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BRIEF REPORT

Health Care Contact and Suicide Risk Documentation Prior to Suicide Death: Results From the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS)

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Objective: Prior research has shown that a substantial portion of suicide decedents access health care in the weeks and months before their death. We examined whether this is true among soldiers. ***Method:*** The sample included the 569 Regular Army soldiers in the U.S. Army who died by suicide on active duty between 2004 and 2009 compared to 5,690 matched controls. Analyses examined the prevalence and frequency of health care contacts and documentation of suicide risk (i.e., the presence of prior suicidal thoughts and behaviors) over the year preceding suicide death. Predictors of health care contact and suicide risk documentation were also examined. ***Results:*** Approximately 50% of suicide decedents accessed health care in the month prior to their death, and over 25% of suicide decedents accessed health care in the week prior to their death. Mental health encounters were significantly more prevalent among suicide decedents (4 weeks: 27.9% vs. 7.9%, $\chi^2 = 96.2$, $p < .001$; 52 weeks: 59.4% vs. 33.7%, $\chi^2 = 120.2$, $p < .001$). Despite this, risk documentation was rare

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among suicide decedents (4 weeks: 13.8%; 52 weeks: 24.5%). Suicide decedents who were male, never married, and non-Hispanic Black were less likely to access care prior to death. Number of mental health encounters was the only predictor of suicide risk documentation among decedents at 4 weeks (*OR* = 1.14) and 52 weeks (*OR* = 1.05) prior to their death. ***Conclusions:*** Many soldiers who die by suicide access health care shortly before death, presenting an opportunity for suicide prevention. However, in most cases, there was no documentation of prior suicidal thoughts or behaviors, highlighting the need for improvements in risk detection and prediction. Increasing the frequency, scope, and accuracy of risk assessments, especially in mental health care settings, may be particularly useful.

What is the public health significance of this article?
Many people who die by suicide access health care in the weeks before dying, suggesting that opportunities exist for health care providers to identify those at risk for suicide death. Despite this relatively high rate of contact in the weeks before death, most suicide cases do not have any documentation in their records of suicidal thoughts or behaviors. These results highlight the importance of enhanced screening for suicide risk among those accessing health care services.

Keywords: suicide, treatment, Army, health care

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Suicide is a leading cause of death and a major concern to psychological scientists and related professionals. Although historically low, suicide rates in the U.S. Army have climbed substantially over the last decade (Armed Forces Health Surveillance Center [AFHSC], 2012), with suicide becoming one of the leading causes of death among soldiers (AFHSC, 2014). In 2013, 123 Regular Army soldiers died by suicide, yielding a rate of 23 suicides per 100,000 person-years that surpasses the age- and sex-adjusted civilian rate (Smolensky et al., 2014). In response to this trend, suicide prevention has become an increasingly high priority for the Army.

Prior research has shown consistently that a substantial proportion of suicide decedents access health care in the weeks and months before death (Luoma, Martin, & Pearson, 2002; Pearson et al., 2009), suggesting that health care settings may be a potential intervention point. Between 57% and 90% of suicide decedents in civilian samples have been found to access a primary care provider (Ahmedani et al., 2014; Pearson et al., 2009)—with nearly 33% accessing a mental health provider—in the year prior to death, whereas close to 50% had primary care contact—and nearly 20% had mental health contact—in the month prior to death (Luoma et al., 2002). These rates are considerably higher than in the overall population. Research on veterans has shown similar patterns (Denneson et al., 2010). It is unclear, however, how many of these cases were detected as having high suicide risk or showing warning signs for suicide (i.e., expressing suicidal thoughts or behaviors; Rudd et al., 2006) or whether this detection could be improved. Research in civilian samples suggests that only 3% to 31% of suicide decedents in health care the year preceding death communicated suicidal intent in their final consultation (Isometsä et al., 1995; Matthews, Milne, & Ashcroft, 1994; Pearson et al., 2009). Research has also found that primary care providers rarely report concerns about suicide during their final visit with patients who died by suicide that year (Pearson et al., 2009). Although risk is identified more frequently in mental health settings (Isometsä et al., 1995), suicide decedents are more likely to access general

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medical care in the month and year before death (Luoma et al., 2002).

Given that health care in the Army is readily available, health care contact prior to suicide may be more likely among soldiers than civilians, although studies of civilian samples have shown that young adult men (of which the Army is largely composed) do not have high rates of treatment seeking. We are aware of no data reported on health care contact of soldiers prior to suicide. We present such data herein from the Study to Assess Risk and Resilience in Servicemembers (Army STARRS; www.armystarrs.org). We consider four issues. First, we examine health care visit prevalence and frequency among suicide decedents in the month and year preceding the day of their death across a range of health care settings compared to matched living controls. Second, we examine the setting and timing of final visits before death. Third, among suicide decedents who accessed health care, we investigate whether suicide risk was documented in the medical records. Fourth, we examine sociodemographic and career history factors as predictors of health care use and documentation of suicide risk (i.e., the presence of suicidal thoughts or behaviors) among suicide decedents.

Method

Sample

Data are from the Historical Administrative Data Study (HADS) of Army STARRS, a consolidated database that combines information from 38 different Army and Department of Defense (DoD) administrative data systems for all soldiers who were on active duty at any time from 2004 to 2009. The HADS includes administrative record codes for all health care visits provided by the military health care system or the private sector covered by military health insurance as well as information on manner and timing of death (Kessler et al., 2013). A total of 975,057 Regular Army soldiers were on active duty sometime between January 1, 2004, and December 31, 2009. The Armed Forces Medical Examiner's office classified 569 of these soldiers as having died by suicide while on active duty.

As reported previously (Gilman et al., 2014), the 569 suicide decedents differed significantly from other soldiers in several ways. Suicide decedents were more likely to be male, unmarried, and young; to have early age at enlistment and a rank below that expected for their time in service; to be in their first term of service; and to be either currently or previously deployed. To adjust for these differences, we selected a probability sample of 10 control soldiers for each suicide decedent matched on these characteristics at the time of death. The final data set included 6,259 soldiers whose histories of health care contacts in the prior 52 weeks were divided into person-weeks going backward from the day of the death of the suicide decedent. The resulting figure of 306,543 person-weeks in the data set is less than the expected 325,468 because 767 suicide decedents and their matched controls were in service less than 1 year at the time of death.

Measures

Information on suicides was obtained from the Armed Forces Medical Examiner Tracking System. Variables used to match cases with controls were obtained from the DoD Defense Manpower Data Center (DMDC) Master Personnel & Transaction Files (sociodemographic and Army career characteristics) and the DMDC Contingency Tracking System (activations, mobilizations, deployments). Information on health care visits with *ICD-9-CM: The International Classification of Diseases, Ninth Revision, Clinical Modification* (Medicode, 1996) 290–319 diagnoses of mental or behavioral disorders in the prior 12 months was obtained from the Medical Data Repository and Theater Medical Data Store. We distinguished between inpatient and outpatient encounters. Inpatient encounters were further divided into *mental health (MH) encounters* (encounters with a documented ICD mental or behavioral disorder) and *nonmental health (non-MH) encounters* (encounters without a documented ICD mental or behavioral disorder). Outpatient encounters were divided into non-MH encounters, MH encounters with a mental health specialist, and MH encounters with a general medical provider. Suicide risk documentation was operationalized as the presence of a suicide attempt (from the DoD suicide event report[1]), a possible suicide attempt (ICD-9 E95*), suicide ideation (ICD-9 V62.84; added to the ICD-9-CM in 2005), or self-damaging behavior (ICD-9 V69.8).

Analysis Methods

Data were analyzed at both the person level (n = 6,259) and the person-week level (n = 306,543) using a case-control framework (Willett & Singer, 1993). We examined the prevalence of health care contacts overall and across settings over the 52 weeks prior to the death of the suicide decedent. Initial analyses were carried out using cross tabulations, with χ^2 tests used to evaluate differences in the treatment patterns of suicide decedents versus controls. We then inspected temporal trends in each type of health care contact over the 52 weeks prior to date of death to determine if changes occurred close to the time of death. As the data were too sparse to examine differences on a weekly basis, we created nine categories based on timing of last visit (1, 2, 3, 4, 5–8, 9–12, 13–26, 27–39, and 40+ weeks before death). Prevalence of any health care contact and mean number of contacts were both examined. We then calculated the proportion of patients whose medical records contained an indication of suicide risk in each health care sector. Finally, we used multivariate logistic regression analyses to examine predictors of health care contact and medically documented suicide risk among decedents. This research was approved by the human subjects committees of all participating institutions.

Results

Health Care Contact Prior to Death

Prevalence. The majority of suicide decedents (96.8%) and controls (95.3%) had at least one non-MH encounter in the 52 weeks before death (χ^2_1 = 3.7, p = .055; see Table 1). The prevalence of non-MH encounters in the 4 weeks before death was considerably lower and not significantly different between suicide decedents (37.8%) and controls (35.9%; χ^2_1 = 0.8, p = .38).

[1] A suicide attempt is defined within the DoD suicide event report as a nonfatal self-inflicted behavior with the potential to cause injury that also has evidence of explicit or implicit intent to die.

Table 1
Prevalence of Health Care Visits Among Suicide Decedents and Controls

	4 weeks								52 weeks							
	Suicide decedents			Controls					Suicide decedents			Controls				
Health care visit type	Frequency	%	*SE*	Frequency	%	*SE*	χ^2	*p*	Frequency	%	*SE*	Frequency	%	*SE*	χ^2	*p*
MH encounters																
Inpatient	17	3.0	.7	13	.2	.1	14.5	<.001	73	12.8	1.4	108	1.9	.2	55.5	<.001
Outpatient, specialist	120	21.1	1.7	317	5.6	.3	72.3	<.001	278	48.8	2.1	1,312	23.1	.6	119.6	<.001
Outpatient, general medical	85	14.9	1.5	185	3.3	.2	55.4	<.001	232	40.7	2.1	1,118	19.7	.5	87.5	<.001
Any encounter	159	27.9	1.9	448	7.9	.4	96.2	<.001	338	59.4	2.1	1,919	33.7	.6	120.2	<.001
Non-MH encounters																
Inpatient	7	1.2	.5	15	.3	.1	4.3	.039	31	5.5	1.0	167	2.9	.2	6.6	.010
Outpatient, general medical	214	37.6	2.0	2,043	35.9	.6	.6	.423	551	96.8	.7	5,424	95.3	.3	3.7	.055
Any encounter	215	37.8	2.0	2,043	35.9	.6	.8	.378	551	96.8	.7	5,424	95.3	.3	3.7	.055
Any encounter (MH or non-MH)	281	49.4	2.1	2,225	39.1	.7	21.4	<.001	555	97.5	.7	5,451	95.8	.3	6.1	.014
No treatment	288	50.6	2.1	3,465	60.9	.7	21.4	<.001	14	2.5	.7	239	4.2	.3	6.1	.014

Note. *SE* = standard error; MH = mental health.

However, inpatient non-MH encounters, while much less prevalent than outpatient contacts, were significantly more prevalent among suicide decedents than controls, both in the 52 weeks (5.5% vs. 2.9%; $\chi^2_1 = 6.6$, $p = .01$) and in the 4 weeks (1.2% vs. 0.3%; $\chi^2_1 = 4.3$, $p < .040$) before death.

The prevalence of MH encounters was significantly higher among suicide decedents than controls, both in the 52 weeks (59.4% vs. 33.7%; $\chi^2_1 = 120.2$, $p < .001$) and in the 4 weeks (27.9% vs. 7.9%; $\chi^2_1 = 96.2$, $p < .001$) before death. Outpatient MH specialty encounters were the most prevalent type of MH encounters among both groups at 52 weeks (48.8% vs. 23.1%; $\chi^2_1 = 119.6$, $p < .001$) and 4 weeks (21.1% vs. 5.6%; $\chi^2_1 = 72.3$, $p < .001$) before death, followed by general medical MH encounters (52 weeks: 40.7% vs. 19.7%; $\chi^2_1 = 87.5$, $p < .001$; 4 weeks: 14.9% vs. 3.3%; $\chi^2_1 = 55.4$, $p < .001$). Inpatient MH encounters were much less prevalent but also significantly more common among suicide decedents at 52 weeks (12.8% vs. 1.9%; $\chi^2_1 = 55.5$, $p < .001$) and 4 weeks (3.0% vs. 0.2%; $\chi^2_1 = 14.5$, $p < .001$). The prevalence ratio (PR) of suicide decedents versus controls increased with decreasing within-sector contact prevalence from a high of a PR of 15.0 (i.e., 3.0%:0.2%) for 4-week MH inpatient encounters to a low of a PR of 2.1 for 52-week outpatient MH encounters in the general medical and specialty sectors.

Number of encounters among those in treatment. Among those receiving any treatment in the past year, suicide decedents had significantly more encounters than controls in both the 52 weeks (19.20 vs. 10.88; $t = 7.4$, $p < .001$) and 4 weeks (3.55 vs. 2.30; $t = 5.7$, $p < .001$) before death. The number of non-MH outpatient encounters was roughly equivalent between the groups. In the case of MH encounters, there were statistically significant differences in the number of encounters at both 52 weeks and 4 weeks, with suicide decedent cases having roughly twice as many encounters as controls (Supplemental Table 1).

Timing and Setting of Final Health Care Contacts

More than one quarter (27.0%) of suicide decedents had their last health care contact in the week before their death, with 58.7% of those being MH encounters. In contrast, only 17.2% of controls had a health care contact in the past week, and only 20.0% of those encounters were MH encounters. Among suicide decedents, the proportion of final health care encounters that were MH encounters increased significantly over the course of the year ($\chi^2 = 74.9$, $p < .001$), rising from 14.3% at 40+ weeks to 58.7% in the week before death (see Supplemental Figure 1 and Supplemental Table 2). Among controls, only 4.8% to 20.0% of final encounters were MH encounters; this proportion remained stable across the 52 weeks preceding death (Supplemental Figure 1).

Predictors of Health Care Contacts Among Suicide Decedents Versus Controls

Given the importance of MH encounters, we focused on predictors of MH contacts rather than non-MH contacts. Suicide decedents who were male (*OR* = 0.37, 95% confidence interval [CI] [0.16, 0.85]), had never married (*OR* = 0.49, 95% CI [0.31, 0.77]), and who were non-Hispanic Black (*OR* = 0.55, 95% CI [0.31, 0.99]) had significantly lower odds than other soldiers of having any MH contact in the 4 weeks before death. Younger age was associated with lower odds of MH contact among suicide decedents in the preceding year (ages 17–19: *OR* = 0.38, 95% CI [0.19, 0.76]; ages 20–22: *OR* = 0.49, 95% CI [0.30, 0.78]). Having never been married and being non-Hispanic Black or other race were associated with lower odds of having any MH contacts for controls in both the past 52 weeks and the past 4 weeks, whereas being of lower rank was associated with higher odds of MH contact among controls (Supplemental Table 3). Interaction models found that lower rank was a weaker predictor of MH contact in the past 4 weeks ($\chi^2 = 7.3$, $p = .03$) among suicide decedents compared with controls.

Prevalence of Medically Documented Suicidal Thoughts or Behaviors Among Suicide Decedents and Controls

Only 13.8% of suicide decedents who had a MH encounter in the 4 weeks before their death had suicidal thoughts or behaviors documented in their medical records over that time period, and only 24.5% had such documentation at any time in the 52 weeks before death (Supplemental Table 4). Only 16.9% of suicide

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decedents who had a MH encounter at any time in the 52 weeks before death had such documentation in their medical records over that time period.

Medical records with documented suicidal thoughts or behaviors were 15.3 times as common among suicide decedents as controls with 4-week MH encounters over that time period (13.8%:0.9%) and 8.9 times as common among suicide decedents with 52-week MH encounters over that time period (16.9%:1.9%). However, the majority of soldiers with documented suicidal thoughts or behaviors did not die by suicide. Suicidal thoughts or behaviors were documented during 161,292 person-months, with 48 suicides among that group. As such, for every one soldier who died by suicide, there were 3,359 person-months in which a soldier was classified as suicidal in the prior 12 months but did not die by suicide that month.

Predictors of Medically Documented Suicidal Thoughts or Behaviors Among Suicide Decedents

We examined several predictors of medically documented suicidal thoughts or behaviors. Number of days with a MH encounter was the only significant predictor of such documentation among suicide decedents (*OR*s = 1.05–1.14) and also emerged as a significant predictor for controls (*OR*s = 1.06–1.44; Supplemental Table 5).

Discussion

This study had five key findings:

1. Approximately 50% of suicide decedents accessed care in the month before their death, and more than 25% did so in the week before their death.

2. Suicide decedents were more likely than controls to have an MH encounter (4 weeks: 27.9% vs. 7.9%; 52 weeks: 59.4% vs. 33.7%) and had nearly twice as many encounters in the 4 weeks and 52 weeks before death than did controls over the same period.

3. Suicide decedents who were male and non-Hispanic Black and had never married were less likely to access MH care before death.

4. Documentation of prior suicidal thoughts or behaviors was rare, even among those receiving MH care the month before death.

5. Number of days with an MH encounter was the only predictor of documentation of suicidal thoughts or behaviors among suicide decedents at 4 weeks (*OR* = 1.14) and 52 weeks (*OR* = 1.05) prior to death.

A considerable proportion of suicide decedents accessed health care in the month (49.4%) and week (27%) before their death, and most of those visits (58.7%) were in MH. This suggests that opportunities exist to intervene with a substantial proportion of suicide decedents in the months before death by focusing on patients in MH treatment. However, documentation of suicidal thoughts or behaviors was rare, occurring in only 13.8% of suicide decedents in the 4 weeks before their death. Our analyses did not reveal any potentially actionable predictors of such documentation that could be used to boost accurate risk detection.

Given that suicidal thoughts typically begin several weeks before the onset of a suicide attempt (Millner, Lee, & Nock, 2016) and many soldiers accessed health care within the week before dying, one clear path forward is to require providers, particularly those in MH, to conduct and document regular risk assessments with all patients. The recently developed U.S. VA/DoD *Clinical Practice Guidelines (CPG) for the Assessment and Management of Patients at Risk for Suicide* calls for exactly this (Department of Veterans Affairs & Department of Defense, 2013). Unfortunately, traditional suicide risk detection strategies are not very accurate (Franklin et al., 2016; Nock et al., 2010). Augmenting the CPG with actuarial risk models similar to those developed to predict suicide among servicemembers (Kessler et al., 2015) and veterans (McCarthy et al., 2015) may be one promising approach to overcome this challenge. These methods have substantially advanced our ability to predict suicide and have the potential to be readily implemented on a large scale across health care settings (i.e., MH and non-MH). They are particularly well suited to the Army, given the recent development of a Behavioral Health Data Portal that allows for automated risk assessment. Combining actuarial methods with implicit measures may also be beneficial, as implicit measures have been shown to outperform clinician- and self-reported suicide risk (Nock et al., 2010).

Beyond improving risk detection, it may also be useful to advance our approach to intervention. One viable approach would be to develop low-cost interventions that could be easily disseminated to all soldiers at high risk. Alternatively, some researchers have suggested that suicide deaths could be more cost-effectively reduced by improving MH services for all patients (Large & Ryan, 2014). We reason that both targeted interventions and more general suicide prevention strategies have the potential to help prevent suicides.

The findings from this study should be considered in the context of four important limitations. First, we relied on available administrative data. Suicide risk detection may have been higher and documented in clinicians' notes but not formally coded in the medical records as prior suicidal thoughts or behaviors. Relatedly, it is also possible that some soldiers may have sought health care in the private sector and elected not to use their military health insurance. These instances, although likely rare, would not be reflected in the present data. Second, our operationalization of suicide risk was constrained to documentation of past self-injurious thoughts and behaviors; although these factors are among the strongest predictors of suicide, many others confer risk (Franklin et al., 2016). Third, our recommendations herein focus primarily on improving risk detection; however, our design precludes making definitive inferences about the exact mechanisms accounting for the infrequent risk detection. For instance, it is possible that some suicide decedents only experience ideation much closer to the event (e.g., hours prior). In such cases, improving risk detection in health care settings may not be sufficient. Fourth, data after 2009 were not available. Current patterns almost certainly differ from those presented herein in light of the new CPG. Once the Army STARRS administrative record system is updated, it will be valuable to carry out a before-and-after expansion of the analyses reported herein.

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