Identifying Risk for Suicide in the Military Health System: Emerging Approaches and Considerations for Population Impact

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Outline

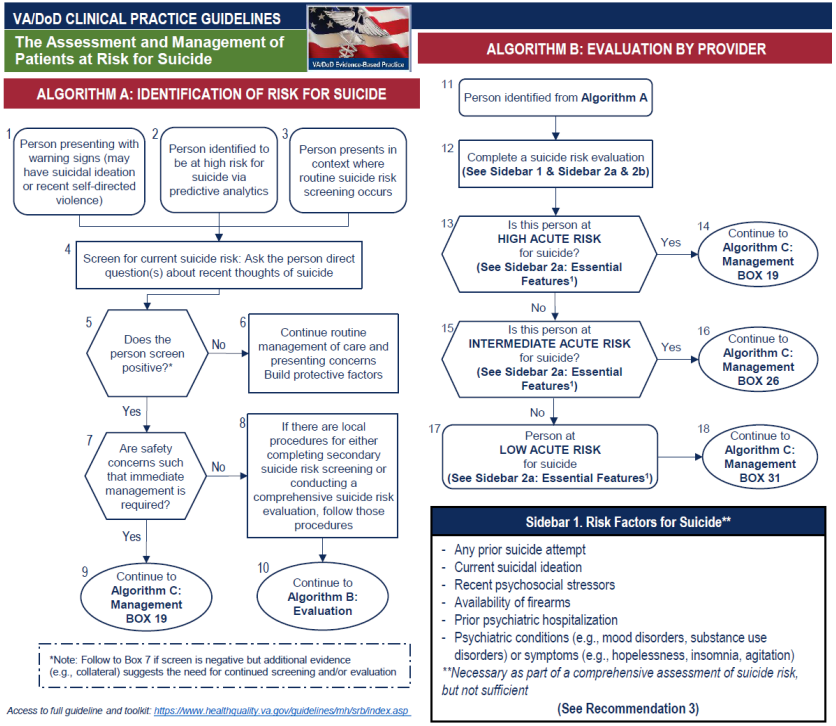
- General overview of identification and management of suicide risk in the Military Health System (MHS)
- Analytic and practical consideration related to implementing suicide analytic screening in the MHS
- Connecting service members to care: identifying risk in the context of emerging communication platforms

Suicide Mortality Rates are Increasing

- Suicide mortality rates have been increasing
  - Increased mortality in the military population
  - Increased mortality in the civilian population
- In CY20, suicide mortality rate was 28.7 deaths per 100,000 among active component service members.

Identification of Risk for Suicide in the MHS

- The VA/DoD Clinical Practice Guideline for the Assessment and Management of Patients at Risk for Suicide
- Risk identified via algorithm or provider
- Low, intermediate, or high risk
  - acute
  - chronic
- Management and care pathways are determined by risk level

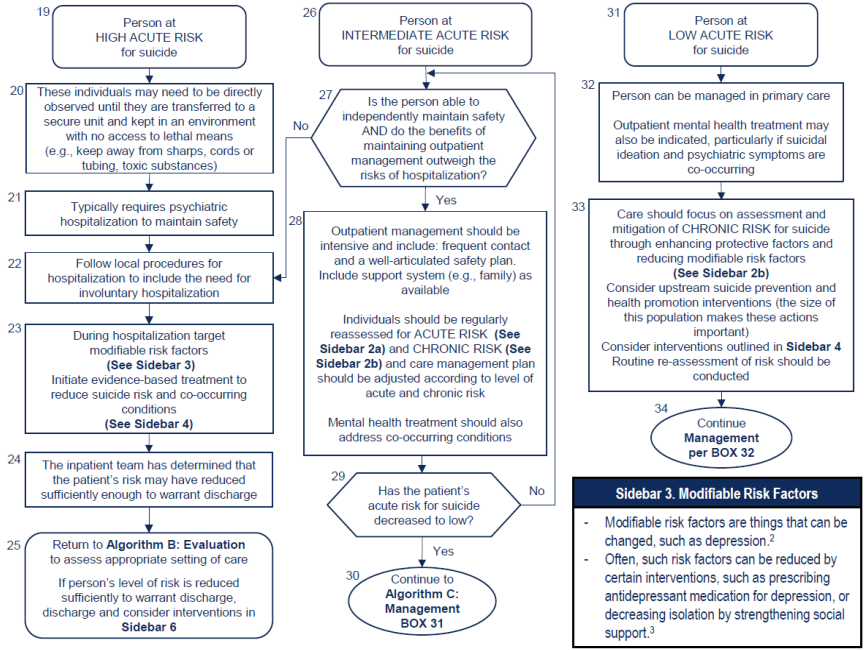


Risk Stratification and Management

Sidebar 2a. Essential Features from Risk Stratification Table – Acute Risk[1]

Level of Risk	Essential Features	Action
High Acute Risk	- Suicidal ideation with intent to die by suicide - Inability to maintain safety, independent of external support/help Common warning signs: - A plan for suicide - Recent attempt and/or ongoing preparatory behaviors - Acute major mental illness (e.g., major depressive episode, acute mania, acute psychosis, recent/ current drug relapse) - Exacerbation of personality disorder (e.g., increased borderline symptomatology)	- Typically requires psychiatric hospitalization to maintain safety and aggressively target modifiable factors - These individuals may need to be directly observed until they are transferred to a secure unit and kept in an environment with limited access to lethal means (e.g., keep away from sharps, cords or tubing, toxic substances) - During hospitalization co-occurring conditions should also be addressed
Intermediate Acute Risk	- Suicidal ideation to die by suicide - Ability to maintain safety, independent of external support/help These individuals may present similarly to those at high acute risk, sharing many of the features. The only difference may be lack of intent, based upon an identified reason for living (e.g., children), and ability to abide by a safety plan and maintain their own safety. Preparatory behaviors are likely to be absent.	- Consider psychiatric hospitalization, if related factors driving risk are responsive to inpatient treatment (e.g., acute psychosis) - Outpatient management of suicidal thoughts and/or behaviors should be intensive and include: frequent contact, regular re-assessment of risk, and a well-articulated safety plan - Mental health treatment should also address co-occurring conditions
Low Acute Risk	- No current suicidal intent AND - No specific and current suicidal plan AND - No recent preparatory behaviors AND - Collective high confidence (e.g., patient, care provider, family member) in the ability of the person to independently maintain safety Individuals may have suicidal ideation, but it will be with little or no intent or specific current plan. If a plan is present, the plan is general and/or vague, and without any associated preparatory behaviors (e.g., "I'd shoot myself if things got bad enough, but I don't have a gun"). These patients will be capable of engaging appropriate coping strategies, and willing and able to utilize a safety plan in a crisis situation.	- Can be managed in primary care - Outpatient mental health treatment may also be indicated, particularly if suicidal ideation and co-occurring conditions exist

ALGORITHM C: MANAGEMENT OF PATIENTS AT ACUTE RISK FOR SUICIDE



Sidebar 3. Modifiable Risk Factors

- Modifiable risk factors are things that can be changed, such as depression.[2]
- Often, such risk factors can be reduced by certain interventions, such as prescribing antidepressant medication for depression, or decreasing isolation by strengthening social support.[3]

[2]Source: Suicide Prevention Resource Center, & Rodgers, P. Understanding risk and protective factors for suicide: A primer for preventing suicide. Newton, MA: Education Development Center, Inc. 2011.
[3]Source: Western Michigan University. Suicide prevention program: Risk factors. Kalamazoo, MI: 2018. https://wmich.edu/suicideprevention/basics/risk

Prediction Models for Suicide Attempts and Deaths are Improving

- Machine learning models more accurate in predicting suicide ideation, attempts and deaths compared to theoretically-driven models (Schafer et al., 2021)
- Outperform traditional methodology (e.g., multiple logistic regression) and clinician-based prediction (Bernert et al., 2020; Burke et al., 2019).
- The Recovery Engagement and Coordination for Health-Veterans Enhanced Treatment (REACH VET) intervention increased completion of mental health appointments and resulted in 5% decrease in suicide attempts (McCarthy et al., 2021)
- Generally stronger performance in predicting suicide attempts versus deaths

Limitations for screening low base rate outcomes such as suicide mortality

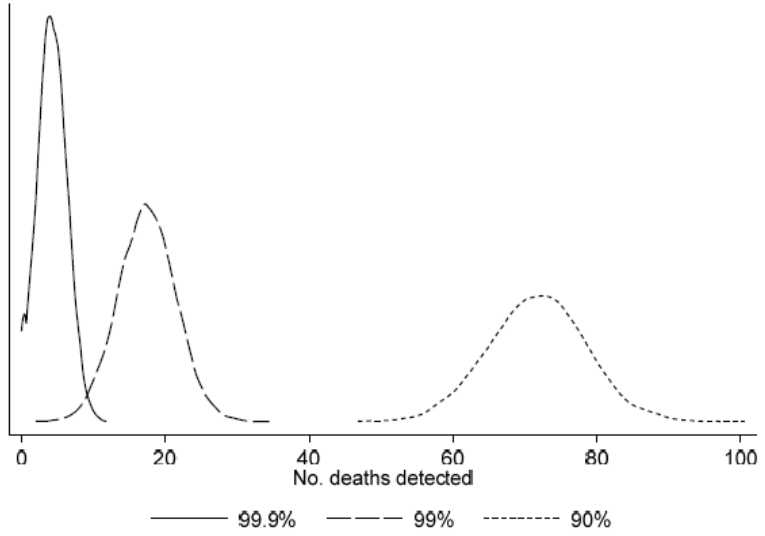
- Numerous methods for screening available
- Regardless of method and outcome/condition, screening for low base rate problems is inherently limited
  - Detecting a relative improvement between screening approaches requires very large sample sizes
  - Improved performance does not necessarily equate to improved practical utility
  - Extremely low positive predictive values

A Simulation of Suicide Predictive Models in the MHS

- Goal is to estimate performance of models in the MHS
- Used estimates of performance based on published research
  - Suicide predictive model performance (McCarthy et al., 2021)
  - Suicide intervention (e.g., caring contacts; Skopp et al., in press)
- Population impact estimated
  - Total number, deaths, and false positives per risk threshold group.
  - Suicide deaths and suicide attempts prevented
  - Performance that would be needed to produce a benefit

Total Suicide Deaths in High Risk Group by Risk Threshold

- Few estimated deaths detected at highest risk threshold
- Selecting a lower threshold substantially improves detection of suicide deaths in the model



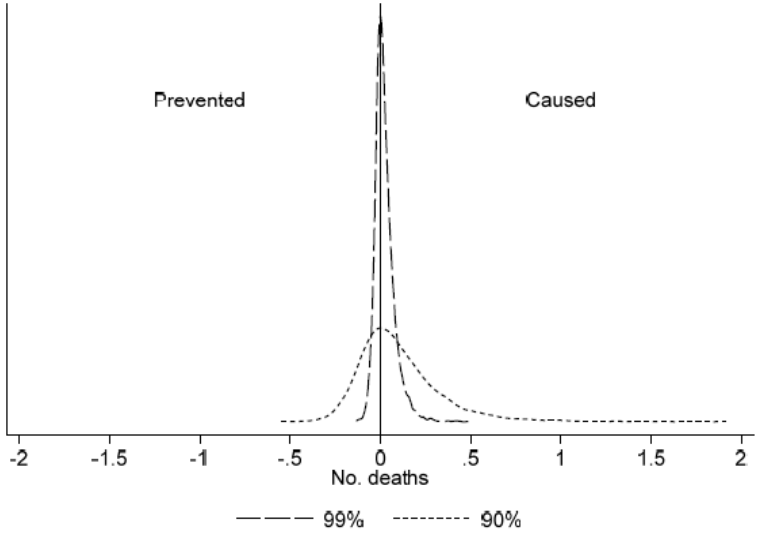
Distribution of the number of deaths included in the high-risk group, by risk percentile threshold

Risk Threshold Selection Impacts False Positives

- A lower risk threshold improves detection of estimated suicide deaths, but adversely impacts false positives
- At the 99.9th percentile threshold, estimate between 168 and 1043 false positives per case detected
- At the 99th percentile threshold, estimate between 552 and 1550 false positives per case detected
- At the 90th percentile threshold, estimate between 1645 and 2398 false positives per case detected

Change in Suicide Deaths after Intervention by Risk Threshold

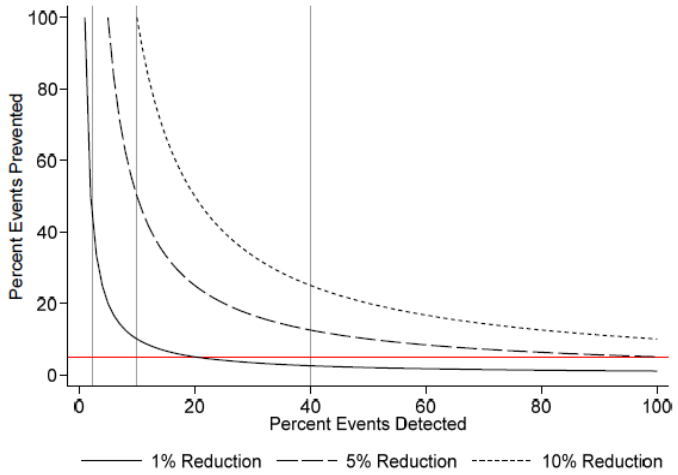
- Most likely outcome is zero
- At 90th percentile risk threshold, 95% percent of the simulated number of deaths affected are between -0.22 and 0.65
- Applying the expected deaths affected to the population number of deaths results in a population change from a 0.13% reduction to a 0.37%



Distribution of the expected change in the number of deaths after intervention, by risk threshold. The 99.9th risk threshold change was heavily concentrated around zero and omitted from the figure for clarity

Estimated Intervention Effect Required to see a Benefit

- At the 99.9th percentile risk threshold (the vertical line at 2.4% detected), an intervention would have to prevent at least 40% of events to achieve a 1% reduction in the population.
- At most, 2.4% of deaths in the population could be prevented if the intervention applied was 100% effective



Minimum sensitivity and intervention effectiveness needed to produce a population-level change. Vertical lines are the sensitivity estimates at the 99.9%, 99%, and 90% risk thresholds, and the red horizontal line represents an intervention that prevents 5% of events.

Discussion: Suicide Analytic Screening in the MHS

- Analytic approaches are improving, but little to no evidence of impact on deaths
  - Inherent difficulty in identification of low base rate outcomes
  - Stronger emerging evidence of impact on attempts
- Our simulation reveals numerous concerns that affect practical impact of models in the MHS:
  - Low proportion of total suicide deaths identified by selected model risk thresholds
  - High levels of false positives if choosing lower risk thresholds
  - Little to no effect on estimated suicide deaths based on optimistic intervention effects

Connecting Service Members to Care: Consideration of Social Media and Emerging Technologies

- Several programs and policies in the Department of Defense (DoD) to connect service members to care and reduce barriers to care
  - inTransition
  - Real Warriors Campaign
- Many organizations in the DoD are visible and accessible via social media
- Identifying risk via informal communications by program outreach and social media is complicated by issues of anonymity, privacy, and consideration of best practices

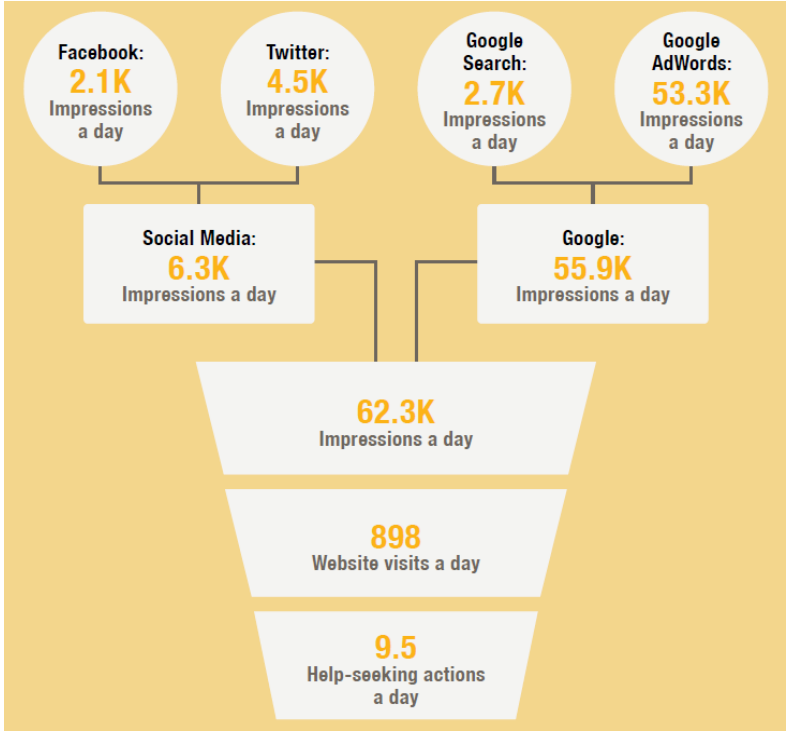
Real Warriors Campaign (RWC)

- Used in-person and virtual outreach channels to improve access to care for service members
- Directed service members to resources
  - RWC website
  - Psychological Health Resource Center Live chat
  - Crisis numbers
- By the end of 2020, more than 62K daily views of RWC messaging on Facebook, Twitter, and Google

RWC Engagement Across Social Media (CY2020)

Materials Disseminated

- 250 print stories
- 67 profile videos
- 18 video shorts
- 33,815 online stories
- 115,853 broadcast stories
- 9 help seeking actions per day



Crisis Responding for Outreach Programs with a Social Media Presence

- RWC redesign in 2019 to enhance ability to provide crisis resources:
  - Improve device compatibility
  - Improve accessibility (e.g., one click banner for crisis resources)
- Findings revealed an increase in new mobile users, new users to site from social media, and help-seeking actions by users (Slay et al., 2021)
- Note that the crisis response used by outreach programs such as RWC remains the same: referral to existing crisis resources

Questions?

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