

3 A Public Health Framework Suggests Five Challenges for Suicide Prevention

5 Evaluation of a New Program that Uses Predictive Modeling in the Fight Against Veteran Suicide

7 VA Suicide Prevention: From Risk Factors to At-Risk Veterans

9 Concerning Trends in Suicide Among Women Veterans Point to Need for More Research on Tailored Interventions

10 Research Seeks to Better Understand the Relationship between Combat-related Killing and Suicidal Ideation

Spring 2018

FORUM

translating research into quality healthcare for Veterans

VA



U.S. Department of Veterans Affairs

Veterans Health Administration
Health Services Research & Development Service

Commentary

Preventing Suicide among Veterans Will Require Clinicians and Researchers to Adopt a Public Health Approach

Lisa A. Brenner, PhD, Claire Hoffmire, PhD, Nathaniel Mohatt, PhD, Jeri E. Forster, PhD, all with the Rocky Mountain Mental Illness Research Education and Clinical Center, Denver, Colorado

In the United States, suicide is the 10th leading cause of death, and rates across populations continue to rise. Compared to members of the general population, Veterans have been found to be disproportionately affected by suicide.

The VHA Office of Mental Health and Suicide Prevention's 2017 report "Suicide among Veterans and Other Americans 2001–2014" sheds light on a number of concerning trends. In 2014, Veterans comprised 8.5 percent of the US population, and accounted for 18 percent of deaths by suicide. Within the Veteran population, many cohorts are at high risk for suicide, including those between the ages of 18 and 29, those who are older than 60, and those living in rural communities.¹ Particularly concerning are data that suggest a 62.4 percent increase in the age-adjusted rate of suicide among female Veterans from 2001 to 2014.

When comparing firearms to other methods of suicide, the former are associated with the highest case fatality rate. This finding holds true for both male and female Veterans. As firearm training is common among military personnel, this shared experience has been identified as a possible contributor to the more frequent use of this method among Veteran cohorts. For example, among female Veterans, firearms were used by 40.5 percent of those who died by suicide. This is compared to a 31.1 percent firearm use by female non-Veterans who died by suicide. Moreover, nearly 70 percent of male Veterans who died by suicide used a firearm compared to

approximately 50 percent of non-Veteran males who died by suicide.

Enhancements in Care to Prevent Suicide

As one of the nation's leaders in suicide prevention efforts, VHA has implemented diverse strategies to identify and enhance care for those at risk at both the population and clinical levels. These strategies include establishing the 24/7 Veterans Crisis Line, placing full time Suicide Prevention Coordinators at hospitals and large Community Based Outpatient Clinics, using predictive modeling to identify and engage Veterans believed to be at high risk for suicide, and facilitating trainings for mental health providers regarding lethal means safety. It is our belief that these efforts have contributed to promising data regarding suicide trends among Veterans who seek VHA care as compared to those who do not. Before 2006, rates of Veteran suicide (adjusted for age and sex differences) were lower than that of civilians. From 2001 to 2014, the risk for death by suicide among Veterans increased relative to non-Veterans, to where Veterans were 22 percent more likely to die by suicide than non-Veterans. However, clear differences have also emerged regarding estimates of relative risk for death by suicide between Veterans who use VHA services and those who do not. Between 2001 and 2014, suicide rates among Veterans who recently used VHA services increased by 5.4 percent compared to a 38.4 percent increase for Veterans who

did not use such services. Moreover, among female Veterans who used VHA services, suicide rates decreased by 2.6 percent. This is compared to a striking increase of 81.6 percent in suicide rates among female Veterans with no recent use of VHA services.

Suicide as Public Health Problem

Historically, public health approaches were most frequently implemented to prevent acute and chronic diseases. Over time, scientific knowledge has contributed to the understanding that complex health-related problems, including suicide, are influenced by a wide range of factors. Importantly, many of these factors exist outside healthcare systems and can be addressed using a public health approach to prevention. Integral to the public health model is the idea that negative outcomes can be prevented by health promotion. That is, empowering individuals via policies, education, and interventions to improve their own health can lead to overall reductions in negative outcomes.

As such, there is wide-spread agreement among researchers and clinicians that a public health approach to suicide prevention is essential to meaningfully reduce suicide rates. Adoption of such an approach does not preclude traditional healthcare-based interventions, focusing on those seeking treatment within VHA, but rather provides the opportunity to expand suicide prevention efforts to meet the needs of those not currently seeking VHA care. Comprehensive

Continued on next page

DIRECTOR'S LETTER



Preventing Veteran suicide was the highest clinical priority of outgoing VA Secretary Dr. David Shulkin, and that priority is likely to continue for our new Secretary. The problem of suicide is a national problem rather than one specific to VA—along with drug overdoses and alcohol-related deaths, suicide is part of an epidemic of “deaths of despair” that have contributed to rising all-cause

mortality this century among white non-Hispanic Americans without a college degree.¹ The problem of suicide among Veterans, however, has unique aspects that make it a distinct and compelling issue.

First, between 2001 and 2014, suicide rates were higher among Veterans compared to their civilian counterparts.² Second, though the role of combat remains uncertain, suicide rates have increased among active-duty military,³ and clusters of suicides among isolated returning combat units have called attention to the possible contribution of combat-related trauma and PTSD. It is particularly heartbreaking when a servicemember survives the dangers of war only to take his or her own life when safely back home. Third, the risk of suicide is dramatically increased in women Veterans (2.5 fold higher than civilian women) and has risen substantially over the past two decades. Finally, whereas civilian suicide rates are highest among men over age 75, among Veterans seeking care in VA, suicide rates are now highest among men aged 18-29. These figures are not an indictment of the VA health system—suicide rates are lower among Veterans who are cared for by VHA than among those outside our system, and suicide rates within VHA have declined among those treated for specific mental health conditions. But the steadily increasing burden of PTSD, depression, and drug and alcohol use disorders among those seeking VA healthcare has caused the number of suicides to rise.

As the individual commentaries in this issue of FORUM indicate, there are many things we know about Veteran suicide but many more we don't. We know that nearly two-thirds of Veteran suicides are committed with firearms, and that high gun ownership may be part of the increased risk among Veterans; however, we don't know the best way to prevent gun-related suicides among at-risk Veterans. We can now identify patients at higher risk of suicide using a variety of clinical and demographic factors incorporated into tools such as REACH VET (see Landes Research Highlight), but we don't yet know the most effective interventions to offer them once flagged. Research shows that underlying mental health problems (especially depression and substance abuse) are major risk factors, we don't yet know the most effective medical or psychological treatments for preventing suicide. In addition, risk increases during the transition from active duty to Veteran status, but the exact reasons or best interventions for that risk are unknown. Finally, we know that studying effective interventions in suicide is challenging because it remains an infrequent event and thus requires large long-term studies. Therefore, the particular nature of suicide requires creative research-clinical partnerships.

The ongoing suicide crisis compels VA and our partners in DoD to act in the face of imperfect evidence, but research is necessary to inform our partners about what is working, what may need to be revised, and what new strategies are worth testing.

References

1. Case A and Deaton A. “Mortality and Morbidity in the 21st Century.” Brookings Papers on Economic Activity, Spring 2017.
2. “Suicide among Veterans and Other Americans,” Office of Suicide Prevention. August 3, 2016. Updated August 2017, VA Office of Mental Health and Suicide Prevention.
3. Anglemeyer A, Miller M, Buttrey S, and Whitaker L. “Suicide Rates and Methods in Active Duty Military Personnel, 2005 to 2011: A Cohort Study,” *Annals of Internal Medicine* 2016; 165(3):167-74.

suicide prevention programs, like the one being promoted by the VHA Office of Mental Health and Suicide Prevention, are comprised of multiple strategies, with interventions ranging from those aimed at health promotion (e.g., improving sleep), to universal prevention (e.g., media campaigns aimed at changing beliefs regarding suicide), to treatment and recovery (e.g., cognitive behavioral therapies for suicide prevention among those with a history of a suicide attempt).

Health Services Research and the Public Health Approach to Suicide Prevention

A 2009 article by Schutchfield and colleagues argues that health services research has focused on “the production and consumption of medical care, while giving comparatively little attention to another important component

of the health system—that of public health services.”² While this article is nearly ten years old, and there has been an increase in focus on public health (e.g., rates of influenza during the 2017/2018 flu season), additional efforts, particularly pertaining to suicide prevention, are warranted. This will require the adoption of methods that may be less familiar to suicide prevention researchers within the health services research community (e.g., pragmatic trials, quasi-experimental community-based studies), as well as those that have not yet been sufficiently deployed (e.g., social network analysis).

For example, using a population dataset and Empirical Bayes standardized mortality ratios, Liu examined the effects of sociodemographic factors on suicide by neighborhood composition.³ Liu's findings suggest that

the impact of individual attributes (e.g., low income) on suicide depends on social contexts (e.g., neighborhood composition by income). As Liu noted, “this study contributes to the literature by showing administrative data can be used to study the effect of small-area interaction on rare outcomes.” The author also suggested that our ability to focus on potential underlying contextual mechanisms of suicide are limited by a “lack of administrative datasets” that include information for populations as a whole.

Another limitation to existing information stems from the separation of clinical data, such as that maintained by VHA, from community indicators such as economic, crime, and other social determinants data. Utilizing data resources within VA, as well as in partnership with others, health services

A Public Health Framework Suggests Five Challenges for Suicide Prevention

Steven K. Dobscha MD, HSR&D Center to Improve Veteran Involvement in Care, VA Portland Health Care System, Portland, Oregon, and Mark A. Ilgen, PhD, VA Center for Clinical Management Research, VA Ann Arbor Healthcare System, Ann Arbor, Michigan

VHA has committed substantial resources to understanding the prevalence and impacts of suicide among Veterans, its risk factors, and approaches to reducing suicide and suicide behaviors. Gaps remain, however, in many aspects of suicide research, and innovative approaches are needed. Eric Caine, MD, an eminent suicide researcher, recently argued for “broadly based public health approaches that reach beyond the current methods of finding individuals deemed to be at imminent risk to die,” and presented a series of challenges for suicide prevention that have yet to be addressed.¹ Twenty-five years ago, the Institute of Medicine proposed a framework for organizing population-based prevention strategies: 1) *universal* strategies are designed to reach an entire population to prevent or delay onset of the problem; 2) *selective* prevention strategies identify and target subsets of the population who have been identified to be at risk; and 3) *indicated* strategies are designed to prevent negative consequences among individuals at confirmed risk.² Here we present five VHA and health services-specific challenges, outlined below, that cut across these prevention domains.

Challenge 1: Match Veterans’ needs to the appropriate type and intensity of services.

VHA is currently funding a number of research and operations projects focused on optimizing screening, risk assessment, and risk stratification. Projects in this category generally fall into the *selective* prevention domain. One such project, REACH VET (Recovery Engagement and Coordination for Health – Veterans Enhanced Treatment), uses a predictive analytic approach with administrative data to identify Veterans at high risk for suicide. While REACH VET and other new risk stratification tools are important developments, there is currently little scientific evidence to guide tailoring of treatment approaches to levels of identified risk. The field has not yet rigorously examined how to best prepare clinicians and care teams to use such data in care. There are also gaps in our

ability to estimate and respond to suicide risk as it changes over time—suicidal intent and action are frequently transient. Additional research incorporating temporality into risk stratification, clinical decision-making, and programming is needed.

Challenge 2: Prepare, activate, and support Veterans to use available healthcare services.

Strategies to address this challenge mostly fall within the domains of *universal* and *selective* prevention. For example, Mark Ilgen, PhD, is conducting a clinical trial that prepares Veterans to call the VA Crisis Line. In this study, at-risk Veterans literally practice calling the Crisis Line before they need it. Marianne Goodman, MD, is conducting several projects that involve family members in safety planning, a key goal being for them to support Veterans in accessing VHA care when it is needed. In general, however, VHA researchers are currently conducting few projects addressing this challenge.

Challenge 3: Expand suicide prevention efforts upstream and to Veterans who do not receive VHA care.

This challenge also addresses *universal* and *selective* prevention strategies. The Office of Mental Health and Suicide Prevention is leading substantial outreach efforts targeting both the VHA internal and larger non-VHA communities. Elizabeth Karras, PhD, is conducting projects evaluating VHA’s suicide prevention communication strategies related to firearms messaging and the *Make the Connection* online resource, respectively. Overall, however, little research is being conducted to address this challenge. Looking forward, research opportunities here include exploring impacts of VHA’s Whole Health and Primary Care Mental Health Integration Initiatives, wider spread implementation of lethal means safety counseling, and enhanced use of social media on suicide awareness, education, and treatment-seeking.

Key Points

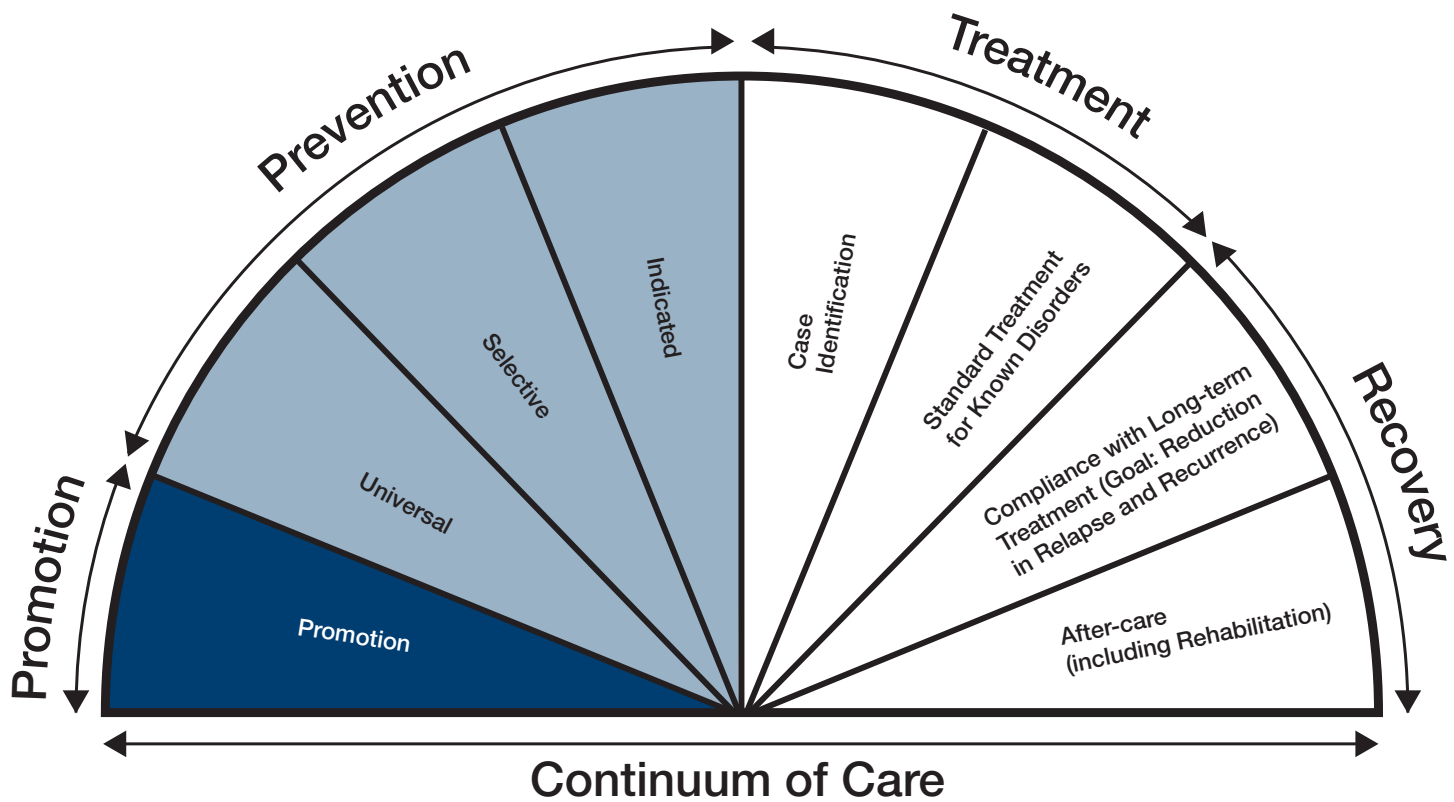
Applying a public health framework can identify clinical and research needs for suicide prevention.

- Match Veterans’ needs to the appropriate type and intensity of services.
- Prepare, activate, and support Veterans to use available healthcare services.
- Expand suicide prevention efforts upstream and to Veterans who do not receive VHA care.
- Coordinate strategies to optimize positive outcomes and reduce negative consequences.
- Scale, implement, sustain, and ensure fidelity to existing evidence-based interventions.

Challenge 4: Coordinate strategies and services to optimize positive outcomes and reduce negative consequences.

VA and the Department of Defense (DoD) are conducting several projects that examine transitions in care. One project in the *indicated* domain, Home-Based Mental Health Evaluation trial, led by Bridget Matarazzo, PsyD, is testing an intervention to help Veterans engage in outpatient care following inpatient psychiatric hospitalization. Key knowledge gaps related to this challenge include understanding how to best coordinate care transitions from DoD to VA, how to successfully coordinate (and leverage) care between community and VA care settings, and how to leverage information technology and telehealth solutions to improve suicide prevention.

Continued on next page



Source: www.samhsa.gov/prevention

Challenge 5: Scale, implement, sustain, and ensure fidelity to existing evidence-based and promising interventions.

VA and other agencies have recently funded a number of clinical trials and pilot projects that fall into the *indicated* prevention domain. Evidence is beginning to accrue that some brief psychotherapy interventions reduce suicide behaviors.³ To date, however, researchers have not conducted large-scale pragmatic or implementation trials in VHA to test methods for expanding access to these promising treatments. It is also unclear what the best approaches are for ensuring fidelity to promising interventions as they are rolled out.

In their FORUM commentary, Lisa Brenner, PhD, and colleagues highlight the need for a public health approach to suicide prevention. The challenges described above call for a range of approaches that cut across all levels of risk. Although important work is being done in each of the prevention domains, the universal domain is relatively underrepresented. If VHA is to adopt a public health approach—particularly one that reaches Veterans outside of VHA—we must continue to prioritize efforts to design and fund projects that focus upstream. This includes projects that: 1) improve delivery of, and Veteran participation in, high quality treatments for conditions that increase risk for suicide; and 2) develop and test approaches that educate, activate, and support Veterans with known and unknown levels of suicide risk, as well as their families and communities, in accessing care when it is needed.

These ideas were developed in collaboration with Peter Mills, PhD, and presented at a VHA/DoD-sponsored meeting in December 2017, which reviewed the suicide prevention research portfolio across VHA, DoD, and other partners and agencies.

References

1. Caine ED. "Forging an Agenda for Suicide Prevention in the United States," *American Journal of Public Health* 2013; 103(5):822-29.
2. Mrazek PJ, Haggerty RJ, eds. *Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research*. Washington DC: Institute of Medicine, National Academy Press; 1994.
3. Brown GK, Jager-Hyman S. "Evidence-based Psychotherapies for Suicide Prevention: Future Directions," *American Journal of Preventive Medicine* 2014; 47(3 Suppl 2):S186-94.

Evaluation of a New Program that Uses Predictive Modeling in the Fight Against Veteran Suicide

Suicide prevention is a high priority for VA. Predictive modeling can support the prevention of suicide-related behavior, as it can be used to identify patients at risk for suicide before they engage in suicide-related behaviors. VA recently implemented a new suicide prevention clinical initiative that utilizes predictive modeling and existing medical record data to identify Veterans at highest risk of suicide; this program is known as the Recovery Engagement and Coordination for Health – Veterans Enhanced Treatment or REACH VET. Variables in the model include demographics (e.g., age, gender, region of country), prior suicide attempts, diagnoses (e.g., depression, chronic pain, diabetes mellitus), utilization of VHA services (e.g., emergency department visits, mental health appointments), medications (e.g., benzodiazepines), and interactions between variables. For more detail on the predictive model, see McCarthy et al.¹

REACH VET coordinators at each facility are responsible for monitoring the REACH VET dashboard that identifies those at high risk and tracks next steps for coordinators and providers. Following identification of patients at risk, coordinators notify each patient’s provider of their high-risk status and orient the provider to the dashboard. Providers are required to re-evaluate the patient’s care, determine if care enhancements are needed, and contact the patient.

Supported by a competitive HSR&D planning grant, the Office of Mental Health and Suicide Prevention (OMHSP) partnered with Dr. Landes and her evaluation team to develop an evaluation plan while the REACH VET program was being developed. This partnership resulted in HSR&D funding for a randomized program evaluation of the implementation of REACH VET. Dr. John McCarthy is evaluating the impact of the REACH VET on patient-level outcomes.

Sara J. Landes, PhD, and James Townsend, DHSc, MBA, MIS, both with the VISN 16 MIRECC & Team-Based Behavioral Health QUERI, Central Arkansas Veterans Healthcare System, Little Rock, Arkansas and Brandy N. Smith, BA, National Center for PTSD, VA Palo Alto Health Care System, Palo Alto, California

Key Points

Predictive modeling can help prevent suicide-related behavior by identifying patients at risk for suicide.

- VA has implemented a new suicide prevention initiative that uses predictive modeling to identify Veterans at risk: REACH VET.
- VA’s predictive modeling draws from existing medical record data.
- Following identification of patients at risk, coordinators notify each patient’s provider of their high-risk status and orient the provider to the dashboard.
- Preliminary evaluation results show a positive impact on Veterans engaged by REACH VET: more health and mental healthcare appointments, decreases in percent of missed appointments, fewer inpatient mental health admissions, and lower all-cause mortality.



The standard implementation strategies used for REACH VET include policy memos, identification of a coordinator at each of the 140 VA healthcare systems, web-based training, educational and support materials, and technical assistance. External implementation facilitation is being offered to sites having difficulty fully implementing the program. Facilitation is “a process of interactive problem solving and support that occurs in a context of a recognized need for improvement and a supportive interpersonal relationship.”² This interactive support process can include a combination of any implementation strategies and typically bundles multiple strategies as needed. As described in a previous FORUM

Continued on next page

article, facilitation was developed in part through work with VA operational partners and has been successfully applied in several national initiatives.³

The REACH VET facilitators are three clinical experts in suicide prevention who were trained in facilitation, along with their supervisor and the REACH VET National Program Manager. Having the facilitators, their supervisor (the clinical lead for REACH VET), and the operational partner together for the training allowed for discussions about how facilitation for REACH VET would proceed. Having operational partner leadership at the training resulted in more informed decision making, as all involved parties were present and able to discuss options with facilitation experts. The evaluation team also attended the training, allowing for tailoring of evaluation.

REACH VET facilitation includes an in-person site visit for collaborative implementation planning and ongoing virtual support for six months. OMHSP is providing facilitation in a stepped wedge design to seven VISNs identified as needing additional implementation support. The four lowest performing facilities in each participating VISN will receive facilitation. The evaluation team

will include these 28 sites in their assessment. Facilitation in the first VISN began in August 2017 with site visits and the third VISN began facilitation in March 2018.

The evaluation team is evaluating numerous implementation outcomes, including: 1) *reach*: the proportion of patients identified at each facility who receive the REACH VET intervention; 2) *adoption*: the proportion of mental health and primary care providers in each facility that participate; 3) *implementation fidelity*: whether facilities implemented all components of the intervention as directed by the memos and the REACH VET program website; and 4) *cost of implementation*: the amount of effort and time needed to offer virtual external facilitation. The evaluation team is also assessing the organizational context of each facility using the Organizational Readiness for Change survey. The team will conduct qualitative interviews in order to assess the overall facilitation process, including barriers and facilitators to implementation. This project, in collaboration with the Behavioral Health Quality Enhancement Research Initiative (BH QUERI), is one of four projects evaluating facilitation with a common set of measures to advance our knowledge of the use of facilitation to

implement complex interventions in VA.

OMHSP recently completed a preliminary evaluation of the impact of REACH VET on patient outcomes by examining 6-month outcomes for Veterans identified by REACH VET. In comparison to control groups, Veterans engaged by REACH VET had more health and mental healthcare appointments, decreases in percent of missed appointments, fewer inpatient mental health admissions, and lower all-cause mortality.⁴

References

1. McCarthy J, et al. "Predictive Modeling and Concentration of the Risk of Suicide: Implications for Preventive Interventions in the US Department of Veterans Affairs," *American Journal of Public Health* 2015; 105:1935-42.
2. Powell BJ, et al. "A Refined Compilation of Implementation Strategies: Results from the Expert Recommendations for Implementing Change (ERIC) Project," *Implementation Science* 2015; 10:21.
3. Ritchie MJ, Kirchner JE. "Facilitation: A Key Strategy in the Field of Implementation Science," *HSR&D FORUM* June 2017.
4. Matarazzo B, et al. "REACH VET: Predictive Analytics in Practice," Presentation at the annual conference of the American Association of Suicidology, April 2018, Washington DC.

Innovation Update

The Virtual Hope Box Smartphone Application | Steven Dobscha and Lauren Denneson

Investigators from HSR&D's Center to Improve Veteran Involvement in Care at the VA Portland Health Care System partnered with the DoD-funded Telehealth and Technology (T2) Center at Joint-Base Lewis McCord on two Military Suicide Research Consortium-funded projects to develop and test the Virtual Hope Box (VHB) smartphone application.^{1,2} VHB was designed to provide a portable suite of tools to enhance coping self-efficacy among Veterans at risk for suicide, incorporating relaxation, distraction, and social engagement strategies along with crisis line information and other resources. The application supports a mix of pre-loaded and user-created content; users can personalize the content with pictures, music, and reminders of reasons for living. In a randomized clinical trial, Veterans who used VHB reported significantly greater ability to cope with unpleasant emotions and thoughts compared with a control group, and found the app to be more helpful than written educational materials. Since its introduction to the public in February 2014, VHB has tallied over 400,000 downloads through iOS and Android marketplaces, with highly positive feedback. The VHB application is one of only a few empirically-tested smartphone tools designed to support patients at risk for suicide. The project was awarded the Association of Military Surgeons of the United States Department of Defense Innovation Award. VA is exploring additional ways to disseminate information about the app and recently incorporated VHB into a mandatory, national VA suicide prevention training program. For more information about VHB, including clinician and Veteran guides, please go to <http://t2health.dcoe.mil/apps/virtual-hope-box>.

References

1. Bush NE, Dobscha SK, Crumpton R, et al. "A Virtual Hope Box Smartphone App as an Accessory to Therapy: Proof-of-concept in a Clinical Sample of Veterans," *Suicide and Life-Threatening Behavior* 2015; 45:1-9.
2. Bush NE, Smolenski DJ, Denneson LM, et al. "A Virtual Hope Box: Randomized Controlled Trial of a Smartphone App for Emotional Regulation and Coping with Distress," *Psychiatric Services* 2017; 68:330-36.

VA Suicide Prevention: From Risk Factors to At-Risk Veterans

John F. McCarthy, PhD, MPH, Aaron Eagan, RN, MPH, Ira R. Katz, MD, PhD, all with the VHA Office of Mental Health and Suicide Prevention, Washington, DC

Veteran suicide is a national concern. VA has documented that suicide rates among patients receiving care in the VA health system exceed those found in the US adult population. Preventing suicide is VA's top clinical priority. Additional approaches are needed, however, to address suicide as a public health priority.

VA has expanded mental health access and implemented innovative suicide prevention services.¹ Consistent with Beverly Pringle's call to better know "whom to target, with which interventions, and in what order of priority," as part of innovative prevention efforts, VA has developed suicide predictive modeling.² In 2016, this work moved beyond proof of concept with implementation of the Recovery Engagement And Coordination for Health – Veterans Enhanced Treatment (REACH VET) program. Through REACH VET, facilities receive information regarding patients in their top 0.1 percent tier of predicted risk based on indicators in the electronic health record. REACH VET shifts the focus of suicide analytics from individual risk factors to individuals at risk, and supplements clinical approaches to risk assessment.

There was consideration of the feasibility of systematically quantifying individuals' suicide risk as early as the mid-1950s. It was regarded then as impractical, given concerns about the anticipated large number of false positives and it was argued that trying to address this by focusing on individuals determined to be at highest risk would drastically reduce the number of correctly identified suicidal patients. By the early 1970s, perhaps with changing expectations that prevention services could include outpatient care, suicide risk calculation was considered potentially practicable. Over 40 years later, VA has demonstrated that health systems can systematically assess suicide risk concentration and employ this information to support suicide prevention.

There are three main approaches to characterize suicide risk concentration. First, as part of routine clinical care, individual providers consider their patients' well-being via clinical assessments and in light of known risk factors. The literature identifies many factors associated with suicide. These include demographic measures (e.g., male gender), clinical diagnoses (e.g., bipolar disorder, depression), and contextual and temporal factors (e.g., rural residence, time since inpatient psychiatric discharge, and suicide attempts). However, effect sizes of individual associations are typically small considering suicide's low event rate. Also, many suicides occur among individuals without salient suicide risk factors. Such individual assessments would be unwieldy as population-level prevention strategies. A second approach, use of data mining and decision tree algorithms to identify high-risk profiles, has been explored, however this has yielded such individualized profiles that they would be difficult to implement broadly. A third strategy is to evaluate predictive modeling to estimate levels of risk for individual patients. VA's proof of concept work regarding suicide risk concentration followed this approach, using clinical and administrative data that are routinely collected as part of VA electronic health record systems.²

With the involvement of the National Institute of Mental Health, VA developed a predictive model that included over 100 concepts and 381 predictors for patient-months over a three year period for all suicide decedents and 1 percent of living patients, divided randomly into development and validation samples. Predictors included measures thought to be risk factors, specific events entered as lag variables, and interactions known to be important. For example, predictors included age, gender, marital status, mental health diagnoses, utilization, psychotropic medication receipt, and any documented

Key Points

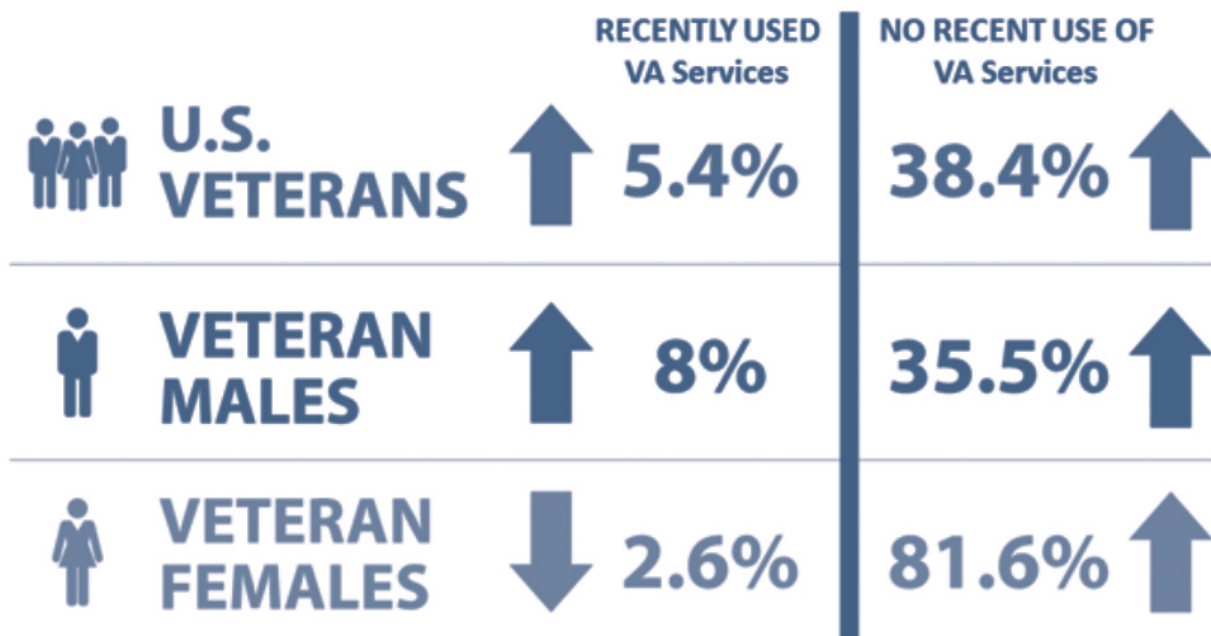
Suicide prevention is VA's top clinical priority.

- VA has expanded mental health access and developed innovative services, including a new program employing predictive modeling.
- The top 0.1 percent risk tier had suicide risk concentration that was 30 times greater than if suicide risk were randomly distributed. These individuals also had elevated risks for death from other external causes and, to a lesser degree, overall non-suicide mortality, mental health hospitalizations, medical-surgical hospitalizations, and suicide attempts.
- REACH VET model enhancements and program evaluation are ongoing.

suicide attempts. Parameters from the logistic regression used for the development sample were used to estimate risk of suicide in the validation sample. To explore the persistence of risk, beyond the index month, they were also applied to a cohort of all VHA patients alive as of 9/30/2010 and risk concentration was assessed over the next 12 months. Risk concentration was measured as the number of observed suicide deaths divided by the expected number if suicide risk were randomly distributed. Modeling demonstrated that suicide rates in the development and validation samples were 39 and 30 times greater in the highest 0.10 percent tier of predicted risk, respectively, as compared to expected rates if suicide risk were randomly distributed. Of the patients in the top 0.1 percent tier of predicted risk, only 21 percent had received a high-risk flag for suicide based on clinical grounds. Suicide risk concentration remained substantially elevated over the subsequent

Continued on next page

Percentage Changes in Age-Adjusted Rates of Suicide in Veterans, 2001-2014



Source: VA's Office of Mental Health and Suicide Prevention

12 months. The model also predicted death from other external causes and, to a lesser degree, overall non-suicide mortality, mental health hospitalizations, medical-surgical hospitalizations, and suicide attempts.

To address problems of correlated measures and to develop a more parsimonious model for operational implementation, VA collaborated with scientists at Harvard University to apply machine learning methods that determine the optimal number of predictors and that select predictors for a new model.³ This was accomplished with similar predictive power using a model with 61 predictors. The Office of Mental Health and Suicide Prevention has developed innovative tools to notify providers of risk assessment results for their patients and to ask providers to reevaluate and enhance care as appropriate in collaboration with the Veteran. This work was completed by the Program Evaluation Resource Center

(PERC) at a remarkable pace and with an ongoing process of modifications to address concerns from the field. REACH VET national program evaluation is ongoing at the Serious Mental Illness Treatment Resource and Evaluation Center (SMITREC). This work is supplemented by ongoing formative evaluation work funded by QUERI and led by Sara Landes.

In considering the swift development and implementation of REACH VET, it is appropriate to recognize some core strengths of the nation's largest integrated health system. REACH VET implementation benefited from VA's close engagement with federal and non-federal scientific partners, active leadership support, a national electronic health record system, innovative field support and program dissemination capabilities, established systems for surveillance and analytics, and the extraordinary efforts of VA professionals

dedicated to the mission of serving Veterans. It is also important to look to the future. The current program identifies and enhances care for VA patients at the highest risk. Future work should extend these enhancements to address the larger group with more moderate risk to make a larger difference in the system as a whole.

References

1. Katz I. "Lessons Learned from Mental Health Enhancement and Suicide Prevention Activities in the Veterans Health Administration," *American Journal of Public Health* 2012; 102 (suppl 1):S14-S16.
2. McCarthy JF, et al. "Predictive Modeling and Concentration of the Risk of Suicide: Implications for Preventive Interventions in the US Department of Veterans Affairs," *American Journal of Public Health* 2015; 105(9):1935-42.
3. Kessler RC, et al. "Developing a Practical Suicide Risk Prediction Model for Targeting High-Risk Patients in the Veterans Health Administration," *International Journal of Methods in Psychiatric Research* 2017; 26(3).

Concerning Trends in Suicide Among Women Veterans Point to Need for More Research on Tailored Interventions

Recent data from the 2016 VA report, “Suicide among Veterans and other Americans: 2001-2014,” demonstrate the importance of understanding suicide risk among women Veterans and developing gender-tailored suicide prevention strategies. Among Veterans, the 2014 suicide rate for women was 19 per 100,000. Although this rate is lower than that observed for men (37 per 100,000), there is concern regarding the more rapid increase in Veteran suicide rates between 2001 and 2014 among women as compared to men; a 62 percent increase versus a 30 percent increase, respectively. Furthermore, the excess suicide risk for Veterans compared to civilians is much higher among women (250 percent, 2014) than among men (19 percent, 2014). Firearms are more commonly used as the mechanism of suicide among Veterans for both women (41 percent) and men (68 percent), as compared to civilians (31 percent and 52 percent, respectively). Notably, women Veterans were the only group for whom the proportion of suicides by firearm increased between 2001 and 2014 (from 36 percent to 41 percent).

These data suggest that although firearm use is not likely to fully explain the excess risk of suicide among women Veterans, the increasing use of firearms among women Veterans is concerning and indicates an opportunity to increase evidence-based interventions promoting firearm safety among women Veterans. Finally, time trends in suicide risk following military service may vary by gender. Findings from one study of Operation Enduring Freedom/Operation Iraqi Freedom Veterans suggest that while suicide risk declines significantly for men during the first seven years post-separation, this is not the case for women, for whom the risk for suicide remains elevated.¹

Despite these trends, the majority of research examining suicide risk among Veterans has been sex and gender neutral; few studies have examined how gender might impact Veterans’ risk for suicide or how risk assessment and prevention approaches could be tailored to account for differences in risk and treatment response. One practical reason for this is that

the low base rate of suicide among women, coupled with the relatively low proportion of women in the Veteran population (10 percent in 2014), makes studying suicide among women Veterans challenging. Accordingly, our current understanding of suicide risk and resilience among Veterans is largely based on studies of men, with only a few emerging trends to suggest that some health and psychosocial factors might be higher-priority intervention targets among women than men.

Although strong social ties are thought to be an important protective factor more broadly, tenuous or unsupportive relationships may be especially concerning for women Veterans as women tend to rely more on social supports to cope with stress and more frequently experience psychological and physical harm from social integration than men.^{2,3} Specifically, past or current physical or sexual abuse, including military sexual trauma, may increase the risk of Veteran suicide among women more so than among men.⁴ Another area that has received attention is substance abuse, though findings to date have been mixed regarding gender differences in the association between substance use disorders and suicide risk. One recent analysis of VA data indicates that the strong association between substance abuse and suicide risk among women Veterans might be explained by other, comorbid mental health conditions.⁵ Meanwhile, a growing body of literature in women’s health indicates the importance of gender-sensitive, coordinated care for women Veterans more broadly, which might be especially important for women who are at risk for suicide.

In recognition of the elevated and increasing suicide rate in the Veteran population, the outgoing VA Secretary recently named suicide prevention as VA’s number one clinical priority. The epidemiologic trends in rates, use of firearms, and risk over time observed among women Veterans suggest that we must incorporate gender into suicide prevention work to rapidly increase our knowledge of suicide risk and resilience across the life

Claire A. Hoffmire, PhD, Rocky Mountain Mental Illness Research, Education and Clinical Center (MIRECC) for Suicide Prevention, Denver, Colorado, and Lauren M. Denneson, PhD, Center to Improve Veteran Involvement in Care, VA Portland Health Care System, Portland, Oregon

Key Points

Additional research is needed to best reach and intervene with women Veterans at risk for suicide.

- Recent data point to concerning trends in Veteran suicide rates among women as compared to men.
- Research shows that there has been an increase in the proportion of suicides by firearms among women Veterans.
- These findings demonstrate the need to develop evidence-based interventions for promoting firearm safety among women Veterans.

course, as well as strategies to tailor firearm safety efforts, for women Veterans. Although published research to date investigating gender differences in suicide risk and treatment response among Veterans is quite limited, this and other work in women’s health point towards the need to identify specific programs and settings to best reach and intervene with women Veterans at risk for suicide.

References

1. Bullman T, Hoffmire C, Schneiderman A, et al. “Time Dependent Gender Differences in Suicide Risk among Operation Enduring Freedom and Operation Iraqi Freedom Veterans,” *Annals of Epidemiology* 2015; 25:964-65.
2. Taylor SE, Klein LC, Lewis BP, et al. “Biobehavioral Responses to Stress in Females: Tend-and-befriend, not Fight-or-flight,” *Psychological Review* 2000; 107:411.
3. Kawachi I, Berkman LF. “Social Ties and Mental Health,” *Bulletin of the New York Academy of Medicine* 2001; 78:458-67.
4. Kimerling R, Makin-Byrd K, Louzon S, et al. “Military Sexual Trauma and Suicide Mortality,” *American Journal of Preventive Medicine* 2016; 50:684-91.
5. Bohnert KM, Ilgen MA, Louzon S, et al. “Substance Use Disorders and the Risk of Suicide Mortality among Men and Women in the US Veterans Health Administration,” *Addiction* 2017; 112(7):1193-1201.

Research Seeks to Better Understand the Relationship between Combat-related Killing and Suicidal Ideation

Shira Maguen, PhD, San Francisco VA Medical Center and Lindsey L. Monteith, PhD, Rocky Mountain Mental Illness Research, Education and Clinical Center (MIRECC) for Suicide Prevention, Denver, Colorado

While there is ample evidence to suggest that killing in war may be a potentially morally injurious experience for Veterans, less evidence exists on how combat-related killing may affect suicide-related outcomes (e.g., suicidal ideation, suicide attempt, suicide).

To better understand whether killing in war contributes unique risk to suicidal ideation, we analyzed data obtained from a cross-sectional, nationally-representative sample of Vietnam Veterans from the National Vietnam Veterans Readjustment Study. Veterans who had higher killing experiences were twice as likely to report experiencing suicidal ideation, compared to those with lower or no killing experiences even after adjusting for demographics, depression, posttraumatic stress disorder (PTSD), substance use disorders, and combat exposure.¹

Next, we examined whether killing in war was associated with suicidal ideation among individuals who had served in more recent conflicts, and whether mental health symptoms mediated this association. Data were collected from 2,854 U.S. soldiers returning from deployment in support of Operation Iraqi Freedom (OIF) as part of a post-deployment screening program at a large Army medical facility.² Depression and PTSD symptoms

mediated the association between killing in combat and suicidal ideation, while PTSD symptoms mediated the association between killing in combat and desire for self-harm. These results provided preliminary evidence regarding different mechanisms of risk that may explain the association between killing and suicidal ideation. Further, these results underscored the importance of screening for and treating PTSD and depressive symptoms among OIF soldiers who experienced killing.

An Understudied Risk Factor

Based on these and other studies that have found killing to be associated with suicidal ideation and attempts, we posit that killing is a potentially important and understudied risk factor for suicidality in military personnel and Veterans. Further, we contend that the impact of killing on suicidal ideation and suicide attempts is likely important to consider in the evaluation and care of Veterans. To guide future research in this area, one framework for more deeply understanding the relationship between combat-related killing and suicide-related outcomes, as well as some of the mechanisms that may be involved, is Joiner's Interpersonal-Psychological Theory of Suicide (IPTS). According to the IPTS, thwarted belongingness and perceived burdensomeness cause suicidal desire, whereas painful and

Key Points

Killing in war is an understudied risk factor for suicide among Veterans and military personnel.

- Research shows that military personnel and Veterans who experience killing in war have an increased likelihood of suicidal ideation and suicide attempts, even after adjusting for mental health and other types of war exposure.
- Additional research is needed to develop a theoretical framework that considers the experience of killing; such a framework may assist in explaining the association between killing and suicide-related outcomes and provide important implications for treatment targets to reduce the risk for suicidal ideation among Veterans who have experienced combat-related killing.

provocative experiences facilitate habituation to the pain and fear associated with suicide, thus increasing one's capability to engage in suicidal self-directed violence. Although the IPTS has been studied with military and Veteran samples, it has not been applied to understanding the impact of killing on suicide-related outcomes.

We recently proposed Joiner's IPTS as a possible explanation for understanding why Veterans who have experienced war-related killing are at increased risk for suicidal ideation and suicidal self-directed violence.³ More specifically, we proposed that combat-related killing may impact suicidal ideation through its effects on perceived burdensomeness and thwarted belongingness (e.g., causing individuals to feel alienated, monstrous, or misunderstood). Further, we theorized that combat-related killing may influence risk for suicidal self-directed violence through its association with the acquired capability for

Veteran Suicide Statistics for 2014

65%

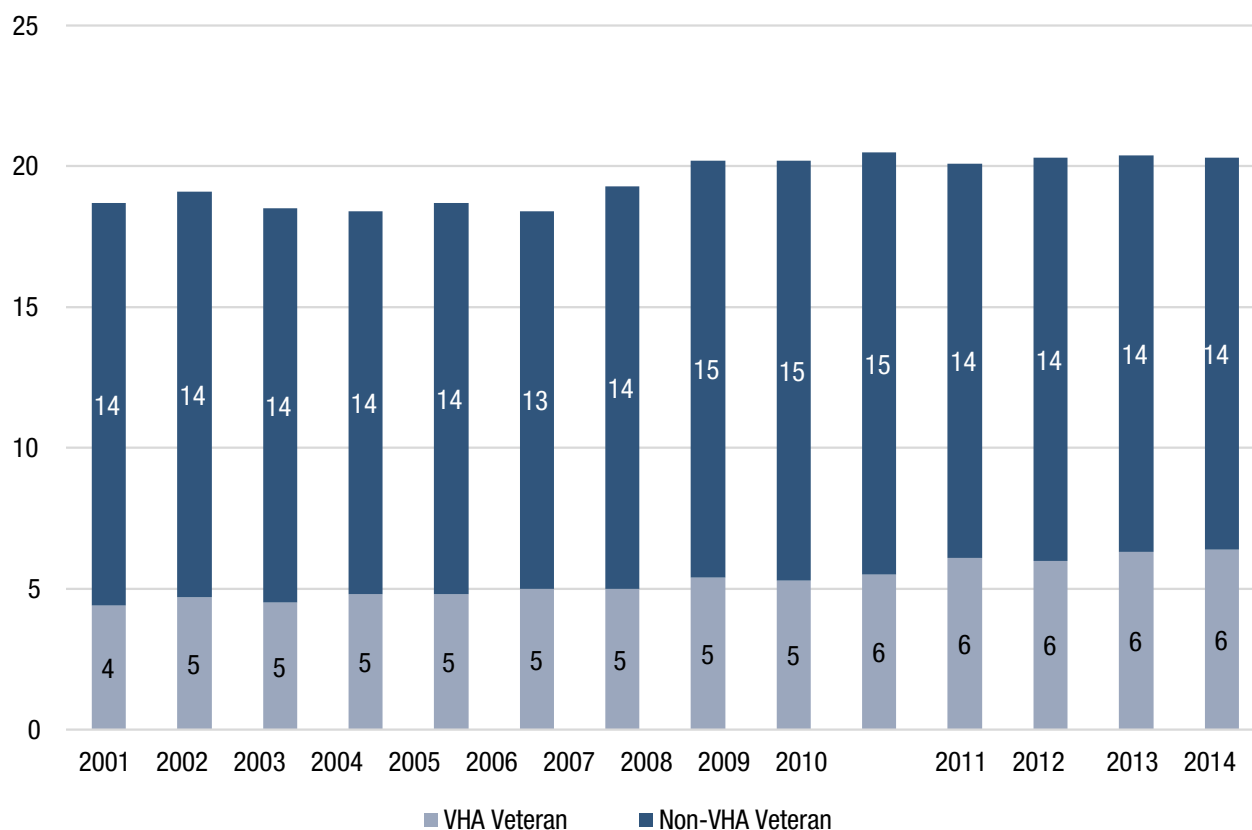
of Veteran suicides are among people age 50 or older

67%

of Veteran suicides are a result of firearm injury



Average Number of Suicides per Day Among Veterans With and Without Use of VHA Services, 2001–2014



Source: VA's Office of Mental Health and Suicide Prevention

suicide, both due to the direct act of killing itself, in addition to common sequelae of killing that individuals may utilize as a means of coping (e.g., substance abuse, risky behaviors). In focus groups comprised of individuals who have been impacted by killing in war, we have found that killing exposed them to the “dark side of the self,” and that this influenced their relationships, sense of belongingness, and led to withdrawal. Veterans also discussed ways in which exposure to death and dying can numb individuals—both to these experiences and to their emotional reactions. This numbing effect could subsequently result in a lower threshold and higher risk for suicidal self-directed violence.

Determining whether the IPTS is a helpful lens through which to examine the association between killing and suicide requires further research. This includes examining whether individuals who have engaged in killing are more likely to experience perceptions of thwarted belonging, perceived

burdensomeness, and higher levels of the acquired capability for suicide (e.g., fearlessness about death). If supported, identifying modifiable factors that contribute to these experiences will be critical, as well as determining the most effective means of addressing these experiences (e.g., healing from moral injury, increasing a sense of belonging and community). Currently, there are several treatments for moral injury that are supported by prior research (e.g., Impact of Killing, Adaptive Disclosure), and these can be an excellent starting point for individuals who are struggling with the impact of killing in war and other moral injuries.

Overall, our research shows that military personnel and Veterans who have experienced killing in war have an increased likelihood of experiencing suicidal ideation and suicide attempts, even after adjusting for mental health and other types of war exposure. There is some research to suggest that these relationships may be mediated by mental health outcomes; however, a

theoretical framework that considers the experience of killing, in addition to the multifaceted effects of engaging in this potentially morally injurious act, may assist in further elucidating transdiagnostic mechanisms to explain the association between killing and suicide-related outcomes. Further, if supported, this framework could provide important implications for treatment targets that could be prioritized to reduce the risk for suicidal ideation and suicidal self-directed violence among Veterans who have experienced combat-related killing.

References

1. Maguen S, et al. “Killing in Combat May be Independently Associated with Suicidal Ideation,” *Depression and Anxiety* 2012; 29(11):918-23.
2. Maguen S, et al. “Killing in Combat, Mental Health Symptoms, and Suicidal Ideation in Iraq War Veterans,” *Journal of Anxiety Disorders* 2011; 25(4):563-7.
3. Monteith, LL and Maguen, S. “Combat-related Killing and Suicide through the Interpersonal-Psychological Theory of Suicide,” In B. Bongar, G. Sullivan, & L. James (Eds.), *Handbook of Military and Veteran Suicide: Assessment, Treatment, & Prevention*. Oxford University Press 2017.

FORUM

translating research into quality healthcare for Veterans

Center for Information Dissemination and Education Resources
VA Boston Healthcare System (152C)
150 South Huntington Avenue, Boston, MA 02130-4893

Continued from page 2

researchers could lead the way in merging community indicators and survey data with electronic medical record and administrative data to prevent Veteran suicide. Moreover, additional innovative strategies are needed to evaluate components of the VHA suicide prevention program that have already been implemented, as well as reach Veterans who are not currently seeking VHA care.

We encourage members of the VHA research community to explore these and other novel means to better understand suicide, with the aim of developing health promotion, universal prevention, and treatment interventions to decrease the rate of Veteran suicide.

References

1. McCarthy, J. F., et al. "Suicide among Patients in the Veterans Affairs Health System: Rural-urban Differences in Rates, Risks, and Methods," *American Journal of Public Health* 2012; 102(S1): S111-S117.
2. Scutchfield FD, Mays GP, Lurie N. "Applying Health Services Research to Public Health Practice: An Emerging Priority," *Health Services Research* 2009; 44(5 Pt 2):1775-87.
3. Ka-Yuet Liu, "To Compare is to Despair? A Population-Wide Study of Neighborhood Composition and Suicide in Stockholm," *Social Problems* 2017; 64(4): 532-57.

Spring 2018

FORUM

Karen Bossi and Margaret Trinity, Co-Editors

Editorial Board

Peter L. Almenoff, MD, FCCP Director,
Chief Improvement Office,
Office of Organizational Excellence,
Washington, D.C.

David Atkins, MD, MPH
Director, HSR&D
VA Central Office,
Washington, D.C.

Martin P. Charns, DBA
VA HSR&D Center
of Innovation, Boston, MA

Joseph Francis, MD, MPH
Director of Clinical Analytics and
Reporting, Office of
Organizational Excellence,
Washington, D.C.

Bonnie Graham, MBA
Director, San Francisco VA
Health Care System
San Francisco, CA

Amy Kilbourne, PhD
Director, QUERI
VA Central Office
Washington, D.C.

Michelle A. Lucatoro, DNP, RN
FNP-BC, Clinical Program
Manager, Specialty Care
Office of Nursing Services,
Washington, D.C.

Skye McDougall, PhD
Network Director, VISN 16
Ridgeland, MS

Richard Owen, MD
Director,
VA HSR&D Center of Innovation,
Little Rock, AR

Michael Weiner, MD, MPH
Director, VA HSR&D Center
of Innovation
Richard L. Roudebush VA
Medical Center
Indianapolis, IN

Michela Zbogor, MD, MBA
Chief Medical Officer, VISN 8
St. Petersburg, FL