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Original Contribution

High-risk emergency department visits and risk of all-cause mortality, suicide, and fatal overdose among US military veterans

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Abstract

Deaths due to overdose and suicide together comprise an urgent public health challenge. Using Veterans Health Administration (VHA) electronic health records, we identified patients with high-risk emergency department (ED) visits related to suicidality or overdose between January 2010 and September 2019 using diagnostic codes from the *International Classification of Diseases*. We calculated standardized mortality ratios (SMR) for 90-day all-cause and cause-specific mortality associated with high-risk VHA ED visits compared with other VHA ED users, all VHA users, and the US general population. Among 20 382 060 ED visits from 3 705 984 unique Veterans, we identified 318 950 high-risk ED visits. The 90-day all-cause mortality rate among Veterans with high-risk ED visits was 2.81 times the expected rate (95% CI, 2.72-2.92) for other VHA ED users after adjusting for sex, race, and age. Rates remained elevated compared to all VHA users and the US general population. By race, mortality rates were markedly elevated among veterans identified as Asian or Pacific Islander (SMR = 3.50, 95% CI, 2.86-4.24) compared to other VHA ED users. The 90-day cause-specific SMRs were most pronounced for suicide, overdose, and accidents or unintentional self-harm. These results suggest that high-risk ED visits should trigger assertive, continued mental health care directed at reducing acute mortality through structured suicide prevention programs.

Key words: emergency department; veterans; suicide; overdose.

Introduction

Deaths due to overdose and suicide together comprise an urgent public health challenge in the United States with significant individual, societal, and economic costs associated.[1-3] Suicidal behaviors and substance use disorder often co-occur.[4,5] Opioid use disorder (OUD) exhibits a particularly strong association with suicidality.[6,7] There is increasing recognition that some opioid overdose deaths classified as unintentional may have a suicidal component,[8,9] prompting some scholars to argue that fatalities related to overdose should also be coded as suicides to better capture the burden of self-injury mortality.[10] Indeed, people who use opioids are 14 times more likely to die by suicide compared to the general population,[11,12] and individuals with OUD who survive an opioid overdose remain at significantly elevated risk for repeat, fatal opioid overdose[13] and completed suicide[14,15] compared with the general population. Identifying possible points of intervention to avert these deaths constitutes a critical priority for health care and public health systems.

In the United States, military Veterans have emerged as a particularly high-risk population for both fatal overdose and suicide.[16,17] Post-traumatic stress disorder (PTSD), which is highly prevalent among Veterans, is associated with suicide mortality risk particularly when symptoms are severe.[18,19] Historically high rates of opioid analgesic use for chronic pain and service-related injuries for Veterans increases risk for fatal and nonfatal overdose,[20,21] and Veterans further exhibit high rates of comorbid mental health disorders including suicidality.[22-24] Prior research also finds that opioid risk behavior—as measured using a validated scale that captures adherence, alternate administrations, solitary use, nonprescribed use, and concurrent use—is increased among Veterans experiencing suicidal ideation and depression.[25] Recent cross-sectional evidence further suggests that Veterans who screen positive for suicidality in the emergency department (ED) setting are at higher risk for subsequent suicide than those screened in ambulatory settings.[26] Although the Veterans Health Administration (VHA) has strengthened its mental health services since 2004, including specific programs for suicide prevention,[27] suicide rates within the VHA have not fallen.[28] As prior research suggests that brief behavioral interventions and follow-up contact following ED can significantly reduce the risk of subsequent completed suicide,[29] an understanding of the risk of death following ED visits related to suicidality and overdose among VHA users is essential.

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The present study builds on prior literature that demonstrates a clear relationship between suicidality and overdose, unique vulnerability among Veterans, and particularly those seeking treatment in emergency department settings. We examine the rates of all-cause and cause-specific mortality among US Military Veterans presenting to a VHA ED with a "high-risk" visit related to suicidal ideation, nonfatal intentional self-harm, or overdose. To better quantify mortality risk associated with these high-risk ED visits, our analysis leverages 3 distinct comparator groups: (1) other VHA ED visits not deemed to be high risk; (2) all VHA users; and (3) members of the US general population. If ED visits by high-risk patients are associated with near-term mortality risk, these visits may represent an essential opportunity for intensive within-encounter and postdischarge interventions.

Methods

Veteran data was extracted from the VHA Corporate Data Warehouse (CDW), which contains information on patient encounters (including ED visits), patient demographics, and unique identifier. We identified all patients who received care at a VHA ED who presented for a high-risk visit related to suicidality (ideation or attempted suicide) or overdose between January 2010 and September 2019 who did not die the day of their visit. High-risk visits were identified using diagnostic codes from the *International Classification of Diseases Ninth Revision* (ICD-9) and *Tenth Revision* (ICD-10) (Table S1). Covariates derived from the VHA CDW included age, sex (male, female, unknown), and race (American Indian or Alaska Native, Asian, Black, White).[30] Veterans of Hispanic and non-Hispanic origin were included in each racial category. We excluded Veterans of other, unknown, or missing race, and our analysis was further restricted to ages 20-99 years.

The primary outcome of interest was all-cause mortality within 90 days of a high-risk ED visit, which was ascertained via the CDC National Death Index Plus. As a secondary outcome, we examined cause-specific mortality within 90 days of a high-risk ED visit for the top ten causes of death classified based on diagnostic codes from the ICD-10 code as follows: diseases of the heart, malignant neoplasms, drug overdose, intentional self-harm (suicide), accidents and unintentional injuries, chronic lower respiratory diseases, diabetes mellitus, chronic liver disease and cirrhosis, cerebrovascular diseases, nephritis, nephrotic syndrome, and nephrosis (Table S2).

Statistical analysis

We calculated standardized mortality ratios (SMRs) for 90-day all-cause mortality associated with high-risk ED visits. The SMR contrasts the number of observed deaths among Veterans with a high-risk ED visit to the number of deaths that would be expected if Veterans with a high-risk ED visit had the same risk of death as the referent population. For our analysis, we specified 3 referent populations: (1) other VHA ED visits not deemed to be high risk; (2) all VHA users; and (3) members of the US general population. We anticipate that of the referent populations included, Veterans with VHA ED visits not deemed to be high-risk during the study period may also experience increased all-cause and cause-specific mortality risk and therefore represent the closest comparator group to Veterans with high-risk ED visits. We additionally include analysis that specify all VHA users and members of the US general population to further characterize the magnitude of all-cause and cause-specific mortality risk associated with high-risk ED visits among US Veterans. Data for each referent population were derived for the same time period as high-risk VHA users (2010-2019) and restricted to the same strata of age, sex, and race represented by Veterans with a high-risk ED visit during this period.

The expected mortality rate was calculated for each referent population within strata defined by sex, 5-year age group, and race. For all estimated SMRs, we calculated the 95% Cis using the Byar approximation.[31] For the US general population, we obtained age-, sex-, and race-specific mortality rates among the US general population over the period of interest from the CDC Wide-ranging Online Data for Epidemiology Research (WONDER) data portal. Because CDC WONDER data are a census of deaths in the US population, they include individuals receiving care through the VHA. CDC WONDER are expressed in person-years; and therefore to obtain the expected number of deaths in the VHA high-risk population (within 90 days of an ED visit), we scaled the mortality rates by 90 per 365.25 to be consistent with analyses for the other 2 referent populations and to match the person-time at risk.

We conducted the following secondary analyses. First, to examine heterogeneity within key population subgroups, we estimated SMRs for all-cause mortality associated with high-risk ED visits within strata defined by race. Second, we examined the rates of cause-specific mortality associated with high-risk VHA ED visits for the top 10 causes of death. Finally, we examined secular trends over the study period by estimating the SMR for all-cause mortality associated with high-risk VHA ED visits for each calendar year of follow-up. In a sensitivity analysis, we restricted our analytic sample to the first ED visit when Veterans had multiple ED times within 90 days. All analyses were conducted using R Statistical Software Version 4.3.2 (R Foundation for Computing, Vienna, Austria).

Results

Among 20 382 060 ED visits from 3 705 984 unique Veterans, we identified 318 950 high-risk VHA ED visits related to suicidality or overdose among 179 917 unique Veterans. We excluded 138 Veterans with unknown age or age ≥100 years (0.1%), 8550 Veterans missing race (4.8%), and 26 Veterans who died on the day of their last visit (0.01%). This yielded a final study population of 171 341 unique Veterans with 3 705 097 VHA ED visits. The majority (89.1%) of Veterans were male, and approximately half were between the ages of 50-59 years (24.9%) or 60-69 years (23.6%). The study population was predominantly White (67.7%) or Black (25.0%), with the minority of the study population comprising Veterans who self-identified Asian (1.5%) and American Indian or Alaska Native (1.1%) (Table 1). Over 2% ($n = 4155$) of patients with a high-risk VHA ED visit died within 90 days.

The 90-day all-cause mortality rate associated with high-risk VHA ED visits was nearly 3 times the expected rate as compared to other VHA ED users (SMR = 2.81, 95% CI, 2.72-2.92) after adjusting for sex, race, and age. The 90-day all-cause mortality associated with high-risk VHA ED visits was more than 4 times the expected rate compared to all VHA users (SMR = 4.15, 95% CI, 4.01-4.29) and the US general population (SMR = 4.42, 95% CI, 4.27-4.57) (Figure 1, Table S3). The estimated SMRs were highest for Veterans identified as Asian or Pacific Islander regardless of the referent population (other VHA ED users: SMR = 3.50, 95% CI, 2.86-4.24; all VHA users: SMR = 7.16, 95% CI, 4.93-10.1; US general population: SMR = 10.6, 95% CI, 7.26-14.8) and Veterans identified as White (other VHA ED users: SMR = 3.11, 95% CI, 3.04-3.17; all VHA users: SMR = 4.91, 95% CI, 4.72-5.10; US general population: SMR = 5.60, 95% CI, 5.39-5.82). By contrast, results were attenuated for Veterans identified as Black or African American other VHA ED users

Table 1. Characteristics of veterans with a high-risk VHA emergency department visit.

Total, N (%)	179 917 (100.0)
Age, N (%)	
20-29 years	15 821 (8.8)
30-39 years	30 126 (16.7)
40-49 years	25 962 (14.4)
50-59 years	44 737 (24.9)
60-69 years	42 439 (23.6)
70-79 years	13 825 (7.7)
80-99 years	6869 (3.8)
Unknown or 100 or more	138 (0.1)
Sex, N (%)	
Male	160 304 (89.1)
Female	19 613 (10.9)
Unknown	0 (0)
Race, N (%)[a]	
American Indian or Alaska Native	1943 (1.1)
Asian	2713 (1.5)
Black	45 016 (25.0)
White	121 821 (67.7)
Other, unknown, or missing	8424 (4.7)

[a]Race was self-reported. Other, unknown, or missing race was excluded from the analysis. Each racial category includes those of both Hispanic and non-Hispanic origin.

(SMR = 1.95, 95% CI, 1.86-2.04) and all VHA users (SMR = 2.36, 95% CI, 2.17-2.57; US General Population: SMR = 2.16, 95% CI, 1.99-2.35) (Figure 1, Table S3).

We observed increased cause-specific mortality rates associated with high-risk VHA visits for all top 10 causes of death regardless of the comparator groups. As compared to other VHA ED users, the estimates SMRs ranged from 1.33 for malignant neoplasms (95% CI, 1.23-1.43) to 20.9 for intentional self-harm (95% CI, 18.8-23.1) after accounting for sex, age, and race. The 90-day mortality rate for intentional self-harm remained markedly elevated as compared to the expected rates for all VHA users (SMR = 17.6, 95% CI, 15.8-19.4) and the US general population (SMR = 23.1, 95% CI, 20.8-25.5). We further observed markedly elevated rates of cause-specific mortality attributed to overdose (other VHA ED users: SMR = 12.3, 95% CI, 11.3-13.4; all VHA users: SMR = 18.9, 95% CI, 17.4-20.5; US general population: SMR = 22.4, 95% CI, 20.6-24.3) and accidents or unintentional injuries (other VHA users: SMR = 6.05, 95% CI, 5.29-6.90; all VHA users: SMR = 5.78, 95% CI, 5.05-6.58; US General Population: SMR = 6.18, 95% CI, 5.40-7.05) accounting for sex, age, and race (Figure 2, Table S4).

In our analysis of secular trends, the estimated SMR for all-cause mortality remained relatively stable from year to year throughout the study period regardless of the referent population (Figure 3, Table S5). Our results remain qualitatively similar when restricting our analytic sample to just the first ED visit (Figure S1).

Discussion

This study examines the all-cause and cause-specific mortality rates associated with a high-risk ED visit related to suicidality or overdose among US Military Veterans between 2010 and 2019. Regardless of the comparator population, we observed increased rates of all-cause mortality associated with high-risk ED visits. This finding was most pronounced increase in all-cause mortality rates among Veterans identified as Asian or Pacific Islanders. We further find extraordinarily elevated rates of cause-specific mortality related to suicide, overdose, and accidents or unintentional self-harm compared to other VHA ED users, all VHA users, and the US general population. Collectively, these findings underscore the vulnerability of Veterans who present to the VHA ED.

Our results are supported by a strong theoretical framework that suggests shared risk factors underlie vulnerability to fatal overdose and suicide. In 2017, the age-adjusted mortality rates for both suicide and unintentional overdose in the United States were higher among men than women, among people who identified as

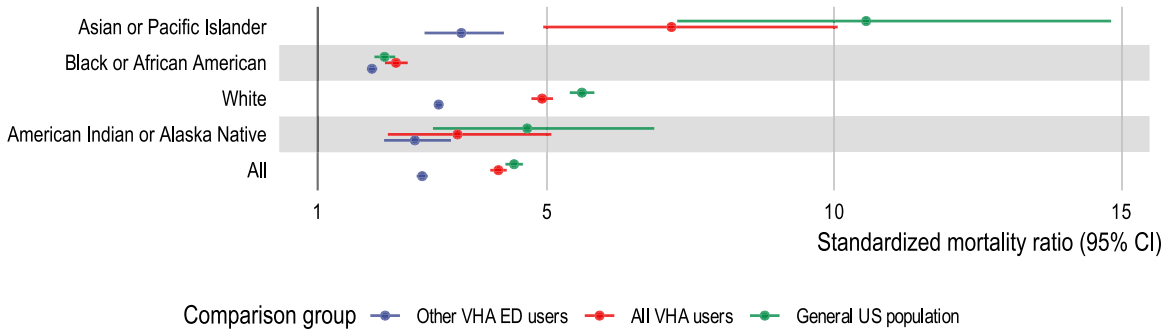

Figure 1. Standardized mortality ratio (SMR) for all-cause mortality among veterans with a high-risk ED visit compared to other VHA users and compared to members of the US general population overall and by race and ethnicity.

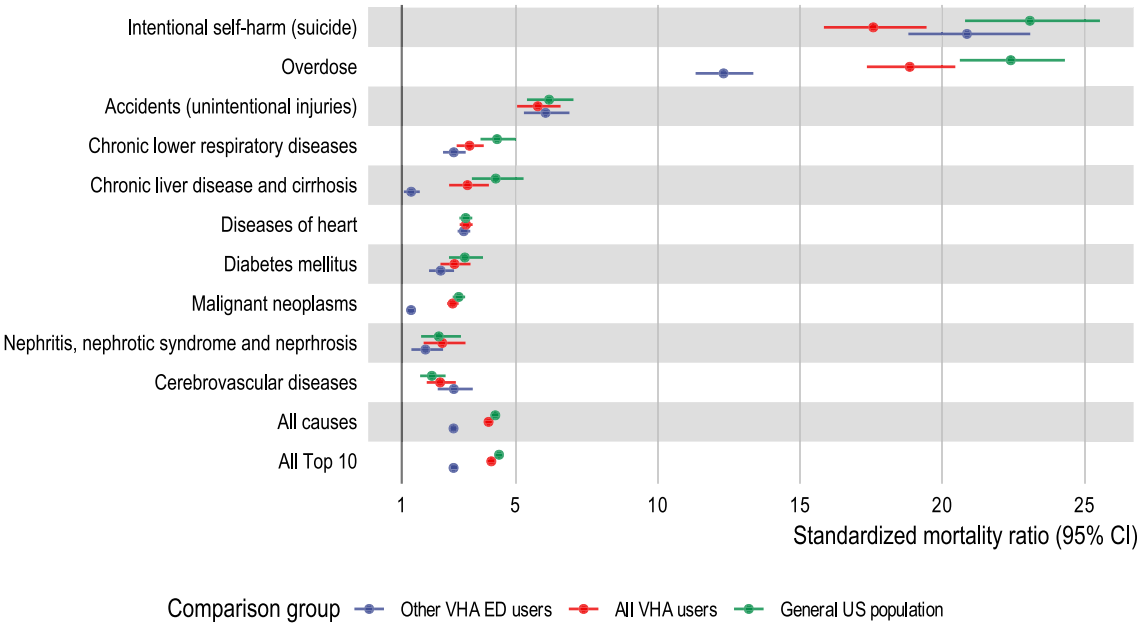

Figure 2. Standardized mortality ratio (SMR) for all-cause and cause-specific mortality among veterans with a high-risk ED visit compared to other VHA users and to members of the US general population.

non-Hispanic White or Native American, and among those from ages 41-64 years.[32] Social and economic disadvantage—including housing and employment instability—are also highly prevalent among individuals with OUD and suicidal behavior.[33,34] Comorbid mental illnesses including substance use disorders constitute a clear shared risk factor.[35,36] There is also a strong theoretical framework that underlies chronic pain as an important driver of both suicide and unintentional overdose,[37-39] as pain alters neurocircuitry related to reward, resulting in vulnerability to suicide and potentially riskier use of illicit and prescription substances including opioids.[40] Increasing rates of suicide and fatal overdose have occurred at least partly in the context of secular trends towards increases in average prescribing of opioids in the United States[41] and declining in economic opportunities for working class Americans.[42]

Our findings are further consistent with recent research further that suggests increased mortality risk is associated with suicidality and nonfatal overdose in non-Veteran study populations. For example, Goldman-Mellor et al found that among 648 646 persons who visited an ED in California from 2009-2011, the rates of suicide deaths were markedly elevated among those who initially presented with deliberate self-harm or suicidal ideation as compared with population-matched controls.[43] Rates of death due to unintentional overdose, suicide, and other causes were similarly elevated in this study population following an ED visit for nonfatal overdose.[44,45] Similarly, among 76 325 Medicaid beneficiaries followed from 2001-2007, the rate of death from all causes in the year after nonfatal opioid overdose was approximately 24 times the rate of death in the general population with markedly increased rates of cause-specific mortality attributed to drug use-associated diseases and suicide among females.[15] Results of this study are further in keeping with a prior case-cohort study of 2601 Veterans who died by suicide between 2004 and 2005 by Ilgen et al, which identified increased dose of opioids as a marker of increased suicide risk after accounting for demographic and clinical factors.[46]

In recent years, the VHA has endeavored to strengthen its mental health services, with a specific emphasis on programs for

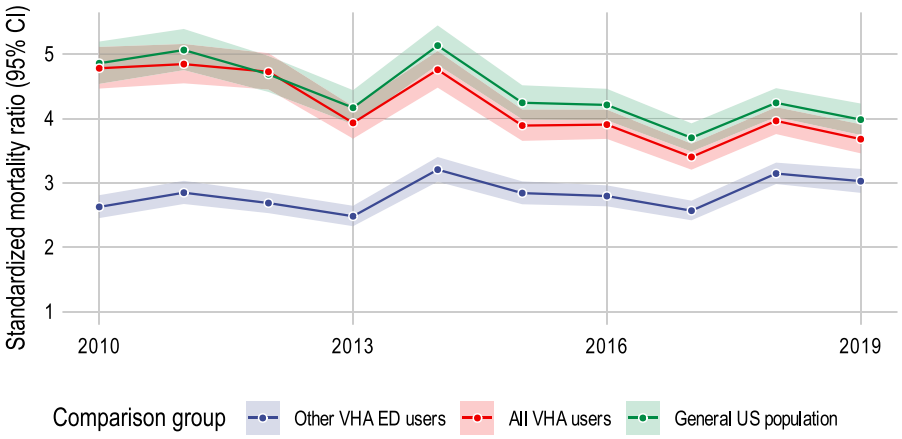

Figure 3. Standardized mortality ratios (SMRs) for all-cause mortality associated with high-risk emergency department visits among US veterans, January 1, 2009, to September 31, 2019.

suicide prevention. As a response to early recognition of mental health problems facing Veterans returning from Iraq and Afghanistan, the VA introduced its 2004 Mental Health Strategic Plan.[42] This strategic plan led to increases in core mental health personnel on a national level, dedicated funds for suicide prevention coordinators with support staff, and established a national office for suicide prevention including a dedicated veteran's call center affiliated with the Veterans Crisis Line. The VHA also introduced required screening for mental health conditions at least annually in all patients, with follow-up evaluation and safety planning for Veterans deemed to be high risk for suicide. In 2018, VHA implemented the VA Suicide Risk Identification Strategy in 2018 (Risk ID), an evidence-informed 3-stage suicide risk screening and evaluation to identify at-risk Veterans earlier.[26,47] Despite concerted efforts, the number of Veteran suicides increased on average by 47 deaths per year from 2001 through 2018. More recently, adjusted rates of suicide among Veterans fell by 9.7% from 2018-2020 compared with 5.5% in the US general population.[48] Ours and prior studies strongly suggest that—in concert with efforts aimed at better upstream identification of patients at risk for suicide—high-risk ED visits should trigger assertive, continued mental health care directed at reducing acute mortality through structured suicide prevention programs.[9,43,49]

By race, we identify the strongest association of high-risk VHA ED visits with all-cause mortality among Veterans identified as Asian or Pacific Islander. These results are in keeping with recent research that suggests suicide rates among Asian American, Native Hawaiian and Pacific Islander (AANHPI) Veterans increased by 36.85% from 2005-2009 to 2015-2019.[50] According to the 2023 National Veteran Suicide Prevention Annual Report, the annualized rate of suicide among AANHPI Veterans was 31.6 per 100 000 in 2021, and recent VHA communication and outreach efforts have focused on suicide prevention among veteran subpopulations deemed to be high risk including Asian American Pacific Islander Veterans.[51] Although our analysis does not interrogate the specific mechanisms that underlie this finding, differences social class, norms around mental illness, material resources, access to mental health care, and clinician bias may all contribute to differential mortality rates associated with high-risk ED visits we observe by race and ethnicity in this study. Future research that specifically considers the severity of symptoms upon presentation to the emergency department and patient's attitudes towards mental illness and treatment seeking propensity may help to inform our understanding of subgroup differences such as these.

Limitations

Generalizability of our study is limited by our focus on the VHA. Veterans differ meaningfully from the general population in terms of their risk for general medical comorbidities,[52] as well as psychiatric comorbidities including depression, PTSD, suicidality, and substance use disorders.[16-18,53] Generalizability is further limited by the fact that VHA ED settings likely differ from that of the community ED. We further note that as of 2019, many Veterans access ED care within the community through the MISSION Act.[54] As our follow-up extends through 2019, our analysis includes only VHA ED visits and not community ED visits. This may further limit generalizability of our findings to present-day veteran populations. Despite this, we note that our results are consistent with prior statewide and national analyses that suggest increased mortality risk following ED visits related to suicidality and overdose, underscoring the importance of potential interventions for these patients.

Although we were able to fully enumerate all high-risk VHA ED visits, we are unable to account for high-risk ED visits that occurred outside of the VHA healthcare system. There is potential for bias due to residual confounding, as there are likely differences between persons with high-risk ED visits and our referent populations other than sex, age, and race. Outcome misclassification may have arisen if cause of death was misclassified based on recorded ICD codes. If deaths in persons with a known history of ED visits related to suicidality or nonfatal overdose were more likely to be erroneously coded with an underlying cause of intentional self-harm or overdose, this would result in overestimation of mortality rates for these causes of death. Our analysis examines mortality rates by race, which may also be misclassified when derived from the VHA CDW vs self-report. Prior studies suggest that race derived from the VHA CDW has good overall agreement with self-reported race (Kappa = 0.86), especially for White and Black Veterans; however, lower accuracy was observed among American Indian or Alaska Native Veterans.[30] We do not anticipate misclassification would be differential with respect to mortality risk or cause of death.

Finally, our analysis is focused on all-cause and cause-specific mortality following high-risk ED visits but does not consider other vulnerable patient populations such as persons recently discharged from psychiatric hospitalizations. As recent research demonstrates increased risk of suicide after psychiatric hospital discharge,[55-58] ongoing research that examines potential avenues of intervention focused on the postdischarge period for patients who are evaluated in the ED and those who are admitted to the hospital may be particularly important.

Conclusions

We examine the implications of high-risk ED visits for subsequent all-cause and cause-specific mortality among US military Veterans. We find extraordinarily elevated rates of 90-day all-cause mortality and cause-specific mortality related to intentional self-harm and overdose compared with other Veterans and compared with members of the US general population of the same age, sex, and race. Ours and prior studies strongly suggest that high-risk ED visits should trigger assertive, continued mental health care directed at reducing acute mortality through structured suicide prevention programs.

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Supplementary material

Supplementary material is available at the *American Journal of Epidemiology* online.

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Conflict of interest

The authors declare no conflicts of interest.

Data availability

The data used in this study are from the Veterans Health Administration (VHA) and are not publicly available due to restrictions on the use of confidential patient information. Access to the data requires approval from the Department of Veterans Affairs. Researchers interested in accessing VHA data may submit a formal request to the Veterans Affairs office of Research and Development.

References

1. Peterson C. Economic cost of injury—United States, 2019. *MMWR Morb Mortal Wkly Rep*. 2021;70(48):1655-1659. https://doi.org/10.1016/10.15585/mmwr.mm7048a1
2. Luo F, Li M, Florence C. State-level economic costs of opioid use disorder and fatal opioid overdose—United States, 2017. *MMWR Morb Mortal Wkly Rep*. 2021;70(15):541-546. https://doi.org/10.15585/mmwr.mm7015a1
3. Florence C, Luo F, Rice K. The economic burden of opioid use disorder and fatal opioid overdose in the United States, 2017. *Drug Alcohol Depend*. 2021;218:108350. https://doi.org/10.1016/j.drugalcdep.2020.108350
4. Bohnert KM, Ilgen MA, Louzon S, et al. Substance use disorders and the risk of suicide mortality among men and women in the US veterans health administration. *Addiction*. 2017;112(7):1193-1201. https://doi.org/10.1111/add.13774
5. Bommersbach TJ, Rosenheck RA, Rhee TG. National trends of mental health care among US adults who attempted suicide in the past 12 months. *JAMA Psychiatry*. 2022;79(3):219-231. https://doi.org/10.1001/jamapsychiatry.2021.3958
6. Bohnert AS, Ilgen MA. Understanding links among opioid use, overdose, and suicide. *N Engl J Med*. 2019;380(1):71-79. https://doi.org/10.1056/NEJMra1802148
7. Na PJ, Bommersbach TJ, Petrakis IL, et al. National trends of suicidal ideation and mental health services use among US adults with opioid use disorder, 2009–2020. *EClinicalMedicine*. 2022;54:101696. https://doi.org/10.1016/j.eclinm.2022.101696
8. Connery HS, Weiss RD, Griffin ML, et al. Suicidal motivations among opioid overdose survivors: replication and extension. *Drug Alcohol Depend*. 2022;235:109437. https://doi.org/10.1016/j.drugalcdep.2022.109437
9. Oquendo MA, Volkow ND. Suicide: a silent contributor to opioid-overdose deaths. *N Engl J Med*. 2018;378(17):1567-1569. https://doi.org/10.1056/NEJMp1801417
10. Rockett IR, Caine ED, Connery HS, et al. Unrecognised self-injury mortality (SIM) trends among racial/ethnic minorities and women in the USA. *Inj Prev*. 2020;26(5):439-447. https://doi.org/10.1136/injuryprev-2019-043371
11. Wilcox HC, Conner KR, Caine ED. Association of alcohol and drug use disorders and completed suicide: an empirical review of cohort studies. *Drug Alcohol Depend*. 2004;76:S11-S19. https://doi.org/10.1016/j.drugalcdep.2004.08.003
12. Harris EC, Barraclough B. Suicide as an outcome for mental disorders. A meta-analysis. *Br J Psychiatry*. 1997;170(3):205-228. https://doi.org/10.1192/bjp.170.3.205
13. Olfson M, Wall M, Wang S, et al. Risks of fatal opioid overdose during the first year following nonfatal overdose. *Drug Alcohol Depend*. 2018;190:112-119. https://doi.org/10.1016/j.drugalcdep.2018.06.004
14. Bogdanowicz KM, Stewart R, Chang C-K, et al. Identifying mortality risks in patients with opioid use disorder using brief screening assessment: secondary mental health clinical records analysis. *Drug Alcohol Depend*. 2016;164:82-88. https://doi.org/10.1016/j.drugalcdep.2016.04.036
15. Olfson M, Crystal S, Wall M, et al. Causes of death after nonfatal opioid overdose. *JAMA Psychiatry*. 2018;75(8):820-827. https://doi.org/10.1001/jamapsychiatry.2018.1471
16. Bennett AS, Elliott L, Golub A, et al. Opioid-involved overdose among male Afghanistan/Iraq-era US military veterans: a multidimensional perspective. *Subst Use Misuse*. 2017;52(13):1701-1711. https://doi.org/10.1080/10826084.2017.1306563
17. Wilder CM, Miller SC, Tiffany E, et al. Risk factors for opioid overdose and awareness of overdose risk among veterans prescribed chronic opioids for addiction or pain. *J Addict Dis*. 2016;35(1):42-51. https://doi.org/10.1080/10550887.2016.1107264
18. Forehand JA, Dufort V, Gradus JL, et al. Association between post-traumatic stress disorder severity and death by suicide in US military veterans: retrospective cohort study. *Br J Psychiatry*. 2022;221(5):676-682. https://doi.org/10.1192/bjp.2022.110
19. Forehand JA, Peltzman T, Westgate CL, et al. Causes of excess mortality in veterans treated for posttraumatic stress disorder. *Am J Prev Med*. 2019;57(2):145-152. https://doi.org/10.1016/j.amepre.2019.03.014
20. Gellad WF, Good CB, Shulkin DJ. Addressing the opioid epidemic in the United States: lessons from the Department of Veterans Affairs. *JAMA Intern Med*. 2017;177(5):611-612. https://doi.org/10.1001/jamainternmed.2017.0147
21. Sandbrink F, Oliva EM, McMullen TL, et al. Opioid prescribing and opioid risk mitigation strategies in the veterans health administration. *J Gen Intern Med*. 2020;35(S3):927-934. https://doi.org/10.1007/s11606-020-06258-3
22. Maynard C, Batten A, Liu C-F, et al. The burden of mental illness among veterans: use of VHA health care services by those with service-connected conditions. *Med Care*. 2017;55(11):965-969. https://doi.org/10.1097/MLR.0000000000000806
23. Zeber JE, Copeland LA, Grazier KL. Serious mental illness, aging, and utilization patterns among veterans. *Mil Med*. 2006;171(7):619-626. https://doi.org/10.7205/MILMED.171.7.619
24. Ghose T, Gordon AJ, Metraux S, et al. Mental illness and homelessness among veterans. *Psychiatr Serv*. 2011;62(12):1514-1515. https://doi.org/10.1176/appi.ps.002942011
25. Cleland CM, Bennett AS, Elliott L, et al. Between-and within-person associations between opioid overdose risk and depression, suicidal ideation, pain severity, and pain interference. *Drug Alcohol Depend*. 2020;206:107734. https://doi.org/10.1016/j.drugalcdep.2019.107734
26. Bahraini N, Brenner LA, Barry C, et al. Assessment of rates of suicide risk screening and prevalence of positive screening results among US veterans after implementation of the veterans affairs suicide risk identification strategy. *JAMA Netw Open*. 2020;3(10):e2022531-e2022531. https://doi.org/10.1001/jamanetworkopen.2020.22531
27. Katz I. Lessons learned from mental health enhancement and suicide prevention activities in the veterans health administration. *Am J Public Health*. 2012;102(S1):S14-S16. https://doi.org/10.2105/AJPH.2011.300582
28. Kemp JE. *Suicide rates in VHA patients through 2011 with comparisons with other Americans and other veterans through 2010*. Veterans Health Administration Washington, DC; 2014.
29. Fleischmann A, Bertolote JM, Wasserman D, et al. Effectiveness of brief intervention and contact for suicide attempters: a randomized controlled trial in five countries. *Bull World Health Organ*. 2008;86(9):703-709. https://doi.org/10.2471/BLT.07.046995

30. Peltzman T, Rice K, Jones KT, et al. Optimizing data on race and ethnicity for veterans affairs patients. *Mil Med*. 2022; 187(7-8):e955-e962. https://doi.org/10.1093/milmed/usac066
31. Curtin LR. *Direct standardization (age-adjusted death rates)*. US Department of Health and Human Services, Public Health Service, Centers; 1995.
32. Jones CM, McAninch JK. Emergency department visits and overdose deaths from combined use of opioids and benzodiazepines. *Am J Prev Med*. 2015;49(4):493-501. https://doi.org/10.1016/j.amepre.2015.03.040
33. Roy A. Risk factors for attempting suicide in heroin addicts. *Suicide Life Threat Behav*. 2010;40(4):416-420. https://doi.org/10.1521/suli.2010.40.4.416
34. Roy A. Characteristics of opiate dependent patients who attempt suicide. *J Clin Psychiatry*. 2002;63(5):403-407. https://doi.org/10.4088/JCP.v63n0505
35. Bohnert AS, Ilgen MA, Ignacio RV, et al. Risk of death from accidental overdose associated with psychiatric and substance use disorders. *Am J Psychiatry*. 2012;169(1):64-70. https://doi.org/10.1176/appi.ajp.2011.10101476
36. Bohnert AS, Roeder K, Ilgen MA. Unintentional overdose and suicide among substance users: a review of overlap and risk factors. *Drug Alcohol Depend*. 2010;110(3):183-192. https://doi.org/10.1016/j.drugalcdep.2010.03.010
37. Bohnert AS, Valenstein M, Bair MJ, et al. Association between opioid prescribing patterns and opioid overdose-related deaths. *JAMA*. 2011;305(13):1315-1321. https://doi.org/10.1001/jama.2011.370
38. Hassett AL, Aquino JK, Ilgen MA. The risk of suicide mortality in chronic pain patients. *Curr Pain Headache Rep*. 2014;18(8):1-7. https://doi.org/10.1007/s11916-014-0436-1
39. Hooley JM, Franklin JC, Nock MK. Chronic pain and suicide: understanding the association. *Curr Pain Headache Rep*. 2014;18(8):1-6. https://doi.org/10.1007/s11916-014-0435-2
40. Racine M. Chronic pain and suicide risk: a comprehensive review. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018;87(Pt B): 269-280. https://doi.org/10.1016/j.pnpbp.2017.08.020
41. Paulozzi LJ, Weisler RH, Patkar AA. A national epidemic of unintentional prescription opioid overdose deaths: how physicians can help control it. *J Clin Psychiatry*. 2011;72(5):589-592. https://doi.org/10.4088/JCP.10com06560
42. Katz LF, Krueger AB. Documenting decline in US economic mobility. *Science*. 2017;356(6336):382-383. https://doi.org/10.1126/science.aan3264
43. Goldman-Mellor S, Olfson M, Lidon-Moyano C, et al. Association of suicide and other mortality with emergency department presentation. *JAMA Netw Open*. 2019;2(12):e1917571-e1917571. https://doi.org/10.1001/jamanetworkopen.2019.17571
44. Goldman-Mellor S, Olfson M, Lidon-Moyano C, et al. Mortality following nonfatal opioid and sedative/hypnotic drug overdose. *Am J Prev Med*. 2020;59(1):59-67. https://doi.org/10.1016/j.amepre.2020.02.012
45. Olfson M, Schoenbaum M, Goldman-Mellor S. Risks of mortality following nonfatal intentional and unintentional opioid overdoses. *JAMA Psychiatry*. 2020;77(11):1191-1193. https://doi.org/10.1001/jamapsychiatry.2020.1045
46. Ilgen MA, Bohnert AS, Ganoczy D, et al. Opioid dose and risk of suicide. *Pain*. 2016;157(5):1079-1084. https://doi.org/10.1097/j.pain.0000000000000484
47. US Department of Veterans Affairs. *Memorandum re: suicide risk screening and assessment requirements*. US Department of Veterans Affairs; Published 2018: Accessed.
48. Office of Mental Health and Suicide Prevention. *National Veteran Suicide Prevention Annual Report*. US Department of Veterans Affairs. Published 2022. Accessed August 15, 2024. https://www.mentalhealth.va.gov/docs/data-sheets/2022/2022-National-Veteran-Suicide-Prevention-Annual-Report-FINAL-508.pdf
49. Stanley B, Brown GK, Brenner LA, et al. Comparison of the safety planning intervention with follow-up vs usual care of suicidal patients treated in the emergency department. *JAMA Psychiatry*. 2018;75(9):894-900. https://doi.org/10.1001/jamapsychiatry.2018.1776
50. Monteith LL, Kittel JA, Schneider AL, et al. Suicide among Asian American, native Hawaiian, and Pacific islander veterans: rates and methods, 2005–2019. *Am J Prev Med*. 2024;66(2):243-251. https://doi.org/10.1016/j.amepre.2023.09.006
51. U.S. Department of Veterans Affairs. National Veteran Suicide Prevention Annual Report. Published 2023. Accessed December 15, 2024. https://department.va.gov/suicide-prevention-annual-report/
52. Boersma P, Cohen RA, Zelaya CE, et al. *Multiple chronic conditions among veterans and nonveterans: United States, 2015–2018*. 2021.
53. Liu Y, Collins C, Wang K, et al. The prevalence and trend of depression among veterans in the United States. *J Affect Disord*. 2019;245:724-727. https://doi.org/10.1016/j.jad.2018.11.031
54. Massarweh NN, Itani KM, Morris MS. The VA MISSION act and the future of veterans' access to quality health care. *JAMA*. 2020;324(4):343-344. https://doi.org/10.1001/jama.2020.4505
55. Forte A, Buscajoni A, Fiorillo A, et al. Suicidal risk following hospital discharge: a review. *Harv Rev Psychiatry*. 2019;27(4): 209-216. https://doi.org/10.1097/HRP.0000000000000222
56. Olfson M, Wall M, Wang S, et al. Short-term suicide risk after psychiatric hospital discharge. *JAMA Psychiatry*. 2016; 73(11):1119-1126. https://doi.org/10.1001/jamapsychiatry.2016.2035
57. Goldacre M, Seagroatt V, Hawton K. Suicide after discharge from psychiatric inpatient care. *Lancet*. 1993;342(8866):283-286. https://doi.org/10.1016/0140-6736(93)91822-4
58. O'Connell PH, Durns T, Kious BM. Risk of suicide after discharge from inpatient psychiatric care: a systematic review. *Int J Psychiatry Clin Pract*. 2021;25(4):356-366. https://doi.org/10.1080/13651501.2020.1800043

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