks
Seaman et al. *(29)*	United Kingdom (Scotland (Edinburgh))	7.7[c]	Subsequent 10 weeks (3–12 weeks)
Singleton et al. *(16)*	United Kingdom (England and Wales)	First week = 12.5 Second week = 4.2	13–52 weeks

a Study participants: drug users.
b Adjusted for gender, age at first imprisonment, age at first illicit drug use, years of drug abuse, and daily use of opioids during the year before admission.
c Study participants: injecting drug users infected with HIV.

Of note, however, are the time trends in mortality rates obtained by Kariminia et al. *(11)*, which depict a decline in all-cause mortality over the study period relative to the New South Wales population. This is largely attributable to reductions in drug-related deaths and suicides. One hypothesis for this finding, which the authors present, is enhanced provision of mental-health services and their availability to prison populations. Indeed, the study coincides with the endorsed expansion of methadone maintenance therapy (MMT) as the principle component of Australia's harm minimization drug policy in 1985 and the introduction, in 1986, of MMT in New South Wales prisons. Such treatment, as a means of harm reduction, is recognized for its protective function against premature mortality among heroin users in community settings *(34,35)*. Research from Australia, Europe and North America collectively confirm that, compared with untreated opioid-dependence, retention in MMT reduces mortality by 75% *(36–41)*. Similar results have been reported in France *(42)* with buprenorphine, a partial opioid agonist–antagonist administered as an alternative substitute medication.

With reference to prison populations, Dolan et al. *(43)* evaluated all-cause mortality in a follow-up study of 382 incarcerated male participants enrolled in a randomized controlled trial of prison-based MMT in New South Wales. In the four-year follow-up, retention in MMT was negatively correlated with mortality. All 17 recorded deaths occurred among individuals either having never received MMT or having discontinued prison-based MMT prior to discharge, reflecting an untreated mortality rate of 20 deaths per 1000 person-years.

Huang et al. *(44)* examined the effectiveness of MMT in reducing the mortality rate of inmates with histories of injecting opiates. Among a cohort of 4357 inmates who were released from prison on the same day and followed up over 18 months, 142 deaths were identified through record linkage with a national registry system. Of the 48 of these deaths, which were attributed to drug overdose, seven occurred during the first week. The mortality rate for the ex-inmates was significantly higher during the first week after release than during the subsequent four weeks (13.7 vs 3.2 per 100 person-years, relative rate = 4.3, P < 0.001). Of the 1982 participants who enrolled for MMT, 700 attended regularly. Regular participation in MMT was associated with a lower risk of overdose mortality (hazard ratio [HR] = 0.09, P = 0.02) and all-cause mortality (HR = 0.07, P < 0.001) (adjustments were made for age, gender and HIV status at the time of release). In contrast, prison detoxification programmes, which could represent a treatment interruption in community-based substitution therapy, neither curb post-release reversion to injecting

practices nor reduce drug-related mortality compared with controls *(45)*. Despite a relatively favourable twelve-month relapse rate of 78% (12% less than in comparable inpatient programmes), the Mountjoy Prison Detoxification Programme in Ireland registered high levels of drug-related post-release mortality after completion of treatment *(46)*. As a result, Crowley *(46)* advocates the provision of prison-based MMT for the majority of incarcerated opioid users for whom detoxification is inappropriate. In addition, prison-based MMT is economically viable, as costs entailed do not exceed those for community-based MMT, and cost per death avoided compares favourably with similar health measures, such as interferon therapy for hepatitis C infection *(47)*.

The risks

Overdose is the principle cause of drug-related death among ex-prisoners immediately after release. The excess rates of overdose deaths observed in the initial post-release period are thought to be a consequence of many factors. Two compounding processes represent the foremost factors for overdose deaths of former prisoners immediately after liberation. These are decreased tolerance after a period of relative abstinence during imprisonment and the concurrent use of multiple drugs which, with every additional illicit drug consumed in combination with opioids, nearly doubles the risk of death from opioids. Inherently interrelated with these processes are risk factors, such as treated and untreated chronic disease progression and sociodemographic determinants. These factors include the lack of pre-release counselling and post-release follow-up, and failure to identify those at risk. It is, therefore, appropriate to examine the underlying mechanisms and risk factors that contribute to these processes.

Imprisonment frequently represents a period of decreased drug availability and a resultant abstinence or reduction in drug intake for the duration of the prison term. Lowered physiological tolerance of the pre-prison drug quantity follows this interval of relative abstinence. This places prisoners at a heightened risk of overdose deaths upon resuming substance use after being released. By the same process of lowered tolerance, overdose deaths are disproportionately high among ex-prisoners that relapse subsequent to prison methadone detoxification *(14,46)*. Indeed, having undertaken methadone detoxification within the past year is positively correlated with overdose, whereas the inverse is true of MMT *(48)*. Thus, as noted earlier, retention in prison and community MMT is associated with a decline in mortality among ex-prisoners *(43,44)*. This may be understood by acknowledging that substance dependence is a chronic disorder that disposes sufferers to high relapse rates and often requires long-

term continuous treatment. Substance dependence is overrepresented among both prison populations *(4,49)* and ex-prisoner drug-related fatalities *(14,16,50)*.

According to non-prisoner-specific studies *(51)*, drug-related deaths among ex-prisoners typically occur in people older than 25 years of age *(13,16,20,32,52)*, suggesting extended careers of substance use. Singleton et al. *(16)* identified that almost three quarters (72%) of the drug-related excess mortality ratio occurred among prisoners aged 25–39 years at the time of release. In a representative survey of prisoners, Singleton et al. *(16)* determined that, of the subset of prisoners who subsequently died of drug-related causes (as compared with the whole sample), 72% were assessed as being drug-dependent within the year of interview (52%), with 40% dependent on opiates and stimulants (12%); 85% used drugs in the month before their prison term (57%) and 54% had abstained from drugs while in prison (55%). Both drug use in the month before incarceration and in-prison drug abstinence were found to be independently associated with post-release drug-related mortality in the final logistic regression model. Also, re-offenders are at an increased risk of post-release death *(7,14,53)*, which implies a cumulative detrimental effect of periods of reduced tolerance due to sporadic disruption to drug or treatment habits. Also, post-release drug-related mortality is associated with older, drug-dependent users not currently receiving MMT and having experienced drug or treatment discontinuity as a consequence of incarceration.

Using record linkage, van Dooren et al. *(54)* investigated the mortality of relatively young people released from adult prisons in one Australian jurisdiction between 1 January 1994 and 31 December 2007 and followed up over one year. Compared to the general Queensland population (adjusted for age and sex), the younger group (< 25 years old at the time of release) (N = 14 920) had a higher SMR (SMR = 6.5, 95% CI: 5.3–8.1) than the older group (≥ 25 years old at the time of release) (N = 27 095) (SMR = 4.0, 95% CI: 3.5–4.5). Among the younger ex-prisoners, 40 of the 92 deaths (43%) were drug-related, while 79 of the 271 deaths (29%) of older prisoners were drug-related.

In addition, what is apparent on examination of substance-related death by age at the time of release is the distinct age difference of drug-related mortality between men and women. Women consistently exhibit a younger age profile than do men. Farrell & Marsden *(50)* found that over two thirds of excess drug-related mortality occurred in men aged 25–39 years, and women aged 20–29 years. Also, Kariminia et al. *(53)* noted that

the age distribution of deaths differs by gender, in that women show a decreasing trend with age while mortality among men is prominent among the youngest and oldest age groups.

When compared with their male counterparts, female ex-prisoners represent a discrete substance-related mortality profile. While more male ex-prisoners die of post-release drug-related causes, female ex-prisoners are proportionately more at risk of dying from such causes *(9–11,17,21)*. This may be a function of the drug classes and combinations that women utilize. Female drug-related fatalities were more frequently associated with benzodiazepines *(14)*, cocaine and tricyclic antidepressants and with more than one class of drug than were corresponding male fatalities *(50)*. For both men and women, however, almost 90% of post-release substance-related deaths in Australia, Switzerland and the United Kingdom (England and Wales) involved opioids *(14,16,50,52)*. Table 3 illustrates the predominance of opioids in toxicological analyses of drug combinations in studies from Australia and Europe. Heroin or morphine was documented as both the most commonly reported drug and the principle cause of death in these studies. This is contrary to findings from the United States, which implicated cocaine in the majority of drug-related deaths among individuals released from prison in Washington State between 1 July 1999 and 31 December 2003 *(20,55)*. However, this trend did not hold when the follow-up period was extended and individuals released during the subsequent six years were included. As in the studies in Australia and Europe, opioids were the most common type of drug associated with ex-prisoner death *(21)*. In the two week period after release, a greater proportion of drug-related deaths reportedly involved heroin and cocaine while fewer were found to involve alcohol than during subsequent post-release periods *(20,50)*.

A significant percentage of post-release drug-related deaths result from the use of multiple psychoactive substances *(14,16,18–21,50,52,56)*. According to the polydrug-use theory, the respiratory depressive effects of opioids are enhanced by the concurrent administration of opiates and other drugs, especially substances that act on the central nervous system *(57)*. It is by this poly-substance mechanism that the intake of regularly tolerated dosages of opioids may cause death. Indeed, Gossop et al. *(58)* established that, for every supplementary illicit drug administered in conjunction with an opioid, the risk of death from opioids nearly doubles. Excessive alcohol consumption, when combined with illicit drugs, was also found to increase mortality. McGregor et al. *(59)* reported that co-administration of heroin and psychotropic substances occurred in three quarters of fatal overdoses

Table 3. Findings of studies on post-mortem toxicological combinations of drug-related ex-prisoner deaths by number (and percentage) of cases

Drugs or drug combinations identified	Number (and percentage) of deaths, by study and cause									
	Davies & Cook (52)[a]	Farrell & Marsden (17)		Harding-Pink (14)[b]		Seymour et al. (18)[c]	Shewan et al. (19)[d]		Singleton et al. (16)	
	Drugs alone	Drugs alone	Drugs plus alcohol	Drugs alone	Drugs plus alcohol	Drugs alone	Drugs alone	Drugs plus alcohol	Drugs alone	Drugs plus alcohol
Single drugs										
Heroin/morphine	6 (13)	57 (22)	30 (12)	ND	4 (31)	10[e] (53)	ND	ND	34 (43)	7 (9)
Methadone	ND	9 (4)	2 (1)	ND	ND	1 (5)	ND	ND	4 (5)	2 (3)
Other opioid or opioid-based substances	ND	6 (2)	5 (2)	ND	ND	ND	ND	ND	3 (4)	1 (1)
Tricyclic antidepressants	ND	5 (2)	1 (0)	ND	ND	ND	ND	ND	1 (1)	ND
Other	ND	6 (2)	2 (1)	ND	ND	1 (5)	ND	ND	ND	ND
All single drug cases	6 (13)	83 (32)	40 (16)	ND	4 (31)	12 (63)	ND	ND	42 (53)	10 (13)
Multiple drugs										
More than one opioid	ND	4 (2)	4 (2)	ND	ND	1 (5)	ND	ND	2 (3)	1 (1)
Opioid(s) plus benzodiazepines	10 (22)	13 (5)	16 (6)	2 (15)	6 (46)	6 (32)	5 (50)	2 (20)	1 (1)	3 (4)
Opioid(s) plus cocaine	ND	11 (4)	6 (2)	ND	ND	ND	ND	ND	3 (4)	ND
Opioid(s) plus one other type of drug	ND	14 (5)	10 (4)	ND	ND	ND	2 (20)	ND	1 (1)	ND
Opioid(s) plus two or more other types of drugs	ND	14 (5)	9 (4)	ND	ND	ND	ND	ND	1 (1)	1 (1)
Opioid(s) plus benzodiazepines plus other types of drugs	24 (53)	6 (2)	9 (4)	1 (8)	ND	ND	1 (10)	ND	2 (3)	3 (4)
Two or more other types of drugs	ND	5 (2)	4 (2)	ND	ND	ND	ND	ND	ND	1 (1)
Unspecified mixture of drugs	5 (11)	5 (2)	3 (1)	ND	ND	ND	ND	ND	5 (6)	2 (3)
All multiple drug cases	39 (87)	72 (28)	61 (24)	3 (23)	6 (46)	7 (37)	8 (80)	2 (20)	15 (19)	11 (14)
Total cases	45 (100)	155 (61)	101 (39)	3 (23)	10 (77)	19 (100)	8 (80)	2 (20)	57 (72)[f]	21 (27)[f]

Note. ND = not determined.

a Unrepresentative retrospective sample of post-release female-only deaths. Alcohol was reported in 3 (7%) unspecified cases.
b Drug-related deaths in the first 45 days post release.
c Drug-related deaths in the first 2 days post release. The number of cases involving alcohol was not specified.
d Female-only drug-related deaths in the first year post release.
e In one of these cases, methadone was present in the blood. However, the cause of death was pulmonary congestion and oedema.
f In one case, mortality was not directly linked to an episode of use.

among ex-prisoners in the month after release. The authors reflect on the inherent difficulties in determining the relative effects of diminished tolerance versus the use of multiple psychoactive drugs. The cumulative effect of these distinct processes, however, places ex-prisoners at a significantly elevated risk of overdose deaths in the immediate post-release period, proportional to other periods after release. Prisoners are insufficiently aware of the risks posed by either decreased tolerance or the concomitant use of multiple psychoactive substances. It is the responsibility of pre-release prison programmes to educate prisoners adequately about the nature and extent of these risks.

Based on a search of records from the Australian National Coroners Information System, which, in addition to demographic information, also provides detailed information on the causes of and circumstances surrounding deaths, Andrews & Kinner *(56)* identified the occurrence of 388 deaths among ex-prisoners between 2000 and 2007. The investigators found that 175 (45%) of these deaths were ruled as accidental drug-related deaths, and 141 as accidental overdose. Based on toxicology reports, opioids were involved in 82% of the drug-related deaths, and most deaths (72%) involved multiple substances. Opioids were listed in 96% of the cases in which multiple substances were found, used most often in combination with benzodiazepines.

Besides age and gender, a number of sociodemographic characteristics are associated with an increased risk of post-release drug-related mortality. Studies from Australia, the United Kingdom (England and Wales) and the United States indicate that inmates from dominant ethnic backgrounds are at a relatively heightened risk of drug-related mortality *(10,16,21,23,50,53)*. A multivariate statistical analysis found that in-prison psychiatric hospital admission *(53)*, suicidality, in-prison victimization and taking medication that acted on the central nervous system *(16)* are independent predictors of drug-related mortality. However, similar analyses of criminological determinants reveal contradictory findings between studies in the measure of principle type of offence *(16,53)*. Additional independent risk factors for post-release drug-related mortality include living off crime before the current prison term and having a primary support network of less than four people *(16)*. These findings emphasize that this population lacks formal and informal psychosocial support structures. It is, therefore, necessary to contextualise drug overdose within the wider framework of prisoner experiences. This provides a potential avenue of redress by means of incorporating psychosocial needs-based programmes into in-prison and after-care treatment protocols.

In comparing information about Australian ex-prisoners who died from accidental drug-related causes and those who died from all other causes, Andrews & Kinner *(56)* found that those in the first-mentioned group were less likely to be indigenous (10.9% vs 28.6%, p < 0.001), born in Australia (51.4% vs 71.8%, p < 0.001), married (12.6% vs 22.5%, p = 0.019), or living alone (16.0% vs 28.2%, p = 0.006), and that they were significantly younger (median age of 30 vs 36, p < 0.001) than those who died from all other causes. Other characteristics where significant differences were observed included: mention in the coronial record of a mental-health condition (29.1% vs 52.1%, p < 0.001); a risk of self-harm (5.1% vs 27.2%, p < 0.001); recent injecting drug use (76.6% vs 14.4%, p < 0.001); a history of heroin use (48.0% vs 17.7%, p < 0.001); and drug withdrawal/detox in the previous 6 months (15.4% vs 3.7%, p < 0.001).

Several recent studies have investigated the relationship between duration of imprisonment and risk of premature mortality but no clear trend has emerged as to whether longer prison stays are protective or hazardous. Using the administrative records of former inmates who had served no more than 10 years in prison and were released on parole in New York, USA, in 1989–1993 and followed up through 2003, Patterson *(60)* found that time in prison had a negative dose-response relationship with life span. Controlling for time spent on parole and other demographic and criminal-justice-related variables, Patterson *(60)* found that for each year the individual was incarcerated, the odds of all-cause death during the post-release period increased by 15.6%. The risk was most elevated immediately following release and subsequently declined so that the odds of all-cause death decreased by 2.0% for every month an individual was on parole. For every year spent in prison, the expected life span of an ex-prisoner was reduced by approximately 2 years. The expected life span of ex-prisoners was found to return to pre-prison levels after they had been on parole for the equivalent of two thirds of the time they were in prison. Furthermore, Lim et al. *(23)* found that longer jail sentences were associated with a lower predicted mean number of days from release until drug-related death (a mean of 189 predicted days to death for those who spent ≥ 91 days in jail vs a mean of 425 predicted days to death for those who spent < 4 days in jail, p = 0.004). Van Dooren et al. *(54)* found that a longer duration of incarceration (measured in one-year increments) was associated with an increased hazard for post-release death (adjusted HR = 1.1, 95% CI: 1.0–1.1).

However, Binswanger et al. *(61)* found that, among former inmates, an increased duration of incarceration (assessed in one-year increments) had a significant protective effect for all-cause mortality (HR = 0.95, 95% CI: 0.91–0.99) and overdose deaths (HR = 0.80, 95% CI: 0.68–0.95). This protective effect was also found in a subsequent study of

this cohort, which included additional follow-up time and an analysis of inmates released in the subsequent 6 years *(21)*.

The setting of post-liberation drug-related mortality (Table 4) highlights the social obstacles encountered by ex-prisoners on release – in particular, the difficulty of procuring permanent housing *(52)*. At least half of deaths occurred in temporary accommodation or in a public place. However, this too provides insight into potential target areas for programmes, such as assistance in securing accommodation. Furthermore, as a significant proportion of these drug-related deaths occurred in residential settings, observers may be trained to recognize, intervene and seek medical assistance in response to an overdose *(16,50,56)*. In this connection, looking at a particularly vulnerable sub-group, namely formerly incarcerated individuals who had used a shelter for the homeless, Lim et al. *(23)* found that the rate of drug-related mortality for these individuals (RR = 3.4, 95% CI: 2.1–5.5) was significantly higher than for former inmates who had not spent at least one night in such a shelter.

In a retrospective registry study of all drug-induced deaths occurring in Oslo between 1 January 2006 and 31 December 2008 among individuals aged 15 to 65 years (a total of 231 deaths), Gjersing et al. *(62)* discovered that half of the 18 deceased former inmates had been found outdoors or in public buildings. This is in contrast to findings from other studies indicating that most post-release drug-related deaths occur in residential settings *(16,50,56)*. Eight of the deaths among the former inmates occurred in the first two weeks after release. The median time from release until death was 18 days. Toxicology reports showed that heroin overdose was the main cause of death in 83% of the cases *(62)*.

Possible preventive responses

In accordance with international law and human rights instruments, the effect of imprisonment on human rights is limited to the deprivation of liberty *(63)*, referred to as "limited exceptionalism" *(64)*. Thus, prisoners, like all other people, are to be afforded the highest attainable standard of physical and mental health *(65–67)*, fulfilling

Table 4. Studies of the settings of post-liberation drug-related mortality, by number (and percentage) of cases for which information was available

Setting and other data	Number (and percentage) of deaths by study			
	Andrews & Kinner *(56)*	Davies & Cook *(52)*[c]	Farrell & Marsden *(50)*	Singleton et al. *(16)*
Permanent place of residence	116 (67.4)[a]	10 (26)	112 (50)	13 (34)
Temporary accommodation		17 (44)		
Other's home/unspecified indoor location	ND	ND	51 (23)	12 (32)
Hostel (local authority or probation)	16 (9.3)	ND	26 (12)	6 (16)
Public space (includes car parks, railway stations and streets)	27 (15.7)	12 (31)	34 (15)	4 (11)
Hospital	9 (5.2)	0	0	3 (8)
Other	4 (2.3)[b]	0	1 (0)	0
Number of cases	172 of 175 (98)	39 of 45 (87)	224 of 261 (86)	38 of 79 (48)
Exclusions (data unavailable)	3 cases	6 cases	37 cases	41 cases

Note. ND = not determined.
a Residential property.
b Caravan/mobile home/campground.
c Unrepresentative retrospective sample of post-release female-only deaths.

the principle of "equivalence of care" between prison and community health care service provision *(1,63,68–72)*. Also, a consolidated system of health care in prisons is advocated so that prison health systems interact with or are integrated into national public health systems *(1,70,73,74)*.

As expressed by the joint WHO, United Nations Office on Drugs and Crime, and Joint United Nations Programme on HIV/AIDS position paper on substitution maintenance therapy *(75)*, a flexible needs-based client-centred approach to opioid dependence is necessary to aptly address the individual needs of clients. Utilization of pharmacotherapy, of which substitution maintenance therapy is an "important component" *(75)*, psychotherapy, psychosocial rehabilitation and risk reduction interventions are thus endorsed. With respect to prisons, harm reduction and prevention measures are recommended *(69,76)*; and in countries where MMT is available in the community, this therapy is to be extended to prisoners so that they may continue or initiate substitution therapy while in custody *(69,77)*. Failure to do so may constitute torture or cruel, inhumane or degrading treatment or punishment, or a breach of the right to life *(78,79)*.

While regional and international instruments detail comprehensive recommendations on minimum standards of prison health, it is the responsibility of national authorities to determine how best to implement these principles. Borzycki *(80)* categorizes prison throughcare in terms of a three-tiered model for conceptualizing service provision within a jurisdiction. The model's tiers are:
(a) the philosophy that informs corrections, which is linked to the aims and methods that are used to achieve those aims;
(b) system-wide service delivery; and
(c) specific programmes delivered within operational frameworks.

The model states that correctional ethos informs policy, which in turn is implemented through system-wide service delivery. It is from these systems that specific programmes are put into operation. Each tier provides the opportunity for conceptual, structural and procedural advancement to influence post-release outcomes. It is on the basis of this model that the following conclusions will be discussed.

Prisoner outcomes are increasingly being pursued in recognition that social context influences criminal recidivism and that prisoner health has implications for public health. In this respect, the orientation of correctional philosophy has shifted, with an appreciation that effective prison management extends beyond the discrete physical and temporal boundaries of the prison sentence. To this end, many criminal-justice systems are embracing prisoner rehabilitation and social reintegration interventions pre and post release (see, for example, Stöver *(5)*, which examines prison drug policy and practice in the European Union). With reference to prisoner health, the duty of care rests with prison authorities, such that (to the extent possible) the provision of health care services is adequate and deaths in custody are duly investigated. However, there is a gap in the clinical management of and responsibility for ex-prisoners *(81)* and for those serving community correction orders *(33)*.

The legality of duty of care for this population group is complex. Nevertheless, the concepts of prisoner health and post-release outcomes need to be broadened at the national and institutional levels to ensure that the inherent right of ex-prisoners to the adequate provision of health care is upheld. This implies reframing the parameters in prison-health mandates and literature on prison outcomes to incorporate post-release mortality, and assigning responsibility for post-release drug treatment and management to an accountable body.

System-wide policy guidelines provide a strategic framework for the consistent service delivery of drug treatment to prison populations. This facilitates the development and maintenance of the comprehensive structural processes necessary for uninterrupted professional health care throughout the criminal justice system and the subsequent amalgamation with community interventions. Such continuity of care is of particular relevance to drug-dependent prisoners, who require sustained long-term treatment and case management of their chronic disorder. National and regional heterogeneity of drug-treatment policy and practice is, however, evident within many prison jurisdictions *(82,83)*, which negatively affects the continuity of care.

Both political will and top-down programme coordination are essential to continuity of care. Incorporating formalized integrated multiagency partnerships and networks among relevant prison-based and external stakeholders ensures the viability of throughcare. Also, multifaceted individualized treatment modalities that are responsive to prisoner needs promote a culture of active participation and empowerment through involvement in designing treatment plans and service options. Effective system-wide policy and practice also includes prisoner education, staff training and built-in regulatory mechanisms. The latter are necessary for identifying implementation and treatment gaps, and evaluating processes and outcomes in a continuous feedback loop.

Innovative approaches to programme delivery, especially those that facilitate familial or community interactions,

can contribute to pre-release preparation. Overdose prevention programmes are of value in educating prisoners and their family members about the risks associated with reduced tolerance and the use of concomitant psychotropic substances. This prevention strategy entails teaching participants to recognize and respond to overdose symptoms *(84)*.

Naloxone, which binds preferentially to opioid receptors to counter the central nervous system and respiratory depression of an opioid overdose, has been recommended for released prisoners *(16,81,85)*. Considering the evidence that many overdoses occur in the presence of others, particularly friends and partners *(86)*, and the ease with which naloxone can be administered by non-medical personnel, there has been interest in recent years in evaluating whether peer administration of naloxone could be an effective means of reducing overdose mortality. The United Kingdom (Scotland) has implemented the National Naloxone Programme in which, all prisons have been taking part since June 2011 with the aim of providing naloxone kits to at-risk individuals upon release *(87)*. Naloxone is also provided in all Australian prison jurisdictions *(88)*. Community pilot programmes involving take-home naloxone have had positive results *(89,90)* and demonstrated preliminary support of the intervention in terms of feasibility and safety. However, randomized and more controlled studies are necessary to establish whether peer administration of naloxone is effective in reducing overdose deaths. In the United Kingdom (England), a randomized trial is being conducted to compare an intervention involving a take-home naloxone kit (one emergency dose plus information and instructions) with the usual treatment (information about overdose risks) *(91)*. The trial aims to enroll 56 000 prisoners. Deaths occurring in the 12 weeks following release from prison will be identified using national register data.

Models and interventions

Specific models and interventions have been developed in many countries, and examples from Australia, Canada, Spain and the United Kingdom (England and Wales) are described below.

With reference to system-wide policy and practice modalities, a case in point is the framework for the United Kingdom (England and Wales), which delivers an integrated multi-entry-point throughcare model of drug treatment. This national framework, the Integrated Drug Treatment System in Prisons in partnership with the Drug Interventions Programme, enlists the multidisciplinary collaboration of therapeutic jurisprudence structures. The provision of prison health-care services, under the direction of the National Health Service since 2004, utilizes evidence-based therapy and, in so doing, has vastly expanded the prison-based MMT programme *(83,92)*. The objective of the Drug Interventions Programme is to guide adult drug users into treatment and away from crime. The commitment of political and professional entities endorses the principle of equivalence of care with community-based interventions in terms of quality, coverage and treatment alternatives. To this end, comprehensive training packages and guides *(83,93)* and protocols on modes of clinical management *(94–96)* have been developed for working with drug-using prisoners.

Additionally, judicial provisions – such as conditional cautioning, restrictions on bail, drug treatment and testing orders, and the drug rehabilitation requirement of community orders – redirect prisoners into treatment at the expense of the prison *(92,97)*. The national framework also documents end-to-end strategic guidelines for throughcare and aftercare, from a prisoner's first contact with the criminal-justice system *(98)*. Indeed, team case management maintains continuity of care as individuals make the transition between prison (counselling, assessment, referral, advice and throughcare services) and the community (criminal-justice integrated teams), utilizing a common data-gathering instrument, the Drug Interventions Record *(92)*.

Best practice in system-wide service delivery for drug-dependent prisoners requires a range of treatment options founded on evidence-based practices. This requires that interventions incorporate flexible client-centred programmes, utilizing a multiphase interdisciplinary approach of an equivalent standard to community interventions. The WHO Regional Office for Europe *(76)* has outlined harm-reduction strategies of relevance to prison populations. These include needle and syringe exchange programmes, educational measures in the form of overdose prevention programmes, formalized information dissemination, outlines of treatment expectations and peer-based support, and pharmacotherapy. The Regional Office further advocates the inclusion of substitution therapy as a central component of prison pharmacotherapy interventions, in recognition of its currently being the most effective treatment to curb mortality among heroin-dependent injecting drug users *(6)*.

Psychotherapy and psychosocial interventions are fundamental components of drug therapy and necessitate programme integrity, responsiveness to criminogenic and psychosocial needs and aftercare *(5)*. Consolidating psychosocial support and pharmacotherapy is positively correlated with greater prisoner motivation to address drug-related problems *(82)*. Also, in recognition of the fact that the post-liberation transition represents a period

of uncertainty for many ex-prisoners, pre- and post-release programmes need to target the development of psychosocial skills and resilience and provide the necessary practical support. Standardized risk assessments and screening are warranted to identify prisoners at a heightened risk of drug-related mortality. Thus, equality of care requires an integrated system-wide psychosocial and pharmacotherapeutic interface that addresses the specific post-release needs of prisoners.

Spain has the most extensive and developed prison-based harm-reduction measures in Europe *(76,99)*. Over a fifth (22%) of opioid substitution therapy in Spain is delivered in prisons, accounting for 19 010 opioid-dependent prisoners in 2005 *(83)*. The health of prisoners in Spain is collaboratively administered by the Ministry of Health and the Ministry of Interior, which offer considerable service and treatment options. These include pre-release education *(83)* and post-release referral to the community services for treatment *(5)*. The utility of service delivery to drug-dependent prisoners in Spain is advanced by psychosocial interventions, which are viewed as indispensable to treatment. One criticism, however, is the restricted availability of psychosocial support *(82,83,100)*.

Specific programmes may be tailored to redress the dynamic adverse health risks encountered by drug-dependent prisoners post-release by targeting the differential needs of this subpopulation. Interventions may be multimodal, incorporating such elements as skill development and problem solving, deinstitutionalization, domestic and financial management, and counselling. In this manner, the drug problem may be put in context, so as to develop an integrated care model and shift the focus from offending behaviour to building capacity. Thus, best practice in programme development and delivery involves the creation of partnerships and effective working relationships with all stakeholders, including correctional and treatment staff, prisoners and external service providers.

One such initiative is the Bolwara House Transitional Centre in New South Wales, Australia, an intensive community-based pre-release programme for women with a history of drug addiction. This non-custodial therapeutic community provides structured transitional support that implements throughcare principles. It incorporates pharmacotherapy, psychosocial development and family and community reintegration in a holistic client-centred approach. The programme consists of two phases, beginning with a four-week in-house deinstitutionalization process, after which time women commence community programmes based on their assessed needs *(101)*. Such programmes include paid or voluntary employment, accommodation,

parenting and education. This fosters social inclusion and rehabilitation while strengthening competences, personal resources and self-esteem.

Similarly, the Aboriginal Offender Substance Abuse Program in Canada is a national intervention that helps aboriginal men holistically address their drug dependence and offending behaviour. This programme includes opioid substitution therapy and examines substance use in terms of interpersonal and transgenerational trauma. Traditional techniques, such as cultural healing practices and re-establishment of spiritual connectedness, are applied in conjunction with current therapeutic measures, including risk management and skill development *(102)*. In this way, the Program confronts the causes of aboriginal drug addiction by implementing culturally appropriate strategies.

A randomized controlled trial is currently being conducted in Queensland, Australia, to evaluate an intervention involving services for ex-prisoners *(103)* whereby, on being released, each inmate is provided with an information package that includes a "passport" detailing the individual's health status and a list of relevant health resources. The individual receives a series of follow-up calls designed to encourage use of the information in the passport.

Conclusions

Many of the studies described in this review use record linkage in examining mortality rates in the immediate post-release period. In their review of such studies, Kinner et al. *(28)* noted that they were plagued by high levels of various types of heterogeneity. Differences in study design, data analyses and reporting outcomes not only make it difficult to calculate pooled estimates but, as Kinner et al. *(28)* demonstrated using data from an unpublished study, have consequences for mortality calculations. Nonetheless, based on the current evidence, some general conclusions can be drawn.

- Custodial populations have markedly elevated rates of overdose deaths in the period immediately following release as a result of diminished tolerance and use of multiple drugs. These deaths are preventable.
- A number of prevention and harm-reduction responses may be suitably applied at all levels of the criminal-justice system, which would result in reducing the number of drug-overdose deaths in the immediate post-release period.
- Continuity of care is essential and should be facilitated by establishing strong links between the ministry responsible for prison-health services and the health ministry, as well as all other stakeholders involved.

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The WHO Regional Office for Europe

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Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Tajikistan
The former Yugoslav
  Republic of Macedonia
Turkey
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Ukraine
United Kingdom
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