The Role of Pain, Functioning, and Mental Health in Suicidality Among Veterans Affairs Primary Care Patients

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Objectives. We examined suicidality, pain, functioning, and psychiatric disorders among veterans in primary care by using both self-report and clinical measures of pain and mental health to determine correlates that might be clinically useful in primary care settings.

Methods. Data were from 884 Veterans Affairs patients enrolled in a regional 4-site cross-sectional study. Patients were administered measures that assessed functioning (including pain) and psychiatric disorders. Data were merged with medical records for clinical pain indicators.

Results. Overall, 9.1% (74 of 816) of patients indicated suicidal ideation, with those who were middle-aged, unemployed because of disability, had less than college education, and served in a warzone most likely to consider suicidality. Suicidal patients had worse functioning (measured by the Short Form-36) than did nonsuicidal patients in every domain, including bodily pain, and were more likely to meet criteria for a psychiatric diagnosis. However, when pain and mental health were jointly considered, only mental health (both psychiatric diagnosis and mental health functioning) was related to suicidality.

Conclusions. Although providers should be alert to the possibility of suicidality in patients with pain, they should be vigilant when patients have a psychiatric disorder or poor mental health. (*Am J Public Health.* 2012;102:S118–S124. doi:10.2105/AJPH.2011.300451)

Military veterans are more likely to commit suicide than nonveterans. Based on a large, nationally representative sample (n = 320 890), a recent publication reported that military veterans were twice as likely to commit suicide as nonveterans.[1] Chronic pain and depression—2 conditions not uncommon in Veterans Affairs (VA) medical settings—are leading contributing factors in deaths by suicide. A systematic literature review of pain and suicide, suicide attempts, and suicidal ideation revealed that patients with chronic pain had a 2-fold risk of death by suicide, a 14% prevalence of suicide attempts (compared with 5% without chronic pain), and a 20% prevalence of suicidal ideation.[2] The relationship between depression, as well as other psychiatric disorders, and suicidality is well established.[3–5] Older age and male gender are also highly related to suicide,[6] as are lower socioeconomic status[7,8] and unemployment[8]—all being predominant characteristics of the VA patient population.

In a study that analyzed data from the National Comorbidity Survey Replication sample, suicidal thoughts and behaviors were associated with self-reported medical conditions presumed to accompany pain (e.g., arthritis or rheumatism, chronic back or neck problems).[9] After controlling for mood and anxiety disorders, this association with pain-related conditions persisted for lifetime measures of suicidality (suicidal ideation, plan, or attempt); however, for current measures of suicidality, it only persisted for those who reported a suicide attempt. In a large study of VA service users, self-reported severe pain was predictive of subsequent suicide, even after controlling for physician-diagnosed psychiatric comorbidity.[10] Of note, this study used a single question from the Short Form-36 (SF-36) to measure pain severity.[11]

Although mental health settings are most often associated with detection and management of suicidal patients, primary care can potentially play an important part. Luoma et al.[12] found that 45% of those who committed suicide had contact with a primary care provider (PCP) in the month before suicide, thus highlighting the importance of PCPs in identifying and intervening with the 2% to 3% of primary care patients who display suicidal ideation.[6] The fact that pain is also very common in primary care patients and is one of the main reasons for seeking medical care[13,14] is further argument for including primary care clinics in planning for effective suicide prevention programs.

Interestingly, in the studies reviewed there was little attention given to functioning associated with pain. It might be that the functional limitations imposed by pain—as much as pain itself—might cause individuals to turn their thoughts to self-destruction. Furthermore, there was little attention to the relationship between pain and psychiatric distress (e.g., pain might cause symptoms of depression, and depression might exacerbate the sense of pain). Thus, our overall objective was to examine suicidality, pain, functioning, and psychiatric disorders among veterans in primary care, determining meaningful correlates that might prove to be clinically useful, especially in primary care settings.

METHODS

We used an existing dataset that was established from a random sample of primary care patients (consent rate 74%) drawn from 4 VA hospitals in 2 Southeast states. The parent study was approved by the institutional review boards of the 4 sites; our study was approved by the institutional review boards of the Medical University of South Carolina. The sampling and methods were described extensively in previous publications[5,15,16]; however, we provide a brief overview here. There were 1076 consenting patients (randomly sampled from the primary care rolls of 4 Veterans Integrated Service Network hospitals with an oversampling of women) for whom sociodemographic information and functioning status (SF-36) were collected at a primary care visit. Records

of patients who completed the clinic interview were sent to Charleston, South Carolina, where trained clinicians contacted them via telephone for a longer interview, which included the Clinician Administered PTSD Scale (CAPS), considered the diagnostic "gold standard" for posttraumatic stress disorder (PTSD),[17] and the Mini International Neuropsychiatric Interview (MINI version 5.0.0)[18,19] to assess for mental and substance use disorders (*Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* [*DSM-IV*][20] and *International Classification of Diseases-10* [*ICD-10*] criteria[21]). The MINI also has a 6-item module that assesses suicidality and suggests a level of current suicide risk as low, moderate, or high. Using the electronic medical record, these data were merged with *ICD-9*[22] diagnoses. The medical record data covered the 12 months before and after the index clinic visit (a total of 24 months).

The dataset is unique in that all patients (not just those who screened positive) were administered the suicidality assessment as well as diagnostic instruments for common psychiatric disorders that include major depression or dysthymia, generalized anxiety disorder (GAD), PTSD, and substance use disorders (SUDs). Additionally, because the sample was drawn from active patient rolls, it did not overrepresent high utilizing patients.

The analytic dataset included all patients for whom we had suicidality (from the MINI), functional status, and psychiatric research diagnoses (from the MINI and CAPS). This resulted in data for 816 patients (82% of consenters).

We focused on the following variables: suicidality based on the MINI, psychiatric diagnoses based on the MINI, PTSD based on the CAPS, functioning status based on the SF-36 (including self-reported bodily pain based on the SF-36), pain conditions based on *ICD-9* codes, and overall medical morbidity based on the Charlson Comorbidity Index (CCI).

Variables

Sociodemographic variables. Self-reported age, race, gender, educational attainment, employment status, warzone military service, and primary war era of service were collected at the time of the in-person interview.

Functioning variables. All functioning variables were derived from the SF-36 Medical Outcomes Study (MOS) 36-Item Short-Form Health Survey, which was administered at the time of the in-person interview. The SF-36 is a self-reported, generic measure of functional health status that assesses 2 factors of analytically derived dimensions (physical health and mental health) with multiple subscales: physical functioning, role functioning limited by health, energy and fatigue, pain, general health, role functioning limited by emotional problems, emotional well-being, and social functioning.[23] The SF-36 discriminates severity of functional impairment across a variety of disease states, such as hypertension, arthritis, gastrointestinal disorders, myocardial infarction[24,25] and even PTSD.[26] The SF-36 raw scores were transformed to a 0 to 100 scale according to the formulas for scoring and transforming in the SF-36 Health Survey manual.[27]

Psychiatric diagnosis variables. All psychiatric diagnoses were derived from MINI with the exception of PTSD, which was assessed by the CAPS. Our broad definition of major depressive disorder (MDD) could be satisfied by the presence of either MDD or dysthymia. We also investigated GAD and SUDs to explore the relationship between these diagnoses and suicidal ideation.

The MINI (version 5.0.0) is comprised of closed questions (yes/no format) and measures *DSM-IV* (and *ICD-10*) mental diagnoses and conditions common in primary care. We selected the modules for: major depressive episode, dysthymia, suicidality, alcohol abuse and dependence, drug abuse and dependence, and GAD. For these modules, there were adequate to excellent psychometric properties for the selected disorders relative to the World Health Organization Composite International Diagnostic Interview (CIDI) and the Structured Clinical Interview-Patient (SCID-P).[18,19,23] With the CIDI as the gold standard, all sensitivities were ≥ 0.83; kappas (κ) were ≥ 0.73 except for GAD (0.36). Results were similar with SCID-P as the gold standard, with only current drug dependence having sensitivity of < 0.50 and $\kappa < 0.50$. Both inter-rater reliability (all ≥ 0.88) and test–retest reliability (all ≥ 0.78) were excellent.

Suicidality was based on MINI suicidality items. Indication of any single item suggested suicide risk, which could be classified as low, moderate, or high based on the number and pattern of affirmative responses.

The CAPS is a structured clinical interview developed at the National Center of Posttraumatic Stress Disorders in 1990 to rate the frequency and intensity of the 17 symptoms of PTSD outlined in the *DSM-IV* along with 5 associated features (guilt, dissociation, de-realization, depersonalization, and reduction in awareness of surroundings).[17,28,29] The CAPS has been shown to have strong inter-rater reliabilities (0.92–0.99) for each of the 3 PTSD symptom clusters (re-experiencing, avoidance, hyperarousal). The CAPS has a high degree of internal consistency (0.73–0.85), is highly correlated with the Mississippi Scale (0.70–0.91), Minnesota Multiphasic Personality Inventory-2 Keane PTSD subscale (0.77–0.84), and has good diagnostic utility compared with the SCID PTSD module.[28] It also has excellent correspondence with the PCL (area under the curve = 88.2%).[28] Magruder et al. [5] conducted a random sample of interviews (8%) by speaker phone to assess interrater reliability and found that raters were 100% concordant for PTSD diagnosis on the CAPS. Frequency and intensity information was collected for each of these symptoms within the context of lifetime and current (within the past month) patient experiences. Using the F1/I2 CAPS scoring rule, symptoms were coded as present if frequency was ≥ 1 and intensity was ≥ 2.[17] PTSD was established if patients satisfied *DSM-IV* criteria B, C, and D, and the duration of symptoms was more than 1 month.

Pain variables. We measured pain in 2 different ways, self-reported bodily pain (SF-36) and pain-related medical diagnoses (ICD-9). We were particularly interested in the SF-36 subscale bodily pain, which is measured by 2 questions: "How much bodily pain have you had during the past 4 weeks?" and "During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?" The responses to these items are normally used to create a single bodily pain variable scaled to range from 0 (poor functioning) to 100 (excellent functioning).[27] However, to understand better the involvement of both physical pain and functional impairment, we also considered the component questions of this subscale individually.

Medical comorbidity. The CCI was used to measure medical comorbidity. The CCI is

TABLE 1—Sociodemographic Characteristics by Suicidality: Veterans Integrated Service Network Hospitals, 1999–2001

Characteristic	Not Suicidal (n = 742), No. (%)	Suicidal (n = 74), No. (%)	χ^2 *P*
Age, y			.024
< 50	155 (90.1%)	17 (9.9%)	
50–64	279 (88.0%)	38 (12.0%)	
≥ 65	305 (94.1%)	19 (5.9%)	
Race			.887
White	455 (90.8%)	46 (9.2%)	
Non-White[a]	287 (91.1%)	28 (8.9%)	
Gender			.789
Male	622 (90.8%)	63 (9.2%)	
Female	119 (91.5%)	11 (8.5%)	
Education			.032
less than a high school diploma	144 (90.0%)	16 (10.0%)	
High School diploma	208 (92.0%)	18 (8.0%)	
Some college	255 (87.9%)	35 (12.1%)	
College degree or greater	135 (96.4%)	5 (3.6%)	
Employment			< .001
Working	264 (95.7%)	12 (4.4%)	
Not Working (retired)	270 (93.4%)	19 (6.6%)	
Not Working (disability)	208 (82.9%)	43 (17.1%)	
Warzone			.004
Served in warzone	321 (87.7%)	45 (12.3%)	
Did not serve in warzone	421 (93.6%)	29 (6.4%)	
War era			.35
World War II	92 (92.9%)	7 (7.1%)	
Korean War	140 (93.3%)	10 (6.7%)	
Vietnam War	431 (89.4%)	51 (10.6%)	
Persian Gulf War	79 (92.9%)	6 (7.1%)	
Site			.213
A	125 (92.6%)	10 (7.4%)	
B	175 (93.1%)	13 (6.9%)	
C	217 (91.6%)	20 (8.4%)	
D	225 (87.9%)	31 (12.1%)	

Note. HS = high school; MINI = Mini International Neuropsychiatric Interview. Suicidal was defined as any indication of suicidality by the MINI module C.
[a]93.7% of non-Whites are known to be of African American descent.

a measure of mortality risk determined from the presence or absence of specific medical comorbidities,[30] and reflects the relative burden of severe medical problems. The CCI was constructed from diagnostic information from fiscal years 2003 to 2005.

Analytic Approach

All patients were classified as being suicidal or not, and χ^2 analyses were calculated for simple comparisons of all categorical variables (sociodemographics, psychiatric diagnoses, pain diagnoses, and CCI). Generalized linear modeling was used to analyze SF-36 scales and subscales. Because many of the subscales on the SF-36 have non-normal distributions, we also ran analyses using the rank-sum test. Those variables that were statistically significant at $P < .1$ were retained for inclusion in the multivariable modeling procedures.

We made the decision to consider these remaining variables in 3 blocks: sociodemographics, psychiatric and functioning, and pain. This led to a series of logistic regression models that were then used to identify meaningful covariates and provide estimated odds ratios (ORs) for suicidality. As we developed these models, we retained variables that satisfied our criterion of $P < .1$ and tested for interaction effects among key variables. Because of their clinical relevance, we made the a priori decision to keep age, race, and gender regardless of their significance level. In the first suite of models, we analyzed only sociodemographic variables. Variables that met our criterion were retained in all subsequent models. The second suite of models included mental and physical health functioning, whereas the third suite focused on pain. The final model explored significant functioning, mental health, and pain variables derived from suites 2 and 3. The intent was to examine the effect of mental and physical health (without pain) on suicidality (suite 2), then look separately at the effect of pain (without mental and physical health variables) on suicidality (suite 3). The final model (suite 4) examined their presence together.

In each suite of statistical models, we tested interactive relationships among key independent variables through inclusion of interaction terms with the intention of preserving any significant interaction terms in all subsequent models.

RESULTS

Overall, 9.1% of patients (74 of 816) selected items indicating suicidal ideation, meaning that at least 1 of the MINI suicidality items was coded "yes"; by MINI scoring, these patients were classified as "suicide risk current." Of these, only 1 patient responded in a manner that indicated a high level of suicide risk; the remaining patients were classified as either moderate (n = 16) or low (n = 50) risk. Although the presence of suicidality was determined, suicide risk level was not available for 7 patients. We compared those at low risk with those at moderate or high risk. There were no significant differences between these groups in the sociodemographic variables and the functioning, pain, and psychiatric measures with 1 exception. There was a higher percentage of high-suicide-risk patients with PTSD than low- or moderate-risk patients (88% vs 52%).

Based on these comparisons and in consideration of the small number of patients in the high and moderate risk categories (and because any level of suicide risk is clinically important), we grouped all patients with any suicide risk (n = 74) and considered them positive for suicidality.

Sociodemographic Characteristics

Table 1 shows the sociodemographic characteristics of our sample by suicidality status with simple χ^2 results based on a probability level of 0.05. There were statistically significant differences in age (with those aged ≥ 65 years having the lowest prevalence of suicidality and those aged between 50 and 64 years having the highest); education (with those attaining at least a college degree having the lowest prevalence and those with some college having the highest), employment (with those not working because of disability having the highest prevalence and those working the lowest), and warzone exposure (with those exposed having a higher prevalence). There were no statistically significant differences by race, gender, war era, or site.

Functioning Status

We examined functioning status using SF-36 scores. For each of the subscales investigated (general health, mental health, vitality, physical functioning, social functioning, role physical, role emotional, and bodily pain), as well as the physical and mental health composite scores, suicidal patients had significantly worse functioning (Table 2). We also analyzed separately the 2 questions that make up the bodily pain scale, and as with the subscales, patients with suicidality were significantly worse on both. The results were unchanged after adjustments for age, gender, race, and education.

Psychiatric Diagnoses

We examined the presence of current psychiatric disorders (depression, including dysthymia; GAD; PTSD; and SUD), as measured by the MINI and CAPS (for PTSD; Table 3). In every category measured, patients meeting criteria for that disorder were much more likely to be suicidal. Not surprisingly, 79.7% of those who were suicidal were depressed compared with 17.8% of those who were not suicidal.

TABLE 2—SF-36 Functioning by Suicidality Status: Veterans Integrated Service Network Hospitals, 1999–2001

SF-36 Domain	Suicidal		Not Suicidal		Rank Sum *P* (unadjusted)	GLM *P* (adjusted)[b]
	Mean (SD)	Median	Mean (SD)	Median		
Physical functioning	43.9 (25.0)	45	61.1 (29.5)	65	.000	.000
Role: physical (continuous)	16.9 (30.4)	0	51.4 (42.4)	50	.000	.000
Role: emotional (continuous)	25.4 (34.0)	0	77.6 (37.7)	100	.000	.000
Bodily pain	35.9 (27.6)	25	60.5 (30.6)	62.5	.000	.000
Pain intensity (7 mo)[a]	3.7 (1.1)	4[a]	2.8 (1.2)	3[a]	.000	.000
Impairment due to pain (8 mo)[a]	3.5 (1.3)	4[a]	2.3 (1.4)	2[a]	.000	.000
General health (continuous)	55.3 (11.9)	55	59.1 (10.9)	60	.005	.005
Vitality	32.3 (20.6)	30	50.4 (24.8)	50	.000	.000
Social functioning (continuous)	49.2 (29.2)	45	77.9 (27.6)	90	.000	.000
Mental health (continuous)	46.1 (23.2)	48	77.5 (19.7)	84	.000	.000
Physical health (composite)	116.2 (52.8)	110	171.6 (66.2)	172	.000	.000
Mental health (composite)	152.9 (87.2)	135	283.4 (89.6)	310	.000	.000

Note. GLM = generalized linear model; SF-26 = Short Form-36.
[a]Raw score (neither reverse-scored nor transformed).
[b]Adjusted for age, race, gender, and education.

Pain-Related Diagnoses

We grouped patients according to whether they had an *ICD-9* diagnosis related to back, chest, head, neurologic, musculoskeletal, or "other" pain (for groupings by diagnosis, see the data available as a supplement to the online version of this article at http://www.ajph.org). Suicidal patients were more likely than nonsuicidal patients to have head pain (21.6% vs 9.8%; *P* = .002) or musculoskeletal pain (78.4% vs 59.3%; *P* = .001); findings were not significant for back, neurologic, or "other" pain. Overall, 89.2% of patients indicating suicidality received 1 or more pain diagnoses compared with 70.6% of patients with no suicidal ideation (*P* = .001; Table 4).

Charlson Comorbidity Index

As a measure of overall medical morbidity, we used *ICD-9* codes to calculate a CCI for every patient. This index ranges from 0 to 2, with 0 the best and 2 the worst. There were no statistically significant differences between CCI distribution for suicidal versus nonsuicidal patients (Table 5); therefore, CCI was not included in multivariable analyses.

TABLE 3—MINI and CAPS Psychiatric Diagnoses, by Suicidality: Veterans Integrated Service Network Hospitals, 1999–2001

	Not Suicidal (n = 742), No (%)	Suicidal (MINI module C; n = 74), No (%)	Total (n = 816), No (%)	χ^2 *P*
MDDbroad	132 (17.8%)	59 (79.7%)	191 (23.4%)	<.001
GAD	65 (8.8%)	33 (44.6%)	98 (12.0%)	<.001
PTSD[a]	54 (7.3%)	44 (59.5%)	98 (12.0%)	<.01
SUD	20 (2.7%)	7 (9.5%)	27 (3.3%)	.002
Any	185 (24.8%)	65 (87.8%)	249 (30.5%)	<.001

Note. CAPS = Clinician Administered PTSD Scale; GAD = generalized anxiety disorder; MDD = major depressive disorder; MINI = Mini International Neuropsychiatric Interview; PTSD = posttraumatic stress disorder; SUD = substance use disorder.
[a]CAPS diagnosis.

TABLE 4—Pain Diagnoses, by Suicidality Status: Veterans Integrated Service Network Hospitals, 1999–2001

Diagnosis	Not Suicidal (n = 742), No (%)	Suicidal (MINI module C; n = 74), No (%)	Total (n = 816), No (%)	χ^2 *P*
Back pain	173 (23.3%)	23 (31.1%)	196 (24.0%)	.136
Chest pain	97 (13.1)%	11 (14.9)%	108 (13.2%)	.664
Head pain	73 (9.8%)	16 (21.6%)	89 (10.9%)	.002
Neurologic pain	59 (8.0%)	9 (12.2%)	68 (8.3%)	.211
Musculoskeletal pain	440 (59.3%)	58 (78.4%)	498 (61.0%)	.001
Other pain types	82 (11.1%)	8 (10.8%)	90 (11.0%)	.950
Any pain	524 (70.6%)	66 (89.2%)	590 (72.3%)	.001

Multivariable Analyses

Suite 1: Sociodemographics. In our first analytic suite (Table 6) we explored the influence of sociodemographic variables on suicidality. ORs (adjusted for gender, race, education, employment, and warzone service) revealed that both middle-aged patients (50–64 years old; OR 2.42; 95% confidence interval [CI] = 1.22, 4.78) and younger patients (< 50 years old; OR 3.35; 95% CI = 1.34, 8.36) were more likely to indicate suicidality than were older patients (> 65 years). Patients with a college degree or greater were less likely to report suicidality than were patients with less than a college degree (OR 0.37; 95% CI = 0.14, 0.97). Patients who were either retired (OR 0.45 95% CI = 0.23, 0.90) or working (OR 0.19 [95% CI = 0.10, 0.39) were less likely to report suicidality than were patients who were not working because of disability. Patients who reported exposure to warzone military service were more likely to indicate suicidality than were unexposed patients (OR 3.00; 95% CI = 1.68, 5.29). Although patients indicating suicidality were more likely to be White, male, and not married, these differences were not significant in this suite. No significant interaction effects were found among the key variables in this model.

Suite 2: Sociodemographics, functioning, and psychiatric diagnoses. In our first model, we used statistically significant and clinically relevant sociodemographic covariates as control variables in the presence of the 2 composite functioning scales. Only the mental health composite was statistically significant (OR 0.99; 95% CI = 0.99, 0.99). In our second model (Table 6), we examined psychiatric diagnoses in the presence of the previously specified sociodemographic variables. Major depression (or dysthymia; OR 4.40; 95% CI = 1.87, 10.36), GAD (OR 2.13; 95% CI = 1.07, 4.23), and PTSD (OR 4.02; 95% CI = 1.95, 8.29) were related to suicidality. SUDs were not. In a combined model with both mental health composite score and psychiatric diagnoses (major depression, GAD, PTSD) each remained significant; there were no interactions. To simplify subsequent analyses and reduce the potential for collinearity, we created a variable indicating the presence of any psychiatric disorder. No significant interaction effects were found among the key variables in this model.

Suite 3: Sociodemographics and pain. The first model in suite 3 (Table 6) examined the SF-36 bodily pain subscale in the presence of the sociodemographic covariates. This subscale was highly significant (OR 0.98; 95% CI = 0.97, 0.99). We then divided this subscale into its 2 component questions (pain severity and impairment because of pain), and only pain impairment was significant (OR 1.44; 95% CI = 1.17, 1.77). The next model tested sociodemographics and *ICD-9* pain categories and showed that musculoskeletal pain (OR 1.69; 95% CI = 0.90, 3.19) and head pain (OR 1.83; 95% CI = 0.90, 3.71) were related to suicidality. The final model in suite 3 combined sociodemographics, pain impairment, head pain, and musculoskeletal pain; all continued to reach our threshold (P < .10) for inclusion in subsequent models. No significant interaction effects were found among the key variables in this model.

Suite 4: Sociodemographics, functioning, psychiatric diagnoses, and pain. In our final model (Table 6), we included our sociodemographic covariates as well as mental health functioning, the presence of any psychiatric diagnoses (major depression, dysthymia, GAD, PTSD, or SUD), pain impairment, and head and musculoskeletal pain. Only mental health functioning (OR 0.99; 95% CI = 0.99, 0.99) and psychiatric disorders OR 7.58; 95% CI = 3.32, 17.31) remained significant. No significant interaction effects were found among the key variables in this model.

TABLE 5—Charlson Comorbidity Index by Suicidality: Veterans Integrated Service Network Hospitals, 1999–2001

	Not Suicidal (n = 742), No (%)	Suicidal (MINI module C; n = 74), No (%)	Total (n = 816), No (%)	χ^2 *P*
Charlson Index				.385
0	261 (35.2%)	32 (43.2%)	293 (35.9%)	
1	197 (26.6%)	17 (23.0%)	214 (26.2%)	
2	284 (38.3%)	25 (33.8%)	309 (37.9%)	
Total	742 (100%)	74 (100%)	816 (100%)	

DISCUSSION

Our findings indicated that VA patients reporting symptoms of suicidality had significantly different sociodemographic characteristics and clinical characteristics than nonsuicidal patients. Although many of our findings were not unexpected (e.g., high prevalence of psychiatric disorders among suicidal patients), some were new. In contrast to other published reports, we found that middle-aged veterans had the highest percentage of suicidal patients and elder patients the lowest. This might be a cohort-related phenomenon related to service era, or it might reflect variations in how VA accepts

TABLE 6—Odds of Suicidality From Multivariable Modeling, by Suite: Veterans Integrated Service Network Hospitals, 1999–2001

	Suite 1, OR (95% CI)	Suite 2, OR (95% CI)	Suite 3, OR (95% CI)	Suite 4, OR (95% CI)
	Sociodemographics			
Age				
Middle vs older aged	2.42 (1.22, 4.78)	0.70 (0.30, 1.62)	1.70 (0.83, 3.46)	0.79 (0.35, 1.79)
Younger vs older aged	3.35 (1.34, 8.36)	0.72 (0.24, 2.16)	1.96 (0.75, 5.09)	0.72 (0.25, 2.10)
Race	1.31 (0.76, 2.26)	1.87 (0.95, 3.67)	1.56 (0.88, 2.77)	1.78 (0.94, 3.37)
Gender	0.85 (0.38, 1.90)	1.14 (0.44, 3.00)	1.18 (0.51, 2.76)	1.58 (0.63, 3.97)
Warzone	3.00 (1.68, 5.29)	1.47 (0.70, 3.07)	2.72 (1.50, 4.95)	1.92 (0.98, 3.76)
Employment				
Retired vs disabled	0.45 (0.23, 0.90)	0.56 (0.25, 1.25)	0.55 (0.27, 1.13)	0.64 (0.29, 1.39)
Working vs disabled	0.19 (0.10, 0.39)	0.50 (0.22, 1.13)	0.33 (0.16, 0.69)	0.43 (0.19, 0.95)
Marital status				
LWS vs single	1.80 (0.59, 5.45)	Dropped	Dropped	Dropped
SDW vs single	1.73 (0.54, 5.53)	Dropped	Dropped	Dropped
College education	0.37 (0.14, 0.97)	0.48 (0.17, 1.40)	0.43 (0.16, 1.16)	0.46 (0.16, 1.30)
	Pain, functioning, and mental health			
SF-36 composite scores				
Physical health		Dropped		Dropped
Mental health		0.99 (0.99, 0.99)		0.99 (0.99, 0.99)
ICD-9 psychiatric diagnoses				
MDDb		4.40 (1.87, 10.36)		. . .[a]
GAD		2.13 (1.07, 4.23)		. . .[a]
PTSD		4.02 (1.95, 8.29)		. . .[a]
Any				7.58 (3.32, 17.31)
SF-36 pain				
Severity (item 7)			Dropped	Dropped
Impairment (item 8)			1.44 (1.17, 1.77)	0.82 (0.62, 1.08)
Bodily pain			Dropped	Dropped
ICD-9 pain diagnoses				
Back pain			Dropped	Dropped
Chest pain			Dropped	Dropped
Head pain			1.83 (0.90, 3.71)	1.86 (0.84, 4.12)
Neurologic pain			Dropped	Dropped
Musculoskeletal pain			1.69 (0.90, 3.19)	1.95 (0.97, 3.91)
Other pain types			Dropped	Dropped

Note. GAD = generalized anxiety disorder; *ICD-9* = *International Classification of Diseases-9*; LWS = living with someone; MDDb = major despressive disorder broad definition (includes dysthymia); PTSD = posttraumatic stress disorder; SF-36 = Short Form 36; SUD = substance use disorder; SDW = separated, divorced, or widowed,

[a]Psychiatric diagnoses were collapsed into a single variable indicating the presence of any psychiatric diagnosis; this was done due to collinearity in the model.

veterans for care over time. Nonetheless, it was clearly related to mental health because age-related findings became nonsignificant in the presence of psychiatric disorders. We expected to find higher rates of psychiatric problems and pain among suicidal patients; interestingly, the 2 are not often measured simultaneously. Furthermore, we incorporated both self-reported measures of pain and mental health (with the SF-36 scales), as well as independent measures (psychiatric diagnoses and *ICD-9* diagnoses associated with pain). Both methods were independently important in the separate models (suites 2 and 3) for defining a relationship with suicidality. However, when mental health and pain were considered jointly, pain—regardless of how measured—was no longer related to suicidality, but mental health (both presence of diagnoses as well as self-reported mental health functioning) was highly related. Thus, although PCPs should be alert to the possibility of suicidality in patients with chronic pain, they should be even more vigilant with their patients who have a psychiatric disorder, not only depression but also anxiety symptomatology, or importantly, poor mental health functioning.

Our study had a number of strengths, including the large random sample from primary care settings drawn from 4 regional hospitals, the use of both clinician and patient measures of pain, and the use of research-based psychiatric diagnoses to provide a consistent mental health assessment. Nevertheless, the study was limited in that it was cross-sectional; thus, we could only discuss association rather than causality. Additionally, we had only a regional sample of VA patients. We also measured suicidality and not suicide itself; however, suicidality was a clear risk factor for suicide that warrants clinical attention.

Our results had several policy implications. Presently, the US Preventive Services Task Force recommends neither for nor against screening for suicide in primary care; however, the VA might consider a different policy based on the higher prevalence of suicidality and suicide in veterans, unique patient characteristics, and more available and integrated mental health services. Pain-related diagnoses and pain functioning emerged as important factors related to suicidality, although that association did not persist in the presence of mental health problems. Nevertheless, Veterans Health Administration should strongly consider targeted screening for patients with pain-related diagnoses (particularly musculoskeletal and head pain). Suicide screening in pain clinics could be easily implemented, especially because many pain clinics already include behavioralists on the treatment team. Additionally, self-reported pain was related to suicidality, with pain-related functioning being more important than pain severity. Thus, providers should be careful to ask about pain-related functioning limitations. Presently, suicide screening in VA primary care clinics

only occurs in the context of a positive mental health screening for either depression or PTSD. Because 20.2% of our suicidal patients did not meet criteria for depression or PTSD, the Veterans Health Administration should consider additional methods to identify these at-risk patients, which could include veterans reporting pain, veterans with pain-related diagnoses, or general screening in primary care. ■

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Contributors

K. M. Magruder and D. Yeager developed the statistical approach and conducted all statistical analyses. O. Brawman-Mintzer provided clinical guidance and interpretation of all clinical outcomes. All authors participated in the original conceptualization, collection, and compilation of background literature and synthesis of data; writing; and providing comments and corrections to various iterations of the article over time.

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