



U.S. Department
of Veterans Affairs

REACH VET

*Recovery Engagement and
Coordination for Health –
Veterans Enhanced Treatment*

Predictive Analytics for Suicide Prevention

Program Overview

Fall 2018

REACH VET is...

- Supported by senior VA leadership as part of establishing **suicide prevention as the top clinical priority**
- A **predictive model** to identify Veterans who may **clinically** benefit from **enhanced** care, **outreach**, and **assessment of risk**
- A **supplement to** current clinical strategies to identify at-risk Veterans
- A complement to other VHA initiatives designed to **identify new opportunities** to enhance care for Veterans



REACH VET: What are they at risk for?

- Suicide and suicide attempts
- Non-suicide external-cause mortality
 - Accidents, injuries, overdoses, violence
- Non-suicide all-cause mortality
- Mental health hospitalization
- Medical/surgical/rehabilitation hospitalization

Not all identified Veterans will have reported or experienced suicidal ideation or behavior.



Background: The Predictive Model

- Developed by VA and NIMH researchers
- Includes clinical and administrative data for each Veteran who uses VHA services

Calculated Risk

Outcome	Top .1% Top Risk
Suicide (one month)	33x
Suicide (one year)	15x
Suicide attempt (one year)	81x

**As compared to overall VHA population*



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Preventing Other Adverse Outcomes

Outcome	Top .1% Top Risk
Other external-cause mortality	8.8x
Other all-cause mortality	1.5x
Mental health inpatient bed days of care	66.0x
Medical/Surgical/Rehab inpatient bed days of care	6.3x



Model Predictors

- Demographics
- Prior suicide attempts
- Diagnoses
- VHA use
- Medications
- Interactions

McCarthy, J. F., R. M. Bossarte, et al. (2015). "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 105(9): 1935-1942.

Predictive Modeling and Concentration of the Risk of Suicide: Implications for Preventive Interventions in the US Department of Veterans Affairs

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Over the past 8 years, the Veterans Health Administration (VHA), the health system of the Department of Veterans Affairs, strengthened its mental health services and supplemented them with specific programs for suicide prevention.^{1,2} However, suicide rates in VHA have been stable, without decreases that can be attributed to these enhancements.³ The stable rates stand in contrast to increased rates in other US populations, especially middle-aged men,^{4,5} and in veterans who do not use VHA.^{3,6} VHA programs may have mitigated population-wide increases. Nevertheless, the finding that suicide rates in VHA remain high represents a strong call for action.

Although epidemiological research has identified an array of risk factors for suicide, effect sizes are, in general, small to moderate.^{7,8} Despite considerable research on how risk factors combine or interact to affect risk, few reports offer information from multivariate models that clinicians could use in decision-making.⁹⁻¹² Two recent reports demonstrated that predictive modeling that uses information from medical and administrative records can identify patients at risk for suicide,^{12,13} and predictive modeling may be more accurate than clinical evaluation.¹³

There is general agreement about domains that clinicians should consider in evaluating patients' risk of suicide.^{14,15} However, obtaining the information needed requires high levels of clinical skill, including the ability to instill a sense of trust.¹⁶ Accordingly, additional training has been recommended to ensure that a broad range of clinicians can conduct accurate assessments,¹⁷ and research is needed to enhance the sensitivity of evaluations, improve clinical assessments, and develop psychological and biological markers.¹⁷⁻²⁰ Improvements in assessments are necessary, for example, to enable accurate identification of patients at

Objectives. The Veterans Health Administration (VHA) evaluated the use of predictive modeling to identify patients at risk for suicide and to supplement ongoing care with risk-stratified interventions.

Methods. Suicide data came from the National Death Index. Predictors were measures from VHA clinical records incorporating patient-months from October 1, 2008, to September 30, 2011, for all suicide decedents and 1% of living patients, divided randomly into development and validation samples. We used data on all patients alive on September 30, 2010, to evaluate predictions of suicide risk over 1 year.

Results. Modeling demonstrated that suicide rates were 82 and 60 times greater than the rate in the overall sample in the highest 0.01% stratum for calculated risk for the development and validation samples, respectively; 39 and 30 times greater in the highest 0.10%; 14 and 12 times greater in the highest 1.00%; and 6.3 and 5.7 times greater in the highest 5.00%.

Conclusions. Predictive modeling can identify high-risk patients who were not identified on clinical grounds. VHA is developing modeling to enhance clinical care and to guide the delivery of preventive interventions. (*Am J Public Health*. 2015;105:1935-1942. doi:10.2195/AJPH.2015.302737)

imminent risk in the emergency department. However, improvements are not necessary prerequisites for use of predictive modeling to target preventive interventions.

In general, discussions of prevention in the field of mental health,²¹ including the 2012 *National Strategy for Suicide Prevention*,²² consider 3 levels of intervention: indicated clinical services for those with symptoms or warning signs associated with high risk, selective clinical and community preventive services for groups of individuals at increased risk, and universal public health strategies directed toward entire populations. The Department of Veterans Affairs' suicide prevention strategy has focused on indicated strategies, for example, facilitating access to mental health services and related services, such as pain management, and on providing resources specifically for suicide prevention, including a crisis line integrated with clinical services.

To extend its indicated strategies, the Department of Veterans Affairs is implementing

a *Clinical Practice Guideline for the Assessment and Management of Patients at Risk for Suicide*.²³ In addition, it is working to develop selective strategies. Consistent with recent calls for research to develop taxonomy of high-risk subgroups,²³ VHA's initial approach used decision-tree analyses, considering categories derived from the electronic medical record for demographics, mental health and medical diagnoses, and service utilization. Although it was possible to identify classes of patients at specific levels of increased risk, these were distributed across many small and complex subgroups. Findings did not support use of decision-tree analyses to guide system-wide policies. Accordingly, the focus shifted to evaluating predictive modeling of clinical and administrative data from the electronic medical record for estimating levels of risk for individual patients. If this proved feasible, the next steps would be for the health care system to develop methods for informing providers about which of their patients are at high risk and for enhancing care.



Variables from VA machine learning model

Demographics

Age >= 80
 Male
 Currently married
 Region (West)
 Race/ethnicity (White)
 (Non-white)
 Service Connected (SC) Disability Status
 SC > 30%
 SC > 70%

Prior Suicide Attempts

Any suicide attempt in prior 1 month
 in prior 6 months
 in prior 18 months

Diagnoses

Arthritis (prior 12 months)
 (prior 24 months)
 Bipolar I (prior 24 months)
 Head and neck cancer (prior 12 months)
 (prior 24 months)
 Chronic pain (prior 24 months)
 Depression (prior 12 months)
 (prior 24 months)
 Diabetes mellitus (prior 12 months)
 Systemic lupus erythematosus (prior 24 months)
 Substance Use Disorder (prior 24 months)
 Homelessness or services (prior 24 months)

VHA utilization

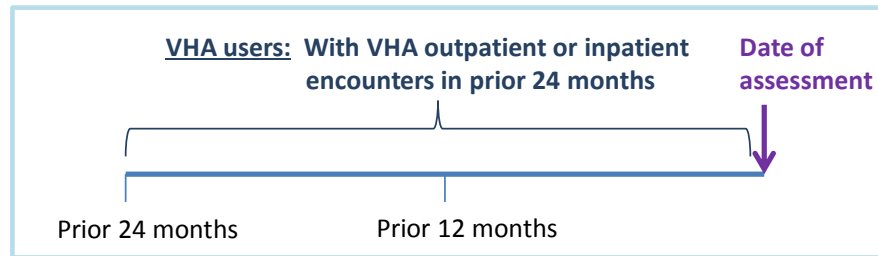
Emergency Dept visit (prior month)
 (prior 2 months)
 Psychiatric Discharge (prior month)
 (prior 6 months)
 (prior 12 months)
 (prior 24 months)
 Any mental health (MH) tx (prior 12 months)
 (prior 24 months)
 Days of Use (0-30) in the 13th month prior
 in the 7th month prior
 Emergency Dept visits (prior month)
 (prior 24 months)
 First Use in Prior 5 Years was in the Prior Year
 Days of Inpatient MH (0-30) in 7th month prior
 Squared
 Days of Outpatient (0-30) in 7th month prior
 in 8th month prior
 in 15th month prior
 in 23rd month prior
 Days with outpt MH use in prior month, squared

Medications

Alprazolam (prior 24 months)
 Antidepressant (prior 24 months)
 Antipsychotic (prior 12 months)
 Clonazepam (prior 12 months)
 (prior 24 months)
 Lorazepam (prior 12 months)
 Mirtazapine (prior 12 months)
 (prior 24 months)
 Mood stabilizers (prior 12 months)
 Opioids (prior 12 months)
 Sedatives or anxiolytics (prior 12 months)
 (prior 24 months)
 Statins (prior 12 months)
 Zolpidem (prior 24 months)

Interactions

- Between Other anxiety disorder (prior 24 months) and Personality disorder (prior 24 months)
- Interaction between Divorced and Male
- Interaction between Widowed and Male



REACH VET Steps

REACH VET Coordinators



1. Access the dashboard.
2. Identify appropriate provider.
3. Communicate with identified provider.
4. Document in EMR using template.

Mental Health and Primary Care Providers



1. Receive notification about a high-risk Veteran.
2. Re-evaluate care.
3. Consider treatment enhancement strategies.
4. Reach out to the Veteran.
5. Document in EMR using template.



Re-Evaluation of Care

- Clinician reviews medical record to re-evaluate the care the Veteran has been provided.
- Care should be evaluated in a **comprehensive** manner and not limited to that provider's services.
 - Review screening evaluations and rescreen as needed.
 - Review diagnoses, current problems, and treatment plans.
 - Ensure patients have access to all services requested and needed and are receiving evidence-based care.



Care Enhancement Strategies

- Considers additional treatment **enhancement strategies**
 - Enhanced communication (e.g., via caring communications)
 - Safety planning
 - Increased monitoring of stressful life events
 - Interventions designed to enhance coping strategies



Provider to Veteran Outreach

- Provides information about REACH VET
- **Informs** the Veteran that s/he have been identified as a patient who may benefit from enhanced care
- Checks in regarding current symptoms and stressors
- As is clinically indicated, **collaboratively** discusses changes to the treatment plan and/or care enhancement strategies



National Implementation

- Fully implemented in February 2017
- Identifying **~6,700 Veterans per month**
- Identified more than **30,000 unique Veterans in the first year**
- REACH VET **implementation team** working to support program uptake
 - CPRS templates launched to decrease administrative burden
- REACH VET **facilitation provided to 7 VISNs/28 sites**
 - Conduct site visit, work collaboratively to create an implementation plan, and provide six months of virtual support

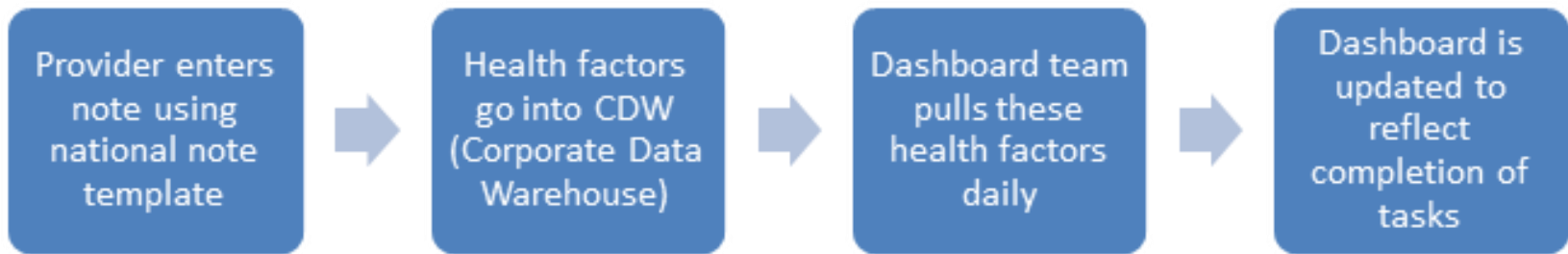


Technical Assistance

- Available nationally via email or phone
- Majority of contacts are with REACH VET Coordinators
- Develop educational tools and modified the program based on user feedback
 - Creation of national note templates
 - Dashboard user guides
 - Best practices document
 - Training video on how to talk to a patient about REACH VET
- These changes are disseminated to the field via a monthly national REACH VET call
- REACH VET intranet site houses all training and educational resources



REACH VET Dashboard & Note Templates



Dashboard Report

- Tracks completion of tasks nationally, by region, by facility and for each Veteran identified
- Historical and current reports
- Data reported is from the start of full implementation (i.e., February 2017)
- Quarterly data reported was pulled two weeks after the last release of each quarter
 - E.g., For the first quarter (Feb-Apr 2017), data reported is for two weeks after the April 2017 release



Monthly Metrics

Met or exceeded 80%

Facility	Week 2						
	Release Date	# Eligible	Assigned Coordinator	Provider Assigned	Care Evaluation Performed	Attempted Outreach	Successful Outreach
National	8/8/2018	6600	97.6%	89.6%	86.0%	77.3%	75.7%
	5/9/2018	6603	97.8%	87.7%	84.0%	80.7%	70.1%
	2/14/2018	6693	94.8%	80.8%	77.0%	67.8%	75.4%
	11/13/2017	6667	91.1%	75.9%	71.4%	63.8%	73.8%
	8/9/2017	6774	81.5%	67.2%	63.6%	58.2%	75.8%



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Randomized Program Evaluation

- The REACH VET randomized program evaluation is funded by the VA HSR&D Service (PI Landes, SDR 16-195)
- Using a hybrid effectiveness-implementation design, we are evaluating the impact of REACH VET on patient outcomes and the impact of facilitation on implementation outcomes
 - SMITREC is leading the effectiveness evaluation
 - Little Rock is leading the implementation evaluation



Initial Effectiveness Evaluation

- February 2018: One year of implementation
- Initial implementation findings:
 - Looked at six-month outcomes for patients identified March – May 2017
 - In comparison to the control groups, patients exhibited:
 - More health care appointments
 - More mental health appointments
 - Decreases in the percent of missed appointments
 - Greater completion of suicide prevention safety plans
 - **Less all-cause mortality**
 - Overall, early findings on implementation and outcomes are positive



What is Facilitation?

Facilitation

- A process of interactive problem solving and support that occurs in a context of a recognized need for improvement and a supportive interpersonal relationship
- Facilitation can be internal or external to a system. This interactive support process can include a combination of any implementation strategies, and typically bundles multiple strategies as needed

Powell et al., 2015



Implementation Outcomes

- **Reach:** the proportion of patients identified at each facility who receive the REACH VET intervention
- **Adoption:** proportion of facilities that implement REACH VET and the proportion of mental health and primary care providers in each facility that participate
- **Implementation fidelity:** whether facilities implemented all components of the intervention as directed by the memos and the REACH VET program website
- **Cost of implementation:** document the amount of effort and time needed to offer virtual external facilitation
- **Cost of the intervention:** document the amount of effort and time needed to implement REACH VET activities
- **Organizational context:** Organizational Readiness for Change survey
- **Barriers, facilitators, experience of facilitation process:** done via qualitative interviews



Measuring Facilitation

- Using the same methods as other Behavioral Health QUERI projects using facilitation to allow comparison across projects
- Time and activity tracking logs (Bauer et al., 2017)
- Facilitator debrief interviews
 - Includes a Key Events Template (Woodward et al., 2016)



Where are we going?

- Program Effectiveness Evaluation
- Update REACH VET predictive model
- Continue to streamline clinical process to improve efficiency
- Share risk data with other VHA informatics platforms
- Expand use of predictive analytics for decision support through multiple pathways



Questions and comments?

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