

# Risk of Death for Veterans on Release From Prison

Hal S. Wortzel, MD, Patrick Blatchford, PhD, Latoya Conner, BA,  
Lawrence E. Adler, MD, and Ingrid A. Binswanger, MD, MPH

We sought to determine, among veterans released from Washington state prisons from 1999 through 2003, the risk of death from all causes, whether those veterans have faced a higher risk of death than have nonveterans, and whether having VA benefits decreased the risk of death. We linked data from a retrospective cohort study to data from the Veterans Benefit Administration. Mortality rates were compared between veteran and nonveteran former inmates. The crude rate of veteran mortality was 1,195 per 100,000 person-years, significantly higher than that of nonveterans ( $p < .001$ ), but adjustment for demographic factors demonstrated no significant increased risk. VA benefits were associated with a reduced risk for all-cause deaths (hazard ratio, .376; 95% confidence interval, 0.18–0.79). Veterans share the heightened risk of death after release from prison faced by all released inmates and should be included in efforts to reduce the risks associated with transitioning from prison to the community. VA benefits appear to offer a protective effect, particularly against medical deaths.

**J Am Acad Psychiatry Law 40:348–54, 2012**

Estimates suggest that 10 percent of incarcerated persons in 2004 were veterans.<sup>1,2</sup> Efforts by the Department of Veterans Affairs (VA) to intervene and minimize the mortality risk associated with the time of release from correctional settings will be usefully guided by data pertaining to the risks faced by veterans released from prison. Establishing both the level of risk faced by veterans with a history of incarceration

and the leading causes of death is essential to the successful development of meaningful interventions to improve coordination of care for veterans making the transition from prison to the community.

Prior studies have demonstrated that inmates face an increased risk of death, compared with the general population, following release from prison in the United States and abroad. Suicide was among the leading causes of death in studies conducted in the United States and the United Kingdom.<sup>3–7</sup> In a retrospective cohort study of inmates released from the Washington State Department of Corrections (DOC), the adjusted risk of death among former inmates was 3.5 times that among other state residents (95% confidence interval [CI], 3.2–3.8). During the first two weeks after release, the risk of death among former inmates was 12.7 (95% CI, 9.2–17.4) times that among other state residents, with a markedly elevated relative risk of death from drug overdose (129; 95% CI, 89–186). The other leading causes of death among former inmates were cardiovascular disease, homicide, and suicide.<sup>4</sup>

The VA now officially recognizes that some veterans are arrested for a variety of offenses, some of which may be related to extended periods of battle readiness and combat exposure during multiple deployments and to maladaptive coping with the return to civilian life. The VA's Uniform Mental

---

Dr. Wortzel is Director of Neuropsychiatric Consultation, Veterans Integrated Service Network (VISN)-19 Mental Illness Research, Education, and Clinical Center (MIRECC), Denver Veterans Affairs Medical Center, Denver, CO, and Assistant Professor, Neurobehavioral Disorders Program and Division of Forensic Psychiatry, Department of Psychiatry, University of Colorado School of Medicine, Aurora, CO. Dr. Blatchford is Assistant Professor, Biostatistics and Informatics, Colorado School of Public Health and University of Colorado, Aurora, CO. Ms. Conner is a Professional Research Assistant and Dr. Adler is Director (retired), VISN 19 MIRECC, Denver, CO. Dr. Binswanger is Associate Professor, Division of General Internal Medicine, Department of Medicine, University of Colorado, Aurora, CO. This study was supported by the Eastern Colorado VA Health Care System's Research Enhancement Award Program in Health Services Research. Dr. Binswanger was supported by Grant K12HS019464 from the Robert Wood Johnson Physician Faculty Scholars Program, the Agency for Healthcare Research and Quality, and Grant 1R21DA031041-01 from the National Institute on Drug Abuse. The content is solely the responsibility of the authors and does not necessarily represent the official views of the Department of Veterans Affairs, the National Institutes of Health, the Robert Wood Johnson Foundation, or the Agency for Healthcare Research and Quality. Address correspondence to: Hal S. Wortzel, MD, VISN 19 MIRECC/Denver Veterans Hospital, 1055 Clermont Street, Denver, CO 80209. E-mail: hal.wortzel@ucdenver.edu.

Disclosures of financial or other potential conflicts of interest: None.

Health Services Package<sup>8</sup> now calls not only for assistance for veterans re-entering the community from state and federal prisons, but also for outreach efforts to veterans who are interfacing with jails, courts, and law enforcement and for education of these agencies regarding mental health problems relevant to veteran populations, such as posttraumatic stress disorder (PTSD) and traumatic brain injury (TBI).

In the present investigation, we sought to identify the veterans released from Washington state prisons to calculate the risk of death faced by those veterans after release from prison; to investigate whether veterans had a higher risk of death after release from prison than did nonveterans; to assess whether veterans had a higher risk of suicide after release from prison than nonveterans; and to determine if veterans who had VA benefits (involving either pension or disability payments) demonstrated a decreased risk of death following their release from prison than those veterans without VA benefits. We hypothesized that veterans would face a higher risk of death after release from prison than would nonveterans and that this increased risk would be related to deaths due to injury caused by self or others, such as suicide. We also hypothesized that veterans with VA benefits would face a lower risk of death than would veterans without VA benefits.

## Methods

### Design

We conducted a data linkage study using data from a retrospective cohort study of inmates released from the Washington State DOC linked to data from the Veterans Benefit Administration (VBA) database. This study was approved by Veterans Affairs Research and Development, the Colorado Multi-institutional Review Board of the University of Colorado Denver, the Research Review Committee of the Washington State DOC, and the National Death Index (NDI).

### Subjects

The study population included an original cohort of 30,237 inmates from a previous study<sup>4</sup> of risk of death following release from prison. These former inmates were released from 1999 through 2003 from the State of Washington DOC. Releases were defined as any transition from prison to the community

(including work release or halfway house), with or without community supervision, after an incarceration of any length of time. The investigators engaged the VBA to identify entries in its database that matched those in the Washington DOC database by first name, last name, sex, birth date (month, day, and year, within one year), and eight of the nine digits in the social security number. Data for 30,231 subjects were sent to the VBA for matching; requiring nonmissing data on all variables to match eliminated 10,353 (34%) of the subjects, but allowing one missing variable retained all but 6 subjects from the original 30,237, thereby leaving 30,231 for VBA matching. The VBA returned 3,806 matches, comprising our subgroup of veterans, which was compared with the 26,431 nonveterans for analyses pertaining to our first, second, and third goals. Of the 3,806 veterans, 573 (15.1%) received benefits from the VA. This group was compared with the 3,233 (84.9%) veterans who did not receive benefits from the VA in the analysis for our fourth goal.

### Data

The primary outcome measure was all-cause deaths. Deaths were identified using the National Death Index, by methods that have been described.<sup>4</sup> Causes of death were obtained from the National Death Index-Plus. Deaths were categorized based on underlying cause listings. Two categories of cause of death were created: those caused by injury by self or others (including overdose, suicide, homicide, and motor vehicle accidents) and those caused by medical events (including HIV, cardiovascular, liver-related, diabetes, cancer, and COPD). Secondary outcome measures were deaths from injury by self or others, medical deaths, suicide, alcohol or drug overdose, homicide, cardiovascular disease, and cancer. The primary predictor variable of veteran status was obtained from the VBA. The electronic database (Offender-Based Tracking System) of the Washington State DOC provided the other covariates. These included sex, race, ethnicity, age, and length of incarceration (in years) for each prison stay that ended in a release during the study period. Age was assessed in decades for ease of interpretation of the resultant hazard ratios.

### Analysis

Death rates were calculated as deaths over person-time at risk in the community, excluding time in

prison during subsequent incarcerations. The veteran and nonveteran death rates were compared by using the exact test based on the binomial distribution, and *p* values were adjusted for multiple comparisons by using the Holm procedure. The question of primary interest was whether time to death changed significantly with veteran status, with adjustment for the demographic variables sex, race, and age and the length of incarceration. Cox proportional hazards regression was used to model the effect of continuous and categorical covariates on time-to-event data.<sup>9,10</sup> The effect of each covariate on time to death was assessed from the calculated hazard ratio (HR) and associated 95% CI. First, the unadjusted effect of veteran status on the different types of death was estimated, followed by a fitting of separate adjusted models for each of the eight different types of death. The Cox regression model was used to determine the effect of receiving benefits from the VA on time until death, again with control for the same covariates as in the primary analysis. The assumption of proportional hazards was tested according to the method of Lin and Wei,<sup>11</sup> in which the observed score process is compared with the simulated score processes for each covariate. The *p* value for the test of proportional hazards is based on the results of performing a Kolmogorov-type supremum test. We performed 1,000 simulations for these tests. Analyses were conducted using SAS 9.2 (SAS Institute Inc., Cary, NC). The number of releases for each inmate varied from 1 to 10 (mean = 1.28, standard deviation = 0.66). Eighty percent of the inmates had a single release, and the other 20 percent had multiple releases, ranging from 2 to 10. Multiple releases of a single inmate may be correlated, and this within-subject correlation was accounted for in the analysis. The analysis applied the method of Lin and Wei<sup>12</sup> to sum the score residuals for each inmate using the PHREG procedure in SAS PROC, thus achieving a robust sandwich estimate of the covariance matrix.

**Results**

Of the 30,231 subjects sent to the VBA for matching, 3,806 individuals with veteran status were identified. The demographic characteristics of the veteran subgroup and the leading causes of death for released veterans are depicted in Table 1. Similar to nonveterans released from prison, released veterans most frequently died of overdose, cardiovascular disease, cancer, hepatic disease, homicide, motor vehicle ac-

**Table 1** Veteran Demographics, Causes of Death and Frequency

Variable	<i>n</i>	%
Branch of service		
Air Force	413	10.85
Army	1,866	49.03
Marines	442	11.61
Missing/unknown	188	4.94
Navy	859	22.57
Other	38	1.00
Service discharge		
Dishonorable	88	2.31
Honorable	2,937	77.17
Missing/unknown	313	8.22
Other	468	12.30
VA benefits		
No	3,233	84.94
Yes	573	15.06
Deaths, total	89	
Total deaths by self/others	38	
Overdose	21	
Motor vehicle	6	
Homicide	6	
Suicide	5	
Total medical deaths	41	
Cardiovascular	16	
Cancer	13	
Liver-related	7	
Diabetes	3	
Other medical (HIV or COPD)	2	
Other	10	

idents, and suicide. Table 2 compares the veteran subgroup to the nonveteran population by various demographic factors. Released veterans were on average 7.5 years older than released nonveteran inmates. Of the 3,806 released veterans identified, 89 died during the study period, and 12 of these deaths occurred in the first month following prison release.

For all-cause deaths, the crude veteran death rate was 1,195 per 100,000 person-years of risk, signifi-

**Table 2** Demographic Characteristics of Veterans Versus Nonveterans

Variable	<i>n</i>	%	Mean ± SD	<i>p</i>
Age, y				<.001
Nonveteran	26,431		33.03 ± 9.53	
Veteran	3806		40.51 ± 9.29	
Time in prison, y				<.001
Nonveteran	26,431		1.66 ± 2.84	
Veteran	3806		2.11 ± 3.24	
Time since release, mo				0.011
Nonveteran	26,431		20.04 ± 15.52	
Veteran	3806		20.72 ± 15.47	
Sex				<.001
Female, nonveteran	3,913	14.8		
Female, veteran	54	1.4		
Male, nonveteran	22,518	85.2		
Male, veteran	3,752	98.6		

**Table 3** Crude Mortality Rates of Veterans and Nonveterans

Cause of Death	Total Deaths (n)	Veteran Deaths (n)	Veteran* Death Rate†	Nonveteran Deaths (n)	Nonveteran‡ Death Rate†	Raw p	Adjusted p
All causes	443	89	1,195	354	714	<.001	<.001
Self/others	232	38	510	194	391	0.166	0.994
Overdose	103	21	282	82	165	0.049	0.424
Suicide	40	5	67	35	71	1.000	1.000
Homicide	54	6	81	48	97	0.863	1.000
Motor vehicle	35	6	81	29	58	0.606	1.000
Medical	136	41	551	95	192	<.001	<.001
HIV	7	1	13	6	12	1.000	1.000
Cardiovascular	56	16	215	40	81	0.003	0.033
Liver	23	7	94	16	32	0.047	0.424
Diabetes	6	3	40	3	6	0.065	0.458
Cancer	39	13	175	26	52	0.002	0.021
COPD	5	1	13	4	8	1.000	1.000

\* Veteran person-time of risk, 7,447.

† Per 100,000 person-years.

‡ Non-veteran person-time of risk, 49,602.

cantly higher than the death rate of 714 observed for the nonveterans ( $p < .001$ ). For the majority of the causes of death, a higher crude death rate was observed in veterans than in nonveterans (Table 3). For example, the veteran death rate from cardiovascular causes was 2.7 times greater than it was for nonveterans (175 versus 52 per 100,000 person-years of risk,  $p = .021$ ).

Although the unadjusted model demonstrates an increased risk for all-cause deaths, overdose, cardiovascular, cancer, and medical causes among veterans compared with nonveterans, models adjusted for the demographic covariates sex, race, age, and length of incarceration indicated that veteran status was not a statistically significant risk factor for any of the types of death investigated (Table 4). Of the 3,806 veterans identified, 573 had received some form of VA benefits. Having VA benefits appeared to offer a protective effect in terms of all-cause deaths for veterans.

**Table 4** Veteran Status and Risk for Various Types of Death

Cause of Death	Hazard Ratio	95% CI	
		Lower	Upper
All causes	1.08	0.85	1.38
Self/others	1.12	0.78	1.62
Suicide	0.89	0.34	2.37
Overdose	1.36	0.81	2.26
Homicide	0.77	0.32	1.86
Medical	1.34	0.91	1.98
Cardiovascular	1.22	0.66	2.24
Cancer	1.39	0.68	2.81

Rates adjusted for sex, race, age, and length of incarceration.

The hazard ratio associated with having VA benefits for all-cause deaths was .376 (95% CI, 0.18–0.78). The protective effect of VA benefits for deaths resulting from medical causes produced a hazard ratio of .262 (95% CI, 0.08–0.82).

## Discussion

Released veterans, in terms of all-cause deaths, faced higher crude death rates than nonveteran released inmates, although veteran status did not prove to be a significant risk factor after adjustment for key sociodemographic characteristics. Appreciating the import of results in this study necessitates consideration of the high-risk comparison group against which death rates for released veterans were measured. The general former inmate population had a risk of death 3.5 times that of other state residents, with a risk 12.7 times higher during the first two weeks following release. The finding that having VA benefits was associated with a reduced risk of all-cause deaths, in particular medical deaths, suggests that benefits and access to care mitigates risk among veterans released from prison. Additional research is needed to determine more precisely any relationship between VA benefits and the risk of death after release, potentially taking into account the amount and type of benefits received.

Although veteran status itself does not appear to be a risk factor for death, for certain causes of death, service-related neuropsychiatric injuries (such as PTSD or TBI) potentially interact with the risk as-

sociated with prisoner status or release from prison, potentially placing such veterans at higher risk compared with their nonveteran counterparts.<sup>13</sup> We thus hypothesized that service-related neuropsychiatric injuries combined with stressors related to prison release would lead to increased rates of death by suicide among veterans. However, veterans' death rates for deaths caused by self or other or any of the individual causes of death subsumed under this category (suicide, homicide, overdose, motor vehicle accident) did not significantly exceed those of nonveteran prisoners. Given the high rates previously established for this population of released prisoners and current results, it seems likely that veterans share in the elevated risk for death caused by self or others. Efforts to direct released veterans to appropriate community and VA resources to mitigate such risks appear to be warranted.

The increase in crude death rates observed for veterans in this investigation seems to have been driven in large part by medical causes, a finding that may comport with the fact that the veteran group was on average seven years older. After adjustment for sociodemographic variables (including age), the veterans did not appear to be at increased risk for medical death. Nevertheless, the high rates of medical deaths observed in this population of released veterans warrant attention, particularly if access to care might mitigate such risk. In addition, the medical literature suggests that in-theater exposures can increase specific types of medical risk for veterans. For instance, some literature reports that in-theater exposures may elevate the risk for particular types of cancers for veterans.<sup>14,15</sup> Recent studies of the relationship between coronary artery disease or subclinical atherosclerosis and combat exposure generally do not support an association.<sup>16,17</sup> However, anxiety disorders (including PTSD) and depression are both associated with increased cardiovascular disease,<sup>18–20</sup> and both have been reported to increase risk of myocardial infarction within a veteran population.<sup>21</sup> Therefore, although combat exposure *per se* may not yield cardiovascular disease, it perhaps leads to increased rates of mood or anxiety disorders, which may then cause cardiovascular disease and death. More research is needed for a better characterization of the rate and nature of medical deaths observed among released veterans.

Limitations of the present investigation include the reliance on data derived from a single state, as the prison system in Washington may not be representative of other regions or of the nation as a whole. The results should be interpreted in the context of the release dates (1999–2003), given that more veterans are now returning from conflicts in the Middle East. Given the end release date of 2003, representation of veterans of Iraq or Afghanistan was low. This new generation of veterans may have different rates of death and criminal justice involvement than those in our study population. Further investigation expanding the release date to capture new returning veterans is indicated.

This study involved matching a correctional database, VBA database, and the National Death Index to assess health outcomes. Use of data linkage procedures among correctional, veteran, and community resources affords the opportunity to measure health outcomes and health care processes in vulnerable populations, affording data that may be used to investigate a variety of otherwise inaccessible research questions. Such methods could be used for comparative effectiveness research in the future. We believe that our database matching procedure produced accurate data. The procedure identified 3,806 (12.59%) veterans within the overall released inmate population consisting of 30,237 individuals. This finding is in line with relatively recent data from the Bureau of Justice Statistics (BJS), indicating that in 2004, 10 percent of state prisoners reported prior service in the U.S. Armed Forces.<sup>1</sup> The BJS found that veterans in state and federal prisons in 2004 were almost exclusively male (99%), consistent with our finding that 98.6 percent of released veteran inmates were male. The BJS reported that veterans in state prisons were about 12 years older than nonveterans on average; veterans in our study population were on average 7.5 years older. The BJS reported that an estimated 62 percent of veterans received an honorable discharge; we observed honorable discharge status in 77 percent of released veterans. Given the different years captured in our dataset, our focus on released persons (as opposed to those actively incarcerated), and that our data reflect the released inmate population from only a single state, the common trends and modest differences between present demographic findings and BJS data generally support the validity of our matching procedure and lend confidence to results.

The present investigation suggests that veterans share the increase in risk of death previously established for persons released from prison, and succumb to the same leading causes of death. These findings lend support to recent expansions by the VA to serve veterans transitioning from correctional settings back into the community. Results of a recent investigation by Webb *et al.*<sup>22</sup> suggested that elevation in suicide risk is associated more diffusely with justice involvement; risk was elevated even among individuals without custodial sentences or guilty verdicts. Whether justice-involved veterans share this elevation in risk more diffusely associated with involvement with the criminal justice system remains to be determined. The VA's Veterans Justice Outreach Initiative is already seeking to mitigate such risk, identifying justice-involved veterans in need and directing them to appropriate medical and mental health services. Although mental health and substance abuse treatment represent needs for many in this population, the present investigation also suggests a need for general medical services, arguing for further integration of care between behavioral and general medical systems of care. Perhaps the advent and expansion of services targeting the justice-involved veteran will help mitigate the risk of death faced by released veterans and serve as a broader model for the nation in terms of the potential benefits derived from sealing the gaps between correctional and community systems of care. Further research is warranted to explore this supposition.

## Conclusions

In this study, we determined that released veterans faced a higher crude death rate from all causes than nonveteran released inmates and that this excess in veteran deaths was largely driven by medical deaths, in particular deaths due to cancer and cardiovascular disease. However, veteran status did not prove to be a risk factor for death when corrections were made for other key sociodemographic variables. Veterans appear to share in the heightened risk of death due to injury by self or others (such as suicide) that has been established for the general released inmate population. Having benefits from the VA seems to offer some degree of protection, particularly in medical deaths.

Such findings lend support to recently expanded VA programming aimed at identifying justice-involved veterans and directing them toward appropriate medical and mental health resources. Additional research is warranted for a more precise characterization of the medical and neuropsychiatric status of the justice-involved veteran population, to support program development specifically tailored to this at-risk population's needs.

## Acknowledgments

The authors thank the Washington State Department of Corrections and Dr. Marc Stern for their vital collaboration and contributions to this study.

## References

1. Noonan M: Veterans in state and federal prison. 2004. Available at <http://bjs.ojp.usdoj.gov/index.cfm?ty=pbdetail&iid=808>. Accessed June 27, 2012
2. Mumola C: Bureau of Justice Statistics Special Report: Veterans in prison or jail. Washington, DC: U.S. Department of Justice, 2000
3. Merrall EL, Kariminia A, Binswanger IA, *et al*: Meta-analysis of drug-related deaths soon after release from prison. *Addiction* 105: 1545–54, 2010
4. Binswanger IA, Stern MF, Deyo RA, *et al*: Release from prison: a high risk of death for former inmates. *N Engl J Med* 356:157–65, 2007
5. Pratt D, Piper M, Appleby L, *et al*: Suicide in recently released prisoners: a population-based cohort study. *Lancet* 368:119–23, 2006
6. Pritchard C, Cox M, Dawson A: Suicide and 'violent' death in a six-year cohort of male probationers compared with pattern of mortality in the general population: evidence of accumulative socio-psychiatric vulnerability. *J R Soc Health* 117:180–5, 1997
7. Rosen DL, Schoenbach VJ, Wohl DA: All-cause and cause-specific mortality among men released from state prison, 1980–2005. *Am J Public Health* 98:2278–84, 2008
8. Information and recommendations for services provided by VHA facilities to veterans in the criminal justice system. April 30, 2009. Available at [http://www1.va.gov/vhapublications/ViewPublication.asp?pub\\_ID=1762](http://www1.va.gov/vhapublications/ViewPublication.asp?pub_ID=1762). Accessed June 27, 2012
9. Cox DR: Regression models and life tables. *J R Stat Soc* 1972; B34:187–220
10. Allison PD: *Survival Analysis Using the SAS System: A Practical Guide*. Cary, NC: SAS Institute; 1995
11. Lin D, Wei LJ, Ying Z: Checking the Cox model with cumulative sums of Martingale-based residuals. *Biometrika* 70:557–72, 1993
12. Lin DY, Wei LJ: The robust inference for the proportional hazards model. *J Am Stat Assoc* 84:1074–8, 1989
13. Wortzel HS, Binswanger IA, Anderson CA, *et al*: Suicide among incarcerated veterans. *J Am Acad Psychiatry Law* 37: 82–91, 2009
14. Levine PH, Young HA, Simmens SJ, *et al*: Is testicular cancer related to Gulf War deployment?—evidence from a pilot population-based study of Gulf War era veterans and cancer registries. *Mil Med* 170:149–53, 2005

### Risk of Death for Veterans on Release From Prison

15. Young HA, Maillard JD, Levine PH, *et al*: Investigating the risk of cancer in 1990–1991 US Gulf War veterans with the use of state cancer registry data. *Ann Epidemiol* 20:265–72, 2010
16. Johnson AM, Rose KM, Elder GH Jr, *et al*: Military combat and burden of subclinical atherosclerosis in middle aged men: the ARIC study. *Prev Med* 50:277–81, 2010
17. Johnson AM, Rose KM, Elder GH Jr, *et al*: Military combat and risk of coronary heart disease and ischemic stroke in aging men: the atherosclerosis risk in communities (ARIC) study. *Ann Epidemiol* 20:143–50, 2010
18. Fan AZ, Strine TW, Jiles R, *et al*: Depression and anxiety associated with cardiovascular disease among persons aged 45 years and older in 38 states of the United States, 2006. *Prev Med* 46:445–50, 2008
19. Ford DE, Mead LA, Chang PP, *et al*: Depression is a risk factor for coronary artery disease in men: the precursors study. *Arch Intern Med* 158:1422–6, 1998
20. Frasure-Smith N, Lesperance F: Depression and anxiety as predictors of 2-year cardiac events in patients with stable coronary artery disease. *Arch Gen Psychiatry* 65:62–71, 2008
21. Scherrer JF, Chrusciel T, Zeringue A, *et al*: Anxiety disorders increase risk for incident myocardial infarction in depressed and nondepressed Veterans Administration patients. *Am Heart J* 159:772–9, 2010
22. Webb RT, Qin P, Stevens H, *et al*: National study of suicide in all people with a criminal justice history. *Arch Gen Psychiatry* 68:591–9, 2011 ses rate?