

# Ascertainment of Patient Suicides by Veterans Affairs Facilities and Associations With Veteran, Clinical, and Suicide Characteristics

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**Objectives.** To evaluate the sensitivity of health care facility documentation of suicide deaths among US veterans with recent Veterans Health Administration (VHA) care and assess variation in identification by veteran, clinical, and suicide death characteristics.

**Methods.** Cross-sectional analyses included 11 148 veterans who died by suicide in 2013 to 2017, per National Death Index death certificate information, with VHA encounters in the year of death or the previous year. Facility suicide ascertainment was assessed per site reports in the VHA Suicide Prevention Applications Network. Bivariate and multivariable analyses assessed ascertainment by decedent demographic, clinical, utilization, and method of suicide characteristics.

**Results.** Site reports identified 3667 suicide decedents (32.9%). Veteran suicide decedents identified by facilities were more likely to be younger and with clinical risk factors and more recent VHA encounters. Suicide deaths involving poisoning were less likely to be identified than deaths involving other methods.

**Conclusions.** VHA facility ascertainment of suicide deaths among recent patients was neither comprehensive nor representative. Findings will inform efforts to enhance facility suicide surveillance and veteran suicide prevention. (*Am J Public Health.* 2021;111(S2):S116–S125. <https://doi.org/10.2105/AJPH.2021.306262>)

Suicide is the 10th leading cause of death in the United States,<sup>1</sup> and the Department of Veterans Affairs (VA) has identified suicide prevention as its top clinical priority.<sup>2</sup> In 2017, the suicide rate among veterans was 50% greater than the rate among nonveteran adults.<sup>3</sup> Among veterans, the age-adjusted suicide rate was 18% higher among those seeking care in the VA health system—the Veterans Health Administration (VHA)—than among other veterans.<sup>3</sup> VHA is the largest integrated health care system in the United States and provides care to more than 6 million veterans each year at more than 1200 locations.<sup>2</sup>

To support veteran suicide prevention, VA has adopted a public health approach to suicide prevention that emphasizes enhanced risk identification, timely access, crisis supports, and ongoing surveillance.<sup>3–5</sup>

Health care providers have a responsibility to assess and recognize suicide risk in their patients,<sup>6</sup> and health systems have enhanced tools to support risk assessment.<sup>7–10</sup> Suicide surveillance, a key element of suicide prevention strategies,<sup>2,11–13</sup> is consistent with the population health focus of managed health systems,<sup>14</sup> which involves tracking patient well-being and adverse events

that commonly occur in community settings. It is understood that clinician assessments of suicide risk may be affected by patient and clinician characteristics<sup>15</sup>; however, little is known regarding health system ascertainment of suicide mortality in their patient populations,<sup>16</sup> nor how this may be affected by patient, clinical, or suicide event characteristics.

Suicide surveillance faces challenges that may affect health care facility ascertainment of patient suicide deaths. These include cause-of-death misclassification<sup>17</sup> and underreporting.<sup>18</sup> Accurate classification of intent to die may vary

depending on method of suicide<sup>18</sup>; for example, deaths involving hanging or firearms may be more easily identified as suicides than those involving poisoning and drowning.<sup>19,20</sup> Suicide identification may also differ in association with decedent sociodemographic characteristics, including age, sex, and race/ethnicity. Potential causes include differential method of suicide and completion of autopsies.<sup>19,21</sup> Stigma surrounding suicide could further affect accurate suicide ascertainment and reporting.<sup>19,22</sup>

Suicide and other mortality surveillance systems also face challenges related to lagged availability of comprehensive mortality data.<sup>11,23</sup> The gold standard of US mortality databases is the Centers for Disease Control and Prevention (CDC) National Death Index (NDI),<sup>24</sup> which compiles death certificate data from state vital statistics offices. NDI mortality data for a given calendar year can take an additional year to become available, and search and processing steps require additional time. Death certificate data for injury-related deaths such as suicide also take longer to become available than for other deaths.<sup>25</sup> Some communities and health systems have developed alternative approaches for more real-time mortality surveillance.<sup>16,26</sup> In addition to comprehensive annual NDI searches,<sup>27</sup> in 2008, VA established an infrastructure for facility-level veteran suicide reporting,<sup>28</sup> which makes data available for internal use months or years before nationwide death certificate information is available.

VHA facility-level suicide surveillance is led by suicide prevention coordinators (SPCs) based at VHA medical centers and very large community-based outpatient clinics. Responsibilities of SPCs include maintaining records of suicide deaths among VHA patients

and other veterans in the community.<sup>29</sup> Veteran suicide deaths are brought to the attention of SPCs by other veterans, family members of decedents, or established collaborations with local coroners and medical examiner offices.<sup>30</sup> From 2008 to mid-2019, SPCs and associated suicide prevention staff entered records of suicide-related events into a VHA system known as the Suicide Prevention Applications Network (SPAN).<sup>28,29</sup> Event records can be entered in SPAN at any time, and information is available to users upon entry, making site reports a timely and convenient alternative to the gold standard NDI mortality data. Information collected through SPAN are used for reports to local VHA leadership, root-cause analyses,<sup>23</sup> and behavioral health autopsy reports.<sup>30</sup> Assessments of SPAN reports regarding nonfatal suicide attempts and completion of root cause analyses regarding suicide deaths shortly following inpatient discharges indicate that VHA facility documentation of suicide-related events is incomplete.<sup>23,29</sup> To date, however, little is known regarding the overall sensitivity of facility documentation of veteran suicide deaths.

Since 2007, VHA has conducted national veteran suicide surveillance using NDI search results.<sup>4,27</sup> In 2012, VA established, in partnership with the Department of Defense, a joint Mortality Data Repository (MDR), which includes death certificate data from annual NDI searches inclusive of the all-veteran population. While comprehensive, MDR updates depend on the timing of annual NDI updates, and data commonly become available 1 to 2 years following completion of a given year. The MDR is a key component of national veteran suicide surveillance, supporting annual national VA reports regarding veteran suicide<sup>3</sup>

and reporting specific to veterans with recent VHA care. MDR data can also be used to evaluate facility identification of suicide deaths.

To support ongoing VA suicide prevention efforts, we examined the sensitivity and representativeness of local VHA facility suicide death ascertainment, using MDR-indicated suicide deaths as the gold standard, as well as how site ascertainment of suicides may be affected by patient characteristics, health system engagement, diagnoses associated with suicide risk, and method of suicide death. For example, we hypothesized that local VA suicide surveillance would under-capture veteran VHA user suicide deaths and would document a greater proportion of suicide deaths among suicide decedents who were younger, whose suicide death involved suffocation or firearms, and who had mental health-related and more recent VHA encounters before death, as compared with other veteran VHA user suicide decedents.

## METHODS

Using MDR records, we identified recent veteran VHA users who died from suicide, and we assessed whether these suicide deaths were identified in VHA facility suicide death reports, per SPAN.

### Study Population

The study population was composed of all recent veteran VHA users who died by suicide in 2013 to 2017 in the 50 US states or the District of Columbia ( $n = 11\,148$ ). Study members must have had at least 1 VHA inpatient or outpatient encounter in the year of their death or year before ("recent users"). Mortality information for the

underlying cohort of decedents was drawn from the MDR, which contains death certificate data obtained from annual NDI searches. Suicide as cause of death was categorized using *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10)*; Geneva, Switzerland: World Health Organization; 2011) codes as follows: X60–X84, Y87.0, and U03.

## Measures

The outcome of interest was facility documentation of the veteran's suicide death, as indicated per SPAN records. We identified SPAN indication of suicide mortality by records with a Self-Directed Violence Classification of "suicide" and outcome indicated as "death." We matched records in SPAN and the MDR based on Social Security Number. Matching criteria required the SPAN record's date of suicide death to be within 3 months of the MDR death certificate–indicated date of death.

We identified patient-level demographic, clinical, and health care utilization measures that could be associated with local suicide death ascertainment. We derived measures from the VHA National Patient Care Database, Corporate Data Warehouse, and Planning Systems Support Group Geocoded Enrollee Files. Demographic variables included sex, age (categorized as 18–34, 35–54, 55–74, or 75–115 years), race/ethnicity (White, Black, Hispanic, other, or unknown), marital status (married or unmarried), rurality of home address (urban or rural), and region of the country (Northeast, Midwest, South, or West, per US Census designations by state). We also examined characteristics of death, namely year of death and method of suicide, per MDR death

certificate information. We categorized method of suicide using *ICD-10* codes as follows: firearms (X72–X74), poisoning (X60–X69), suffocation (X70), and other (X71, X75–X84, Y87.0, U03).

We examined clinical characteristics of decedents in the 12 months before death. These included an overall measure of any mental health or substance use disorder (SUD) diagnosis, individual diagnostic categories for any SUD, anxiety, bipolar disorder, depression, post-traumatic stress disorder (PTSD), or schizophrenia,<sup>3</sup> as well as indications of homelessness, per *International Classification of Diseases, Ninth Revision, Clinical Modification* (Hyattsville, MD: National Center for Health Statistics; 1980) and *International Classification of Diseases, Tenth Revision, Clinical Modification* (Hyattsville, MD: National Center for Health Statistics; 2000) diagnosis codes (Table A, available as a supplement to the online version of this article at <http://www.ajph.org>). We considered at least 1 diagnosis code from a VHA encounter a positive indication. We assessed any documentation of a non-fatal suicide attempt per VHA encounter *ICD* diagnosis codes or event records in SPAN, as well as history of a clinical high risk for suicide flag and documentation of a suicide safety plan. We assessed the following attributes of VHA health care use before death: facility type (VHA medical center, community-based outpatient clinic, or other) and setting (inpatient mental health, inpatient non-mental health, emergency department, outpatient mental health, or outpatient non-mental health) of most recent VHA encounter. We also assessed completed screens for PTSD, depression, and alcohol use disorder in the 12 months before death and any missed VHA appointments in the 1 month before death.

## Statistical Analyses

Univariate analyses examined characteristics of recent veteran VHA user suicide decedents in 2013 to 2017. Bivariate analyses assessed differences among suicide decedents by whether their suicide death was identified by facilities and documented in SPAN. We calculated effect size for each level of a covariate by using relative risk for categorical variables and Cohen's *d* for continuous variables. We considered relative risk less than 0.5 or greater than 2.0 clinically significant, and we assessed small, medium, and large effects for Cohen's *d* as 0.2, 0.5, and 0.8, respectively. We assessed statistical significance for differences between facility-identified decedents and non-identified decedents by using the  $\chi^2$  test for categorical variables and *t* test or Wilcoxon rank sum test for continuous variables. Finally, to assess the association between suicide decedent characteristics and ascertainment, we used a multivariable logistic regression model with random intercepts for VHA administrative parent facilities ( $n = 140$ ; these designate VHA sites managed by a common administrative leadership team) to model the adjusted odds of facility suicide death identification that were associated with patient sociodemographic and clinical characteristics and method of suicide death, adjusting for other characteristics. We conducted analyses with SAS version 9.4 and SAS Enterprise Guide 8.2 (SAS Institute Inc, Cary, NC).

## RESULTS

We identified 11 148 recent veteran VHA users who died by suicide between January 1, 2013, and December 31, 2017, per death certificate

information in the MDR. Of those, we found suicide death records for 3667 decedents (32.9%) to have been documented by facilities in SPAN.

Table 1 presents univariate and bivariate descriptive statistics regarding recent veteran VHA user suicide decedents, overall and by facility identification. Veterans who died by suicide in 2013 to 2017 had an average age of 60.1 years and were primarily male (95.9%), White (80.8%), and residing in urban areas (64.2%). In the 12 months before death, 55.4% had a VHA-documented mental health or SUD diagnosis, 4.2% had a documented nonfatal suicide attempt, and 5.6% received a clinical flag for high suicide risk.

Bivariate analyses indicated that demographic, geographic, clinical, and mortality characteristics of recent veteran VHA user suicide decedents were associated with likelihood of the decedent's suicide death having been recorded by facilities. VHA facilities identified 41.9% of suicide deaths among recent veteran VHA users who were female and 32.5% among those who were male. Decedents identified by sites were younger than those who were not identified (mean age 53.6 vs 63.3 years). Among suicide decedents aged 18 to 34 years, sites identified suicide deaths of 52.1%. Among those aged 75 years or older, sites identified 17.5%. Decedents whose race/ethnicity was categorized as "other"—inclusive of Asian/Pacific Islander, American Indian/Native Alaskan, and multiple races—were more likely to be identified (45.7%) than other race/ethnicity groups (e.g., 31.7% among White decedents).

Site identification of suicide deaths was greatest among users in the West (39.4%) and lowest in the South (27.2%). Facility-identified suicide decedents resided nearer to VA facilities

(average distance 12.5 miles; SD = 21.9) than nonidentified suicide decedents (13.0 miles; SD = 19.7), and identification was greater for decedents living in urban areas (34.2%) compared with those in rural areas (31.5%).

Time since most recent VHA encounter was briefer among facility-identified suicide decedents (average 48.6 days; SD = 86.5) than among nonidentified suicide decedents (103.5 days; SD = 129.0). Patients whose last VHA encounter occurred in inpatient settings and those whose last use occurred in an outpatient mental health setting were more likely to be identified as suicide decedents by facilities, compared with those seen in other settings. Facility-identified suicide decedents had received more VHA outpatient visit days (average 25.4 [SD = 28.0] vs 13.4 [SD = 19.3]) and more inpatient stays (average 0.55 [SD = 1.33] vs 0.24 [SD = 0.83]) in the 12 months before death.

We found significant crude associations between facility identification and each mental health and SUD diagnostic category examined. Veterans with any mental health or SUD diagnosis in the 12 months before death were 2.6 times as likely as those without a mental health or SUD diagnosis to have their death documented by facilities. Relative risks for facility identification associated with having a diagnosis of depression or PTSD were each 2.0. Having previous nonfatal suicide attempts documented per diagnosis codes or SPAN reports, presence of a clinical high risk for suicide flag, documentation of a suicide safety plan, and other indicators of VHA use were also associated with elevated likelihood of facility identification.

Overall site documentation of suicide deaths among recent veteran VHA users increased slightly over the 5-year

period of interest, from 29.3% capture in 2013 to 33.3% in 2017. Likelihood of facility identification differed by a decedent's method of suicide. Decedents who died by suffocation were most likely to have had their death documented by facilities (44.5%), and those who died by poisoning were captured least frequently (26.7%).

In multivariable logistic regression with random facility effects, few patient characteristics remained significantly associated with facility identification of a recent veteran VHA user's suicide death when we adjusted for all covariates (Table 2). The facility average odds of SPC identification were lower for older suicide decedents than younger decedents, and patients with a more recent VHA encounter before death had greater odds of identification than those for whom more time had passed since their most recent encounter, with adjustment for covariates. Veterans whose last VHA visit was in an inpatient non-mental health setting or outpatient mental health setting had increased odds of being identified by facilities, as did those with a recent diagnosis of depression or PTSD. In the adjusted model, number of outpatient visit days, having a recent clinical flag for high risk of suicide, and suicide death involving suffocation were each associated with greater odds of facility identification. Number of inpatient discharges per patient was inversely associated with adjusted odds of facility identification. Suicide involving poisoning was associated with lower odds of identification than suicide involving other methods.

## DISCUSSION

VHA facilities identified suicide deaths among 33% of recent veteran VHA users who died by suicide in 2013 to

**TABLE 1—** Characteristics of Recent Veteran VHA Patient Suicide Decedents by Facility Identification of Suicide: United States, 2013–2017

	All, No. (Column %) or Mean ± SD	Suicide Identified by Facility		Effect Size		P <sup>a</sup>
		Yes, No. (Row %) or Mean ± SD	No, No. (Row %) or Mean ± SD	RR	Cohen's d	
Total no.	11 148	3667 (32.9)	7481 (67.1)			
Year of death						.001
2013	2110 (18.9)	618 (29.3)	1492 (70.7)	1 (Ref)		
2014	2191 (19.7)	718 (32.8)	1473 (67.2)	1.1		
2015	2241 (20.1)	767 (34.2)	1474 (65.8)	1.2		
2016	2290 (20.5)	794 (34.7)	1496 (65.3)	1.2		
2017	2316 (20.8)	770 (33.3)	1546 (66.8)	1.1		
Sex						< .001
Female	454 (4.1)	190 (41.9)	264 (58.2)	1 (Ref)		
Male	10 694 (95.9)	3477 (32.5)	7217 (67.5)	0.8		
Age, y						< .001
18 to < 35	1542 (13.8)	803 (52.1)	739 (47.9)	Ref		
35 to < 55	2400 (21.5)	1011 (42.1)	1389 (57.9)	0.8		
55 to < 75	4504 (40.4)	1381 (30.7)	3123 (69.3)	0.6		
75 to 115	2702 (24.2)	472 (17.5)	2230 (82.5)	0.3		
Mean ± SD	60.1 ± 18.7	53.6 ± 18.3	63.3 ± 18.0		−0.5	< .001
Race/ethnicity						< .001
White	9009 (80.8)	2854 (31.7)	6155 (68.3)	1 (Ref)		
Black	562 (5.0)	179 (31.9)	383 (68.2)	1.0		
Hispanic	284 (2.6)	115 (40.5)	169 (59.5)	1.3		
Other	849 (7.6)	388 (45.7)	461 (54.3)	1.4		
Unknown	444 (4.0)	131 (29.5)	313 (70.5)	0.9		
Married	4571 (41.0)	1443 (31.6)	3128 (68.4)	0.9		.01
Rurality of home address						.003
Urban	7061 (64.2)	2416 (34.2)	4645 (65.8)	1 (Ref)		
Rural	3931 (35.8)	1237 (31.5)	2694 (68.5)	0.9		
Distance from home address to nearest VHA facility, miles	12.8 ± 20.5	12.5 ± 21.9	13.0 ± 19.7		0.0	.01
Region of the United States						< .001
Northeast	1207 (10.8)	372 (30.8)	835 (69.2)	1 (Ref)		
Midwest	2298 (20.6)	852 (37.1)	1446 (62.9)	1.2		
South	4648 (41.7)	1264 (27.2)	3384 (72.8)	0.9		
West	2992 (26.9)	1179 (39.4)	1813 (60.6)	1.3		
Days since most recent VHA encounter	85.4 ± 119.6	48.6 ± 86.5	103.5 ± 129.0		−0.5	< .001
Facility type of most recent VHA encounter						.002
VAMC	6987 (62.7)	2351 (33.7)	4636 (66.4)	1 (Ref)		
CBOC	3122 (28.0)	952 (30.5)	2170 (69.5)	0.9		
Other	1039 (9.3)	364 (35.0)	675 (65.0)	1.0		
Setting of most recent VHA encounter						< .001
Outpatient primary care	3089 (27.7)	763 (24.7)	2326 (75.3)	1 (Ref)		
Outpatient mental health	2172 (19.5)	1104 (50.8)	1068 (49.2)	2.1		
Outpatient emergency department	256 (2.3)	75 (29.3)	181 (70.7)	1.2		

Continued

**TABLE 1— Continued**

	All, No. (Column %) or Mean ± SD	Suicide Identified by Facility		Effect Size		P <sup>a</sup>
		Yes, No. (Row %) or Mean ± SD	No, No. (Row %) or Mean ± SD	RR	Cohen's d	
Outpatient other	5460 (49.0)	1624 (29.7)	3836 (70.3)	1.2		
Inpatient mental health	80 (0.7)	44 (55.0)	36 (45.0)	2.2		
Inpatient non-mental health	91 (0.8)	57 (62.6)	34 (37.4)	2.5		
Diagnoses in previous 12 mo						
Any mental health or SUD diagnosis	6178 (55.4)	2796 (45.3)	3382 (54.7)	2.6		<.001
Any SUD	2508 (22.5)	1245 (49.6)	1263 (50.4)	1.8		<.001
Opioid SUD	478 (4.3)	257 (53.8)	221 (46.2)	1.7		<.001
Bipolar disorder	860 (7.7)	439 (51.1)	421 (49.0)	1.6		<.001
Schizophrenia	383 (3.4)	194 (50.7)	189 (49.4)	1.6		<.001
Depression	3989 (35.8)	1950 (48.9)	2039 (51.1)	2.0		<.001
Anxiety	2252 (20.2)	1077 (47.8)	1175 (52.2)	1.6		<.001
PTSD	2206 (19.8)	1214 (55.0)	992 (45.0)	2.0		<.001
Indication of homelessness in previous 12 mo	687 (6.2)	363 (52.8)	324 (47.2)	1.7		<.001
Indication of suicide attempt in previous 12 mo	471 (4.2)	324 (68.8)	147 (31.2)	2.2		<.001
Per ICD diagnosis codes	257 (2.3)	175 (68.1)	82 (31.9)	2.1		<.001
Per SPAN	341 (3.1)	239 (70.1)	102 (29.9)	2.2		<.001
No. of outpatient visit days in previous 12 mo	17.4 ± 23.2	25.4 ± 28.0	13.4 ± 19.3		0.5	<.001
No. of inpatient discharges in previous 12 mo	0.34 ± 1.03	0.55 ± 1.33	0.24 ± 0.83		0.3	<.001
Clinical high risk for suicide flag in previous 12 mo	626 (5.6)	432 (69.0)	194 (31.0)	2.2		<.001
Suicide safety plan in previous 12 mo	703 (6.3)	457 (65.0)	246 (35.0)	2.1		<.001
Enrolled with VHA	10 880 (97.6)	3625 (33.3)	7255 (66.7)	2.1		<.001
Missed at least 1 VHA appointment in previous 1 mo	3888 (34.9)	1729 (44.5)	2159 (55.5)	1.1		.001
Mental health screening in previous 12 mo						
Screened for major depressive disorder	6493 (58.2)	2170 (33.4)	4323 (66.6)	1.0		.16
Screened for PTSD	3630 (32.6)	1370 (37.7)	2260 (62.3)	1.2		<.001
Screened for alcohol use disorder	8018 (71.9)	2935 (36.6)	5083 (63.4)	1.6		<.001
Method of suicide						<.001
Firearm	7697 (69.0)	2420 (31.4)	5277 (68.6)	1 (Ref)		
Poisoning	1280 (11.5)	342 (26.7)	938 (73.3)	0.9		
Suffocation	1561 (14.0)	694 (44.5)	867 (55.5)	1.4		
Other	610 (5.5)	211 (34.6)	399 (65.4)	1.1		

Note. CBOC = community-based outpatient clinic; ICD = *International Statistical Classification of Diseases and Related Health Problems*; PTSD = posttraumatic stress disorder; RR = relative risk; SPAN = Suicide Prevention Applications Network; SUD = substance use disorder; VAMC = Department of Veterans Affairs Medical Center; VHA = Veterans Health Administration.

<sup>a</sup>P value derived from  $\chi^2$ , *t* test, or Wilcoxon rank sum test comparing facility-identified decedents and nonidentified decedents.

2017. Facilities were more likely to identify suicide deaths of veterans who were younger, had mental health and SUD diagnoses, and who had other recent clinical indicators such as a clinical high risk for suicide flag or previous nonfatal suicide attempt, as compared

with veterans without these characteristics. Facility identification differed by method of suicide; suicide deaths involving poisoning were less likely to be ascertained by facilities than those involving other methods. Study results are consistent with findings that from

2002 to 2014 approximately 35% of veteran suicide deaths that occurred within 7 days after VA inpatient mental health discharge were identified in the root cause analysis database.<sup>23</sup>

Study findings document variation in identification by patient



**TABLE 2— Adjusted Odds of Facility Identification of Recent Veteran VHA Patient Suicide Decedents: United States, 2013–2017**

Predictor	AOR (95% CI)	P
Year of death		.36
2013	1 (Ref)	
2014	1.07 (0.90, 1.25)	
2015	1.17 (0.99, 1.38)	
2016	1.18 (0.98, 1.42)	
2017	1.12 (0.90, 1.39)	
Sex		.68
Female	1 (Ref)	
Male	0.96 (0.80, 1.16)	
Age, y		< .001
18 to < 35	1 (Ref)	
35 to < 55	0.62 (0.52, 0.73)	
55 to < 75	0.40 (0.34, 0.47)	
75 to 115	0.27 (0.21, 0.33)	
Race/ethnicity		.59
White	1 (Ref)	
Black	0.86 (0.72, 1.04)	
Hispanic	0.94 (0.74, 1.20)	
Other	0.93 (0.78, 1.11)	
Unknown	0.95 (0.76, 1.19)	
Married	1.11 (1.03, 1.20)	
Rurality of home address		.50
Urban	1 (Ref)	
Rural	0.96 (0.85, 1.08)	
Distance from home address to nearest VHA facility, miles	1.00 (1.00, 1.00)	
Region of the United States		.11
Northeast	1 (Ref)	
Midwest	1.27 (0.90, 1.78)	
South	0.87 (0.65, 1.17)	
West	1.10 (0.81, 1.49)	
Days since most recent VHA encounter	0.997 (0.996, 0.997)	
Facility type of most recent VHA encounter		.98
VAMC	1 (Ref)	
CBOC	1.01 (0.91, 1.12)	
Other	0.99 (0.83, 1.18)	
Setting of most recent VHA encounter		< .001
Outpatient primary care	1 (Ref)	
Outpatient mental health	1.47 (1.30, 1.67)	
Outpatient emergency department	0.98 (0.75, 1.29)	
Outpatient other	1.05 (0.95, 1.17)	
Inpatient mental health	1.45 (0.83, 2.53)	
Inpatient non-mental health	3.13 (2.09, 4.69)	
Diagnoses in previous 12 mo		

*Continued*

sociodemographic characteristics, clinical diagnoses, and previous utilization. Stigma surrounding suicide, difficulties of ascertaining intention of death, and differential cause of death misclassification may affect facility ascertainment of suicide deaths. For example, facility identification of suicide deaths may require outreach to a decedent's family or close contacts to confirm cause of death. Suicide is perceived as more stigmatized than other causes of sudden death<sup>31</sup>; thus, identification of deaths as suicides may be challenging if contacts are unavailable or unwilling to disclose suicidal intent.

In addition, determination of intent to die—which is critical to the identification of suicide deaths<sup>32</sup>—can vary by method of death.<sup>21</sup> We found that suicide deaths by suffocation or firearms were more likely to be identified by facilities than those involving poisoning, which includes drug overdoses. Riblet et al. similarly found that suicides involving firearms were most likely to receive root-cause analyses among suicide deaths following VA inpatient discharges.<sup>23</sup> Suicide deaths involving drug overdoses may take longer for coroners or medical examiners to process and classify,<sup>25</sup> which could contribute to facilities being unaware of these suicides.

It is important to note the negative association found between veterans' age and facility identification of suicide deaths. Suicide deaths of older veteran VHA patients were significantly less likely to be documented by facilities than suicides among younger veteran VHA patients. Older decedents are less likely to have an autopsy than younger decedents,<sup>33</sup> and sites may be less informed of suicide deaths among older decedents because natural causes of death are assumed. Furthermore, older age among veterans is

**TABLE 2— Continued**

Predictor	AOR (95% CI)	P
Any SUD	1.01 (0.89, 1.14)	
Bipolar disorder	1.15 (1.00, 1.33)	
Schizophrenia	1.14 (0.92, 1.41)	
Depression	1.44 (1.30, 1.58)	
Anxiety	1.08 (0.98, 1.20)	
PTSD	1.50 (1.35, 1.67)	
Indication of homelessness in previous 12 mo	0.98 (0.80, 1.20)	
Indication of suicide attempt in previous 12 mo		
Per ICD diagnosis codes	1.15 (0.82, 1.61)	
Per SPAN	1.17 (0.87, 1.57)	
Number of outpatient visit days in previous 12 mo	1.01 (1.01, 1.01)	
Number of inpatient discharges in previous 12 mo	0.92 (0.87, 0.96)	
Clinical high risk for suicide flag in previous 12 mo	1.69 (1.33, 2.14)	
Suicide safety plan in previous 12 mo	1.28 (1.02, 1.61)	
Enrolled with VHA	1.46 (0.90, 2.38)	
Missed at least 1 VHA appointment in previous 1 mo	1.20 (1.08, 1.33)	
Mental health screening in previous 12 mo		
Screened for major depressive disorder	0.99 (0.90, 1.09)	
Screened for PTSD	0.90 (0.82, 0.99)	
Screened for alcohol use disorder	0.99 (0.87, 1.13)	
Method of suicide		< .001
Firearms	1 (Ref)	
Poisoning	0.45 (0.37, 0.54)	
Suffocation	1.23 (1.09, 1.39)	
Other	0.77 (0.64, 0.93)	

Note. AOR = adjusted odds ratio; CBOC = community-based outpatient clinic; CI = confidence interval; ICD = *International Statistical Classification of Diseases and Related Health Problems*; PTSD = posttraumatic stress disorder; SPAN = Suicide Prevention Applications Network; SUD = substance use disorder; VAMC = Department of Veterans Affairs Medical Center; VHA = Veterans Health Administration.

associated with increased reports of loneliness,<sup>34</sup> which could mean fewer contacts to report a suicide death, and older suicide decedents may also be less likely to disclose suicidal intent before death<sup>35</sup> compared with younger individuals. This could contribute to sites being unaware of suicide deaths among older decedents.

Study findings indicate that characteristics of a veteran's recent interactions with the VHA health care system were associated with facility identification and documentation of their suicide death, and that suicide deaths among veteran

VHA users without certain characteristics may go unreported. Incomplete capture of suicide decedents without mental health diagnoses or similar clinical indicators is consistent with another study's findings that suicide decedents without psychiatric comorbidities documented on their death certificate had almost 7 times the odds of potential suicide misclassification as decedents with psychiatric indications.<sup>21</sup>

Local facility identification of patient suicide deaths was less complete among suicide decedents who were older, unmarried, had less VHA

utilization, whose last encounter was not in a mental health clinic or inpatient non-mental health setting, without clinical indications of high suicide risk or a missed appointment, and whose suicide did not involve firearms or suffocation. Findings offer guidance regarding risk populations that may be underrecognized by facilities. The VHA Suicide Prevention NOW initiative, which focuses on achievable short-term suicide prevention enhancements to complement ongoing activities, encompasses work to support some of the subgroups identified in this analysis, including VHA patients with non-mental health clinical risk indicators.

## Strengths and Limitations

A strength of this study is the inclusion of all death certificate-identified suicide deaths among recent veteran VHA users nationwide in the 5-year period 2013 through 2017. A limitation is that the most recent year of mortality data available at the time of analysis was 2017, and the extent to which results are generalizable to ongoing facility ascertainment of veteran VHA user suicides is unknown. Another limitation is that historical facility-level data on SPC staffing was not available. Further work is needed to assess associations between facility suicide prevention staffing, SPC workload and methods of ascertainment, and facility identification of patient suicides. Finally, we note that because of a frequent study outcome, odds ratios calculated in our regression model may overestimate the relative risk.

To our knowledge, this is the first comprehensive assessment of the sensitivity of VHA facility identification of patient suicide mortality. We observed that facility documentation identified only 33% of suicide deaths among



recent veteran VHA users, and identification differed by characteristics of decedents and their deaths. Though timely, facility suicide surveillance identifies an incomplete and unrepresentative sample of patient suicide decedents. VA is working to enhance facility identification of suicide deaths; the present findings may support ongoing prevention and surveillance efforts specific to the VHA-using veteran population. Understanding limitations of facility ascertainment will inform interpretation of facility reports and assessment of local suicide prevention efforts. Future analyses will assess the specificity of facility suicide death ascertainment, complementing the present study's assessment of sensitivity, and should also examine heterogeneity of suicide death ascertainment across providers and facilities.

## Public Health Implications

Study findings have important implications for VHA facility and regional suicide prevention efforts. Without comprehensive national death certificate indicators, VHA facilities may underestimate the burden of suicide in their patient populations and generate inaccurate profiles of patient suicide decedents. To address these concerns, VHA has developed reporting structures to provide VHA facilities and regional networks with information on counts and rates of suicide among recent veteran VHA users, per MDR death certificate data. Further enhancements are in development to provide sites with information regarding characteristics and utilization patterns of veteran patient suicide decedents, overall and by facility ascertainment.

For non-VHA health systems, reliance on local provider documentation of

patient suicide deaths may likewise identify a small and nonrepresentative subset of patient suicide decedents. Findings from Michigan's Henry Ford Health System suggest that internally collected data are best supplemented by death certificate data for comprehensive suicide death surveillance.<sup>16</sup> In the absence of comprehensive death certificate information, local health systems may fail to recognize the burden of suicide in their patient populations or to identify at-risk subpopulations. This may adversely affect resource allocation for suicide prevention and result in missed opportunities to conduct outreach or bereavement support. Study findings highlight the importance of comprehensive health system suicide surveillance based on searches of death certificate data as an essential complement to local facility surveillance efforts. *AJPH*

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## CONTRIBUTORS

K. M. Palframan completed the analyses and led the writing. B. R. Szymanski assisted with the study design and writing. J. F. McCarthy conceptualized the analysis and assisted with writing.

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## CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

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