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Title:

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Date:

2019-04-01

Citation:

de Andrade, D. F., Spittal, M. J., Snow, K. J., Taxman, F. S., Crilly, J. L. & Kinner, S. A. (2019). Emergency health service contact and reincarceration after release from prison: A prospective cohort study. *Criminal Behaviour and Mental Health*, 29 (2), pp.85-93. <https://doi.org/10.1002/cbm.2106>.

Persistent Link:

<https://hdl.handle.net/11343/286825>

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Title: Emergency health service contact and reincarceration after release from prison: A prospective cohort study

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Conflict of interest: None

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: [10.1002/cbm.2106](https://doi.org/10.1002/cbm.2106)

Abstract

Background: Adults released from prison often have complex health needs. They are at high risk of poor health outcomes and reincarceration, with health service use unlikely to be planned.

Aims/hypotheses: To determine the incidence of emergency health service (EHS) use - ambulance attendance and/or emergency department presentation - among 1181 adults released from Australian prisons. We hypothesised that EHS contact would be associated with increased reincarceration risk.

Methods: Baseline surveys were conducted within six weeks before release. Post-release EHS contacts and reincarceration were identified through prospective data linkage. For each participant, EHS contacts within a 24-hour period were combined to make an episode. We used Cox proportional hazards regression to examine the relationship between EHS episodes and reincarceration, controlling for covariates.

Results: More than half (53.3%) of participants had at least one EHS contact over a median of 25.6 months follow-up. In adjusted analyses, compared to those with no EHS contacts, the hazard of reincarceration was greater for participants who had one to three EHS episodes (HR=1.84; 95%CI 1.48 to 2.29) or four or more (HR=2.35; 95%CI 1.67 to 3.29).

Conclusions/Implications for Practice: Emergency department attendance by people with a history of imprisonment may be indicative of wider decompensation. Improved management of such patients may improve health outcomes, and have collateral benefits for reducing reincarceration.

MeSH Keywords: Prehospital Emergency Care, Prisoners, Vulnerable Populations, Data Linkage, Proportional Hazards Models, Mental Health

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Introduction

Since 2000 the world's prison population has increased by 20%. On any one day, there are now more than 10.35 million people in prison (Walmsley, 2015). High rates of reincarceration have contributed significantly to this growth. In the United States of America (USA) and Australia, approximately 29% and 39% of prisoners (respectively) return to prison within two years of release (Fazel & Wolf, 2015). Many people who cycle through prisons have complex health needs. The prevalence of substance dependence, mental disorder and infectious disease (often-related to injecting drug use (IDU)), are markedly elevated in this population. (Dolan et al., 2016; Fazel & Baillargeon, 2011; Fazel & Danesh, 2002; Fazel, Yoon & Hayes, 2017). In some settings, prison health services provide an opportunity for these needs to be met (Macmadu & Rich, 2015), but these health gains are rarely maintained upon return to the community (Kinner & Wang, 2014), such that the net effect of incarceration is likely to be health depleting (Csete et al., 2016). Ex-prisoners face an increased risk of preventable death in the weeks following release (Kinner et al., 2011; Kinner, Forsyth & Williams, 2013; van Dooren, Kinner & Forsyth, 2013) - often directly related to these identified health problems.

Ex-prisoners in Australia and elsewhere use expensive, tertiary health services at a much higher rate than the general adult population of comparable age (Alan, Burmas, Preen & Pfaff, 2011). Emergency department presentations and hospital admissions after release from prison are frequently due to drug and alcohol use, or mental illness (Alan et al., 2011; Erlyana, Fisher & Reynolds, 2014; Frank et al., 2013) – health problems that are also

associated with reincarceration (Baillargeon et al., 2010; Dowden & Brown, 2002; Thomas, Spittal, Taxman & Kinner, 2015). Consistent with this, there is evidence of significant overlap between populations with recent criminal justice involvement on the one hand and frequent emergency department attendance on the other (Frank, Linder, Becker, Fiellin & Wang, 2014; Markam & Graudins, 2011); the latter is commonly defined as four or more presentations within a twelve-month period (Doupe et al., 2012). Rates of paramedic attendance on people recently released from prison have rarely been studied but, given high rates of drug overdose, self-harm and suicidal ideation in this population (Borschmann et al., 2017; Winter et al., 2015), these are also likely to be elevated.

Contact with emergency health services (EHS), which we defined as using an ambulance or emergency department (ED) attendance, after release from prison may be indicative of escalating chaos in ex-prisoners' lives, and may thus serve as a marker for reincarceration risk (Frank et al., 2013). In a large cohort of adults recently released from prison, our aims were to: (a) estimate the incidence of EHS contact; (b) describe patterns of and reasons for EHS contact; and (c) examine the relationship between EHS contact and reincarceration. We hypothesised that contact with EHSs would be associated with an increased risk of reincarceration, in a dose-dependent fashion.

Methods

Ethics

This study conformed to the principles embodied in the Declaration of Helsinki. It was approved by the University of Queensland's Behavioural and Social Sciences Ethical Review Committee, Queensland Corrective Services (QCS) Research Committee, Queensland Health Human Research Ethics Committee and the Australian Institute of Health and Welfare Ethics Committee.

Sampling

Seven high security prisons in Queensland (three in north Queensland and four in south-east Queensland), Australia, were identified by Queensland Corrective Services (QCS) as prisons from which a large proportion of sentenced prisoners were discharged. A total 1976 soon-to-be released men and women were identified through the QCS Integrated Offender Management System as being potentially eligible to participate in a randomised controlled trial (RCT) of a service brokerage intervention (the 'Passports study'), based on offender status (sentenced only), and expected release date (within the next six weeks) (Kinner et al., 2013). The 'Passports study' was designed to increase primary and allied health care use after release from prison (Kinner, van Dooren, Boyle, Longo & Lennox, 2014). Eligible people were provided with information about the study and asked for written consent to participate. Women were intentionally oversampled to allow for sex-stratified analyses, but otherwise the cohort was representative of persons released from prison in Queensland on assessed demographic and criminal justice variables.

Baseline interviews were conducted between August 2008 and July 2010 and covered socio-demographic characteristics; general health, mental health and health-related quality of life; intellectual disability; substance use; social support; health risk behaviours; and transitional arrangements and support. In addition, with participant consent, information on infectious diseases and medication use was extracted from prison medical records. The recruitment and data collection process is described in more detail elsewhere (Kinner et al., 2013).

Following completion of the randomised controlled trial, participant identities were linked prospectively with correctional, health service and mortality records. We obtained reincarceration data to 31 July 2012 from QCS, undertaking deterministic linkage based on a unique prisoner identification number. We identified deaths in the cohort to 31 July 2012 through probabilistic linkage with the Australian National Death Index. We obtained records of ambulance attendance and ED presentation in the cohort to 31 July 2012 through probabilistic linkage with the state wide Emergency Department Information System (EDIS) and Queensland Ambulance Service (QAS) databases. Data linkage of this sort is routine in Australia and previous research has found that it results in 0.1% of links being missed (false-negatives) or invalid (false-positives) (Holman, Bass, Rouse & Hobbs, 1999).

We examined two outcomes - EHS episode and reincarceration. For these purposes, an EHS episode was defined as one or more ambulance service contacts or ED contacts within a 24-hour period. EHS episode was treated as a cumulative, time-varying covariate, the value of which was set at "0" on release. This variable was then recoded into a time-varying

categorical variable (0, 1-3, ≥ 4 episodes) to produce clinically meaningful categories for analysis. Reincarceration was treated as a binary variable (yes/no).

We considered a number of binary covariates covering socio-demographic, criminal justice, substance abuse, physical health, mental health, and social/reintegration support domains.

Where possible, variables were constructed from previously validated instruments. A detailed description of exposed and unexposed categories for each covariate and their source is provided in Supplementary Table 1. Socio-demographic variables included age, sex, Indigenous status, outstanding debts, education, poverty, housing stability, and employment status. Criminal justice measures included prior adult incarceration, prior juvenile detention, income from illegal activities, length of incarceration, and drug-related offence. Substance use measures included risky use of alcohol, cannabis, methamphetamine, or opioids, and lifetime history of IDU. Mental health measures included self-reported lifetime history of self-harm (including suicide attempts), use of central nervous system (CNS) medications, intellectual disability, and psychological distress. Physical health measures included obesity, sedentary behaviour, self-reported physical health, and lifetime history of chronic illness. Measures of social or reintegration support included marital status, visits in prison in the past four weeks, perceived social support, history of separation from family as a child, and reintegration support provided by QCS.

The period of observation for each participant spanned from their date of release from prison until right censoring at first reincarceration, death, or 31 July 2012. First, we examined the

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timing and frequency distribution of EHS contacts amongst participants. Second, we examined the frequency distribution of ICD-10 (International Classification of Diseases 10th Revision) diagnostic codes for all ED contacts, and we also stratified by sex. Third, we calculated the proportion of participants re-incarcerated within the follow-up period according to each baseline characteristic, and tested the statistical significance of group differences by comparing exposed versus unexposed using a chi-square test. We then performed a Cox proportional hazards regression treating EHS episodes as a time-varying exposure, and time to first reincarceration as the outcome. All potential predictors had values set at baseline (i.e. when $t = 0$). To account for multiple EHS episodes, we used cluster adjusted robust standard errors, where the clustered unit was the individual. The graphical representation of this model (Figure 1) shows the accumulated risk of reincarceration on any day during follow-up time. The second model adjusted for age, sex and Indigenous status. The third model adjusted for demographic factors and a range of baseline health and social factors, as potential confounders. Analyses were performed using Stata, version 13.1.

Results

Of the 1665 people who met eligibility criteria, 312 declined to participate, and 28 were unavailable for interview (e.g. released), resulting in a recruitment fraction of 80%. Three of the 1325 participants were not released from prison by 31 July 2012, three could not be linked to QCS data and 138 were interviewed more than six weeks before release from prison. Analyses here were thus based on the remaining 1181 participants.

Six hundred and thirty-one (53%) participants had contact with emergency health services at least once during a median of 25.6 months (inter-quartile range [IQR] = 7.5 - 35.7 months) of follow-up. These participants were collectively responsible for 1048 ambulance contacts (35%) and 1979 distinct ED contacts (65%). Women were significantly more likely than men to have contact with an EHS (66%: 50% respectively, $p < 0.001$). The median time to first EHS contact following release from prison was 6.4 months (IQR 2.4 - 14.4 months). Number of contacts per participant was highly skewed, with 20% of participants accounting for 72% of contacts.

Table 1 presents the ICD-10 codes most frequently assigned to men and women in the ED. Nearly one third of women (28%) and men (32%) had suffered ‘injury, poisoning and/or certain other consequences of external causes’ (including drug overdose and assault). ‘Mental and behavioural disorders’ accounted for 13% of diagnoses among women and 14% among men; 6% and 7% respectively had diagnoses relating to psychoactive substance use, including dependence. It was not possible to disaggregate reasons for ambulance use.

Insert Table 1 about here

After collapsing multiple ambulance and emergency department contacts that occurred within a 24-hour period, we identified 2128 unique EHS episodes among 630 (64%) participants: 454 (38% of all participants) had had 1-3 EHS episodes and 176 (15% of all participants) had had four or more EHS episodes during follow-up. Sixteen (80%) of the 20 participants who died during follow-up had had at least one EHS episode in that time.

Six hundred (51%) of the 1181 participants had returned to prison by 31st July 2012. The median time to return was 7.8 months (IQR 3.4 - 15.4 months). Twenty died, but 561 (47.5%) participants had stayed out of prison at least until the study end date. Supplementary Table 2 presents baseline characteristics of the sample.

Table 2 shows the unadjusted and adjusted hazard of reincarceration as a function of EHS contact. There was no effect of the Passports intervention on ambulance or ED contact ($p>0.05$), so the intervention effect was excluded from the multivariable models to preserve statistical power. In the unadjusted model (Model 1), participants who had had 1-3 EHS episodes were at twice the risk of reincarceration after release from prison than those with no episodes (hazard ratio [HR] 2.24, 95%CI 1.85- 2.71); participants who had had four or more ECS episodes were at over three times the risk of reincarceration than those without ECS episodes (HR 3.21, 95%CI 2.40-4.31). After controlling for demographic variables (Model 2), the association between EHS episodes and reincarceration was slightly attenuated but remained statistically significant ($p<0.001$). The fully adjusted model (Model 3) shows this association remained statistically significant after controlling for demographic, criminal justice, substance use, mental health, physical health, and social/reintegration support variables. Having 1-3 EHS episodes was associated with nearly twice the risk of reincarceration (HR 1.84, 95%CI 1.48-2.29), and four or more with over twice the risk (HR 2.35, 95%CI 1.67-3.29).

Insert Table 2 about here.

Figure 1 shows the cumulative failure estimates of reincarceration over time (days) from release, for three differing levels of EHS episodes. Given the time-varying nature of the EHS exposure variable, each curve represents those participants who are in that EHS episode category at each day of follow-up; participants may move between EHS episode groups over time. For participants who did not have an EHS episode by 90 days post-release, the estimated risk of returning to prison at this time was 9%. This risk rose to 25% for those who had one to three EHS episodes by 90 days post-release, and to 42% for those with four or more EHS episodes by 90 days post-release. The risk of reincarceration at any point in time was highest for participants who had four or more EHS episodes.

Insert Figure 1 about here

Discussion

In this prospective study of men and women released from prison, we observed a high incidence of any emergency service contact (64%), with 15% frequent users. Having taken a drug overdose or having been assaulted were the most common reasons for EHS use. Our hypothesis of a relationship between EHS contact and reincarceration was sustained, even after adjustment for potential confounders. Just over 40% of participants who had frequent (four or more) EHS episodes within three months of release returned to prison during this period, compared with fewer than 10% of those with no EHS episodes.

Previous work in the prison setting has highlighted the diversity and complexity of chronic health problems in this population (Australian Institute of Health and Welfare, 2015). Our findings are consistent with previous studies (Alan et al., 2011; Erlyana et al., 2014; Frank et al., 2013). For people recently released from prison, emergency health service contact may be an indication of personal crisis or escalating life instability; situations potentially exacerbated by mental health or substance use problems that may also increase their risk of reincarceration (Baillargeon et al., 2010; Dowden & Brown, 2002; Thomas et al., 2015). We were unable to describe or characterise these life circumstances in this study, and recommend qualitative research into the circumstances surrounding emergency health service use by former prisoners; this could provide a model to inform improvements to transitional support to services which could better meet their complex health and welfare needs.

Our findings suggest a need for interventions to address the root causes of both emergency health service use and reincarceration among ex-prisoners. It may be that emergency health service contact shortly after release from prison would provide both an opportunity and an appropriate context to initiate such interventions. The results of a systematic review on interventions for frequent ED presenters suggest that individualised case management involving health education (e.g. self-care, and management of chronic diseases), education about the health care system, counselling (social and emotional), and referral to specialist outpatient services can lead to significant improvements in health, welfare, and substance use outcomes (Michelen, Martinez, Lee & Wheeler, 2006). While adequately resourced,

individualised case management appears to be effective in ED settings for high frequency service users (Althaus et al., 2011), similar strategies have rarely been evaluated for prisoners returning to the community (Kinner, Burford, van Dooren & Gill, 2013). There is emerging evidence, however, that high quality transitional support, including individualised case management, can facilitate and encourage engagement with primary care and mental health services (Kinner et al., 2016), increase use of specialist health services (Young et al., 2015), and reduce ED use after release from prison (Wang et al., 2012). Individualised care may also assist in reducing stigma associated with incarceration among those released from prison, and within community service providers (Baillargeon, Hoge & Penn, 2010).

Despite growing evidence that highlights the importance of transitional support after release from prison, the evidence has largely failed to translate to effective change in policy and practice. Barriers to successful transitions are individual (e.g. complex needs), institutional (e.g. availability of transitional support) and governmental (e.g. limited/no health benefits) (Baillargeon, Hoge & Penn, 2010; Kinner et al., 2013). Our findings highlight the need for a more holistic, multi-systemic approach to the health and wellbeing of ex-prisoners that goes beyond criminal justice measures, such as parole or Global Positioning System (GPS) monitoring, and addresses combined health, welfare and justice risks. Rigorous evaluation (i.e. RCT) of such an approach would allow for the examination of health outcomes, EHS contact and reincarceration.

This is, to our knowledge, the first study to examine prospectively the time-varying association between emergency health service contact and reincarceration in a large cohort of ex-prisoners. The study had three main limitations. First, the creation of health episodes through the combination of ambulance and ED contacts may have been imperfect. We presumed that all ambulance and/or ED contacts within a 24-hour period were related to the same health problem (e.g. ambulance transporting a patient to the ED), but some EHS episodes may have pertained to contacts for unrelated health emergencies that occurred within the same 24-hour period, resulting in under-estimation of the incidence of EHS episodes. Secondly, due to the sensitive nature of some topics explored during baseline surveys, some participants may have chosen not to disclose stigmatising or illegal behaviours, particularly alcohol and other drug use, which would have prevented complete adjustment for confounding in Model 3. Given, however, the high proportion of participants reporting stigmatising behaviours at baseline, the likelihood of this is low, and there is evidence that self-report can be reliable in incarcerated populations (Carroll, Sutherland, Kemp-Casey & Kinner, 2016; Schofield, Butler, Hollis & D'Este, 2011). Thirdly, missing data for baseline variables resulted in approximately 12% of the sample not being included in the final multivariate model. It is unlikely that this resulted in substantial bias given that the maximum missing values for any covariates represented 6.5% of values, and both the exposure and the outcome were common.

Our findings suggest that adults released from prison are highly likely to present to emergency health services, and that those who do present are at increased risk of

reincarceration with some evidence of higher risk or reincarceration with higher frequency of emergency service use. Further research is needed to investigate whether improving the quality and duration of transitional support, facilitating engagement with appropriate specialist services, and more intensive case management after EHS contact can improve health outcomes for this vulnerable population, while simultaneously reducing both further EHS contact and reincarceration.

Acknowledgements

The authors wish to thank Queensland Corrective Services and the Passports study interview team for efforts made through the data collection process. The research presented in this paper is that of the authors and does not reflect the views or policies of Queensland Corrective Services. Funding: This study was funded by the Australian National Health and Medical Research Council (NHMRC) Strategic Award #409966, NHMRC Project Grant APP1002463, and Australian Research Council (ARC) Discovery Project DP140102333.

Funding bodies had no role in the study design; collection, analysis, and interpretation of the data; writing the report; or decision to submit the report for publication.

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Table 1. Most frequent primary diagnostic categories for ED contacts post-prison release, by sex.

Primary diagnostic category (ICD-10)	No. of contacts (%)	Most frequent IDC-10 subcategory	No. of contacts (%)
Women (n=445 contacts)			
S00-T98 Injury, Poisoning, and Certain Other Consequences of External Causes	126 (28.3%)	S00-S09 Injuries to the head	32 (7.2%)
F00-F99 Mental & Behavioural Disorders	57 (12.8%)	F10-F19 Mental & behavioural disorders due to psychoactive substance use	25 (5.6%)
R00-R99 Symptoms, Signs and Abnormal Clinical & Laboratory Findings, not Elsewhere Classified	52 (11.7%)	R00-R09 General symptoms and signs	24 (5.4%)
Z00-Z99 Factors Influencing Health Status & Contact with Health Services	106 (11.5%)	Z00-Z13 Persons encountering health services for examinations	20 (4.5%)
Men (n=1342 contacts)			
S00-T98 Injury, Poisoning, and Certain Other Consequences of External Causes	462 (34.4%)	S00-S09 Injuries to the head	111 (8.3%)
F00-F99 Mental & Behavioural Disorders	193 (14.4%)	F10-F19 Mental & behavioural disorders due to psychoactive substance use	99 (7.4%)
Z00-Z99 Factors Influencing Health Status & Contact with Health Services	165(12.3%)	Z53 Procedures/treatment for other specific health care, not carried out	81 (6.0%)
R00-R99 Symptoms, Signs and Abnormal Clinical Laboratory Findings, not Elsewhere Classified	134 (10.0%)	R50-R69 Symptoms and signs involving the circulatory & respiratory systems (mainly chest pain symptoms)	47 (3.5%)

Note: 192 cases were removed due to the participant not waiting for treatment. Most of these (n=177) also had an ICD-10 code of “Z53.2,” referring to “Procedures/treatment for other specific health care, not carried out.”

Table 2. Hazard ratios from unadjusted and adjusted Cox proportional hazards regressions of EHS episodes on time to reincarceration.

Emergency Health Service Episodes	Model 1 HR (95%CI)	Model 2 AHR (95%CI)	Model 3 AHR (95%CI)
No episodes	Ref	Ref	Ref
1-3 episodes (low frequency)	2.24 (1.85, 2.71)	2.21 (1.83, 2.68)	1.84 (1.48, 2.29)
≥4 episodes (high frequency)	3.21 (2.40, 4.31)	3.12 (2.32, 4.20)	2.35 (1.67, 3.29)

Abbreviations: HR: hazard ratio; AHR: adjusted hazard ratio

Model 1: unadjusted

Model 2: adjusted for age, sex, and Indigenous status

Model 3: adjusted for socio-demographic, criminal justice, substance use, mental health, physical health, and social/reintegration support variables (excluding Passports intervention)

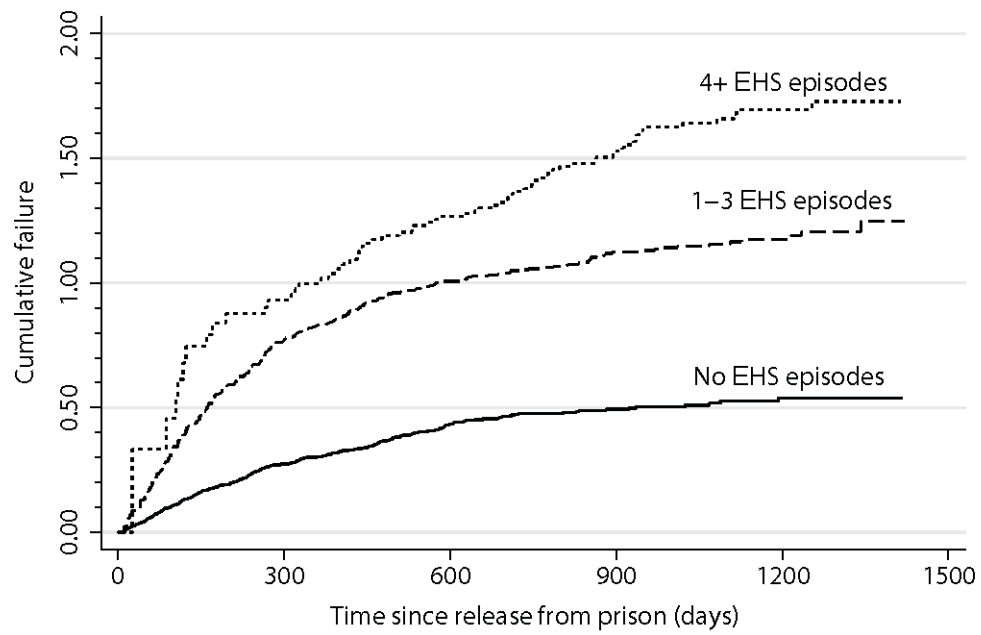


Figure 1. Estimated cumulative failure curves for unadjusted Cox proportional hazard regression with time-varying covariate