

Acute risk of drug-related death among newly released prisoners in England and Wales

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ABSTRACT

Aims To investigate drug-related deaths among newly released prisoners in England and Wales. **Design** Database linkage study. **Participants** National sample of 48 771 male and female sentenced prisoners released during 1998–2000 with all recorded deaths included to November 2003. **Findings** There were 442 recorded deaths, of which 261 (59%) were drug-related. In the year following index release, the drug-related mortality rate was 5.2 per 1000 among men and 5.9 per 1000 among women. All-cause mortality in the first and second weeks following release for men was 37 and 26 deaths per 1000 per annum, respectively (95% of which were drug-related). There were 47 and 38 deaths per 1000 per annum, respectively, among women, all of which were drug-related. In the first year after prison release, there were 342 male deaths (45.8 were expected in the general population) and there were 100 female deaths (8.3 expected in the general population). Drug-related deaths were attributed mainly to substance use disorders and drug overdose. Coronial records cited the involvement of opioids in 95% of deaths, benzodiazepines in 20%, cocaine in 14% and tricyclic antidepressants in 10%. Drug-related deaths among men were more likely to involve heroin and deaths among women were more likely to involve benzodiazepines, cocaine and tricyclic antidepressants. **Conclusions** Newly released male and female prisoners are at acute risk of drug-related death. Appropriate prevention measures include overdose awareness education, opioid maintenance pharmacotherapy, planned referral to community-based treatment services and a community overdose-response using opioid antagonists.

Keywords Drug-related death, mortality, overdose, prison, release.

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INTRODUCTION

The prison population is characterized by high levels of psychoactive substance use, particularly illicit heroin dependence [1]. Overdose is a significant health risk for heroin users. Dependent users at liberty are partially protected from overdose through neuroadaptive tolerance. If tolerance is attenuated or lost during incarceration, the administration of a dose at previous levels can prove fatal. In this accidental overdose scenario, respiratory depression with hypoxia is the primary mechanism of death [2]. The risk of fatal overdose may increase when alcohol, benzodiazepines or other central nervous system depressants are taken in combination with heroin [3,4]. More broadly, drug-related deaths can also arise directly from intentional overdose, or indirectly in circumstances involving accidents, misadventure or violence.

Research from Australia, Continental Europe and North America has indicated an elevated risk of death among newly released prisoners [5–9]. Research in Scotland reported that the risk of death was pronounced in the early weeks following discharge [10,11]: for example, Bird and colleagues recruited a sample of 19 486 males and observed 57 deaths in the first 12 weeks after discharge, of which 34 occurred in the first 14 days [12]. Our research group conducted an initial investigation of 13 410 sentenced prisoners released in England and Wales in June and December of 1999 and observed 137 deaths to the end of January 2001 [13]. Few studies have been able to examine trends in mortality or recruit sufficiently large samples of women for reliable assessment of the mortality risk among female prisoners and gender differences. Accordingly, the present study was designed to investigate released prisoner mortality over a 3-year period and, with over-sampling, to document the

magnitude of mortality risk among women. It also examined the causes and circumstances of death and offered recommendations for prevention. To our knowledge, this is the largest study conducted to date of newly released prisoner mortality. This report presents the main findings.

METHODS

Design

This was a confidential database linkage study of sentenced prisoners in England and Wales, aged 15 years and over, who were released during 1998, 1999 or 2000. All cases were identified using population databases operated by the Prison Service and Home Office. Personal demographic information was matched with the National Health Service Central Register (NHSCR) which records births and deaths of all registered residents of England and Wales. For all recorded deaths on the NHSCR, a copy of the death registration certificate and other relevant information was forwarded to the research team. The study included all NHSCR-flagged individuals who died up to November 2003. The study design and procedure was supported by the South-east England Multi-Centre Research Committee.

Mortality recording

For each case, a death registration certificate classified the underlying cause using codes from the International Classification of Diseases (9th and 10th revisions). For all drug-related deaths (including deaths due to transport accidents, misadventure, suicide and violence, but not from diseases caused by blood-borne pathogens), information was requested on the post-mortem examination, toxicology report and the coroner's description of the deceased's clinical history and circumstances of death. As a validity check on the classification process, an independent forensic toxicologist, blind to the coroners' verdicts, was provided with death registration certificate data and was asked to assign these as drug-related or due to other causes. There was a very high consistency of categorization between the judgement of this independent assessor and the coronial record.

Sampling procedure

The sample was drawn from the Prison Service inmate database, which includes details of all sentenced prisoners who are released from custody each month. Prisoners who had been deported, repatriated, transferred out of England or Wales, transferred to hospital or had died in custody were excluded. For the 1998 and 2000 samples, males and females were drawn separately. Because of the smaller size of the female prison population, nearly all female released prisoners (12 042) were included to

facilitate the assessment of female mortality risk. Sampling from the much larger male population was drawn from the months of March, June and December of 1998, June and December 1999 and June, September and December of 2000, in order to minimize the risk of seasonal variation in mortality. The list for each month was ordered by age and a systematic sample drawn using different sampling fractions for each month. The sampling fractions were selected with the aim of providing a sample of approximately 6000 prisoners in each month flagged. The expected matching rate on the NHSCR was 88%, which meant that approximately 6800 cases would be needed in each month to provide a matched sample of 6000 per month. Some 18 533 prisoners released in 1998, 13 410 prisoners released in 1999 and 19 647 released in 2000 were sent for matching on the NHSCR. Of these, 5% could not be matched and were excluded. The final NHSCR-flagged sample was as follows: 1998 (12 506 men and 5142 women), 1999 (11 553 men and 882 women) and 2000 (12 454 men and 6234 women); a total sample of 48 771. All recorded deaths to the end of November 2003 were included in the present analysis. Forty-one per cent (20 084) were under 25 years of age and 49% (23 984) were aged between 25 and 39.

Calculation of mortality rates

Period specific mortality rates for men and women were calculated on the basis of the total time at risk of death after the index prison release and the total number of deaths recorded. Excess mortality rates by time since index release (grouped by week) were calculated using Poisson regression (STATA 6.0) in relation to general population mortality data for England and Wales (1998–2000).

RESULTS

Observed and expected mortality

A total of 442 deaths were recorded to the end of November 2003 of which 261 (59%) were classified as drug-related. Table 1 shows the observed and expected deaths together with the equivalent death and excess mortality rates for men and women banded by time since index release. The odds of a drug-related death among women in the first week of release were > 10 times greater than that observed at 52 weeks [odds ratio (OR) = 10.6; 95% confidence interval (CI) = 4.8–22.0] and around eight times greater than at 52 weeks among men (OR = 8.3; 95% CI = 5.0–13.3). Although the drug-related mortality rate among women was more than 10% higher than the drug-related mortality rate for men, the difference is not statistically significant. The higher rates of mortality from all causes among men were statistically higher than

Table 1 Deaths among the general population and discharged prisoners in England and Wales (1998–2000) showing equivalent death rate per 1000 per annum population and excess mortality rate (95% confidence intervals) by gender and weeks after release to 1 year ($n = 48\,771$).

Weeks after release	No. expected		No. observed		All causes (CI)			Drug-related causes (CI)			Non-drug related (CI)		
	All causes	Drug-related	Non-drug related	Equivalent death rate	Excess mortality rate*	Equivalent death rate	Excess mortality rate*	Equivalent death rate	Excess mortality rate*	Equivalent death rate	Excess mortality rate*		
Males													
Up to 1	0.9	26	25	1	37.2 (24.3–54.4)	29.4 (19.0–42.8)	35.7 (23.1–52.7)	28.3 (18.4–41.9)	1.4 (0.0–8.0)	1.1 (0.03–6.3)			
1–2	0.9	18	14	4	25.7 (15.2–40.6)	20.4 (12.1–32.3)	20.0 (10.9–33.6)	15.8 (8.7–26.7)	5.7 (1.6–14.6)	4.5 (1.2–11.6)			
3–4	1.8	18	5	13	12.9 (7.6–20.3)	10.2 (6.0–16.1)	3.6 (1.2–8.3)	2.8 (0.9–6.6)	9.3 (4.9–15.9)	7.4 (3.9–12.6)			
5–8	3.5	24	13	11	8.6 (5.5–12.8)	6.8 (4.4–10.2)	4.7 (2.4–7.9)	3.7 (2.0–6.4)	3.9 (2.0–7.0)	3.1 (1.6–5.6)			
9–13	4.4	23	14	9	6.6 (4.2–9.9)	5.2 (3.3–7.8)	4.0 (2.2–6.7)	3.2 (1.7–5.3)	2.6 (1.2–4.9)	2.0 (0.9–3.9)			
14–26	11.4	87	42	45	9.6 (7.6–11.8)	7.6 (6.1–9.4)	4.6 (3.3–6.3)	3.7 (2.7–5.0)	5.0 (3.6–6.6)	3.9 (2.9–5.3)			
27–52	22.3	146	76	70	8.1 (6.7–9.5)	6.4 (5.6–7.7)	4.2 (3.3–5.2)	3.3 (2.7–4.3)	3.9 (3.0–4.9)	3.1 (2.4–4.0)			
Total to 1 year	45.8	342	189	153	9.4 (8.4–10.5)	7.5 (6.6–8.3)	5.2 (4.5–6.0)	4.1 (3.5–4.8)	4.2 (3.6–4.9)	3.4 (2.8–3.9)			
Females													
Up to 1	0.2	11	11	0	46.8 (23.4–83.8)	68.9 (34.3–123.0)	46.8 (23.4–83.8)	68.9 (34.3–123.0)	0.0 (–)	0.0 (–)			
1–2	0.2	9	9	0	38.3 (17.5–72.7)	56.3 (25.7–106.7)	38.3 (17.5–72.7)	56.3 (25.7–106.7)	0.0 (–)	0.0 (–)			
3–4	0.3	6	6	0	12.8 (4.7–27.8)	18.8 (6.9–40.8)	12.8 (4.7–27.8)	18.8 (6.9–40.8)	0.0 (–)	0.0 (–)			
5–8	0.6	4	3	1	4.3 (1.2–10.9)	6.2 (1.7–16.0)	3.2 (0.7–9.3)	4.7 (1.0–13.7)	1.1 (0.03–5.9)	1.6 (0.04–8.7)			
9–13	0.8	4	2	2	3.4 (1.0–8.7)	5.0 (1.4–12.8)	1.7 (0.2–6.1)	2.5 (0.3–9.0)	1.7 (0.2–6.1)	2.5 (0.3–9.0)			
14–26	2.1	25	14	11	8.2 (5.3–12.1)	12.1 (7.9–17.9)	4.6 (2.6–7.7)	6.7 (3.7–11.4)	3.6 (1.8–6.4)	5.3 (2.7–9.6)			
27–52	4.1	41	27	14	6.7 (4.8–9.1)	10.0 (7.9–13.6)	4.4 (2.9–6.4)	6.5 (4.3–9.6)	2.3 (1.3–3.9)	3.4 (1.9–5.7)			
Total to 1 year	8.3	100	72	28	8.2 (6.7–10.0)	12.1 (9.8–14.7)	5.9 (4.6–7.4)	8.7 (6.7–10.9)	2.3 (1.5–3.3)	3.4 (2.2–4.9)			

*Excess mortality is based on the expected deaths from an age, gender and observation period poison regression in comparison with the general population (1998–2000). There were no statistically significant changes over time among men or women for drug-related and non-drug-related mortality rates recorded in 1998, 1999 and 2000.

rates of all-cause mortality among women, due mainly to the higher ratio of non-drug deaths among men.

Trends in mortality rates

There were no statistically significant changes in mortality rates between 1998, 1999 and 2000 for drug-related and non-drug-related mortality rates in the year after index release. Period specific mortality rates were also examined for potential differences between the years included in the sample. Again, there were no statistically significant changes in period specific drug-related and non-drug-related mortality rates for either men or women.

Recorded cause of death

One hundred and forty-four (55%) of the drug-related deaths were attributed to 'mental and behavioural disorders due to drug use' (using ICD codes: 'drug psychoses', 'drug dependency' and 'non-dependent abuse of drugs'). A further 82 deaths (31%) were classified as due to 'accidental poisoning'. The attributed cause of the remaining deaths was as follows: 28 (11%) were poisonings where 'intention could not be determined'; five (2%) were classified as intentional poisonings; and two (1%) were classified as 'external injury or poisoning'. The 181 non-drug-related deaths were attributed most commonly to external injury (38%), diseases of the nervous, circulatory, respiratory or digestive systems (29%) or transport accidents (17%). The coroner ruled that a deliberate suicide had occurred in nine (3%) of the drug-related deaths and 27 (15%) of the deaths from other causes. These 27 suicides were mainly by other methods and were different from the drug-related deaths.

Toxicology reports and circumstances of death

Thirty-two per cent of drug-related deaths involved a single drug and 23% involved a combination of drugs including alcohol. Opioids were identified in 247 of the 261 drug-related deaths (95%), of which heroin alone was recorded in 173 deaths (66%). Benzodiazepines were cited in 52 cases (20%), cocaine in 36 cases (14%) and tricyclic antidepressants in 26 cases (10%). Opioids (mainly heroin) and cocaine were involved in 97% and 21%, respectively, of drug-related deaths occurring within the first 2 weeks of release from prison, compared with 59% and 11% of deaths, respectively, involving these drugs afterwards. In terms of gender differences, 73% of female deaths were drug-related, compared to 55% of male deaths (OR = 2.2; 95% CI = 1.2–4.0). Relatively more male deaths involved heroin (71% compared to 54%; OR = 2.1; 95% CI = 1.2–3.7) and relatively more female deaths involved benzodiazepines, cocaine or tricyclic

antidepressants (74% overall compared to 32%; OR = 6.1; 95% CI = 3.3–11.2). Of the 37 deaths which involved methadone, 23 occurred in the 1998 cohort and seven occurred in each of the 1999 and 2000 cohorts. Finally, information on the location of death was available for 224 drug-related deaths (86%): 50% occurred at the deceased's usual address, 23% at another person's home or an unspecified indoor location, 12% in a hostel and 15% in a public place.

DISCUSSION

This study shows that the risk of death is strikingly acute in the first and second weeks following release from prison. Relative to the general population, male prisoners were 29 times more likely to die during the week following release, while female prisoners were 69 times more likely to die during this period. Higher excess mortality ratios were observed among females during the whole of the first month following release with all of the excess mortality during this period due to drug-related causes. This very concerning finding is likely to reflect high levels of harmful substance use and psychiatric and drug dependence morbidity among women [14,15]. While consumption of alcohol and other depressant drugs certainly exacerbates the risk of opioid overdose, the picture that emerges here is one in which the prime cause of death is an overdose of heroin or other opioids.

The strengths of our study include the large national sample and the well-matched database linkage and detailed coronial records obtained for analysis. Nevertheless, two limitations are acknowledged: first, although the aim was to identify mortality rates for prisoners from an index release, this method may underestimate the true risk of death because there may be additional risk due to subsequent imprisonment and release; secondly, the risk of death may have been underestimated for prisoners with a history of opioid dependence, as this study was unable to distinguish between opioid-dependent and non-opioid-dependent individuals. Our findings are remarkably consistent with both smaller- and larger-scale research studies conducted in Australia [5], Denmark [6], Finland [7], France [8] and the United States [9], which have observed high levels of mortality in the first few weeks following release. Our findings add to this literature and highlight the risk for women.

The critical question, therefore, is whether these drug-related deaths can be prevented. We believe that four pragmatic prevention measures are required: first, to ensure that prisoners participate in overdose prevention awareness programmes with a particular emphasis on the nature of overdose risk in the post-release social environment; secondly, following overseas experience, to introduce opioid maintenance pharmacotherapy in

prisons for high-risk individuals with chronic opioid dependence [16] to reduce overdose risk and confer general improvements in personal and social functioning [17]; thirdly, to ensure that the release of drug-dependent prisoners is planned and guided by risk appraisal and active referral to community-based treatment and support services; and finally, to evaluate a fatal overdose prevention programme in the community for this population, utilizing resuscitation techniques and opioid antagonist medication [18].

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