inTransition "Hot Handoff" Evidence Review and Analysis

Psychological Health Center of Excellence

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REQUEST: To identify a list of evidence-based suicide risk factors to inform the inTransition "hot handoff" versus "warm handoff" process proposal. These risk factors would be accessible to the inTransition team when pulling MHS data to identify eligible Service members preparing to discharge from the military.

BACKGROUND: This report is comprised of two parts. The first part is a review of the existing evidence on suicide risk factors and instruments. The second part includes exploratory analyses conducted to estimate the impact and accuracy of applying discrete risk predictors to identify transitioning Service members that may be in need of a "hot handoff."

SUMMARY: Although common risk factors of suicidal behavior have been identified and suicide risk assessment tools have been developed, the current body of evidence indicates that there is no compelling evidence to suggest any specific predictor or scale is a strong and clinically significant predictor of suicidal behaviors. However, to further inform decisions pertaining to the use of known risk factors to classify higher-risk inTransition Service members in need of a "hot handoff," we conducted analyses to estimate the impact and accuracy of using known risk factors accessible in the Medical Data Repository (MDR). These results suggest that using any single indicator as a screening threshold would have little or no advantage over applying just the higher-level intervention to all individuals in the population. Using any two risk indicators as a criterion may result in a more efficient means to identify transitioning Service members who may need a higher level of care. Even using this method, only about 25% of the overall suicides would be detected: only 40% of patients who died by suicide had a mental health history and would have been initially flagged for inTransition; only 60% of those would be identified by this 2-risk factors criterion. In addition, for every one potential case detected, there would be 1,364 non-cases detected who would require additional services.

Part I. Evidence Review of Suicide Risk Factors

Methodology

Several recent, high quality systematic reviews on predictors of suicide risk were identified to inform this request. Given the comprehensive nature of these reviews, additional literature searches were not deemed necessary.

Results

- A 2017 systematic review and meta-analysis[1] covered 50 years of published research up to 2015, and incorporated 365 longitudinal studies and 3,428 risk factor effect sizes. The review focused primarily on single risk factors used to predict future suicide behaviors. Risk algorithms to predict suicidal behaviors were not included in the review.
- The results of this meta-analysis indicated that no single risk factor, subcategory, or category of risk factors included in this analysis reached clinical significance. The authors state that "…based on the existing literature, all suicide risk factors are weak and inaccurate. This general pattern has not changed over the past 50 years and was not meaningfully moderated by study characteristics or type of risk factor" (p.31).
- The authors also noted that "…no risk factor category or subcategory is substantially stronger than any other; [and] there is no compelling evidence that any specific suicide outcome is associated with a unique set of risk factors" (p.28).
- Although not strongly predictive and also not statistically different from one another, the top five non-prioritized predictors for each outcome were as follows:
  - Suicide ideation:
    - prior suicide ideation
    - hopelessness
    - depression (diagnosis)
    - abuse history (any kind)
    - anxiety (diagnosis)
  - Suicide attempt:
    - prior non-suicidal self-injury
    - prior suicide attempt
    - screening instrument
    - Axis II diagnosis (any kind)
    - prior psychiatric hospitalization

- Suicide death:
  - prior psychiatric hospitalization
  - prior suicide attempt
  - prior suicide ideation
  - socioeconomic status (lower)
  - stressful life events

- The authors state that "The limited ability of this meta-analysis to inform suicide theory, prediction, and treatment emanates from one major source: the methodological limitations of the existing literature" (p.28).
- Three other recent systematic reviews[2–4] evaluated the evidence on suicide risk assessment tools, such as self-report screeners, and other methods to identify individuals at increased risk of suicide. Across all three systematic reviews, the evidence indicated that suicide risk assessment tools do not demonstrate sufficient diagnostic accuracy in predicting suicide and have limited clinical utility given the high rates of false positives.

Part II. Hot Handoff Data Analysis

Methodology

Data for this analysis are from two sources:

1. The Department of Defense Suicide Event Report (DoDSER) data repository – this source compiles data that are reported to the DoDSER system on suicide deaths and attempts among Service members.
2. The Military Health System Mart (M2) – this source is a data warehouse of medical encounter data for both direct and purchased care for all Service members.

All Service members who had a mental health encounter in calendar year (CY) 2017 were included in the analysis. In addition, only Active-Component Service members were included.

The data were queried for the presence of the following risk factors in the year prior to death for suicide cases or during CY 2016 or 2017 for the larger population:

1. Prior suicide attempt/self-harm
2. Inpatient mental health
3. Any mood disorder
4. Any anxiety disorder
5. Adjustment disorder
6. Substance abuse/dependence, substance use disorder

Suicide cases were subtracted from the number of individuals in each factorial configuration of the six risk indicators to account for potential duplication. The data used from the MDR were de-identified so it was not possible to separate cases and non-cases at the individual level.

The data analysis consisted of an evaluation of the sensitivity and specificity associated with each of the indicators listed above. The sensitivity was the percent of Service members who died by suicide who also had evidence of the indicator. The specificity was the percent of Service members who did not die by suicide who did not have evidence of the indicator. A perfect indicator would have 100% sensitivity and 100% specificity. In practice, these values are less than 100%; the goal is to maximize both to the extent practicable and with an understanding that as one measure improves, the other tends to worsen. An additional analysis aggregated the indicators into a frequency to examine the effect of increasing numbers of indicators present on the overall classification.

Results

There were 279 suicide deaths in Active-Component Service members in CY 2017 that had data available for the analysis. Of those, it should be noted that 109 had a mental health encounter in the year prior to the event indicated (39%), which corresponds to the eligible population for inTransition. The remaining analysis examines the ability to identify these individuals. It is assumed that those without a mental health counter would be entirely missed by any inTransition approach to risk stratification. There were 242,550 Service members included in the analysis with any mental health encounter in CY 2017.

For the single indicators, a history of adjustment disorder had the highest sensitivity and the lowest specificity. The history of prior suicide attempt/self-harm had the highest positive predictive value (proportion of suicide cases relative to the number in the total population with the indicator); however, the low sensitivity suggests that a focus on this risk factor alone would have a negligible population benefit.

In terms of combining risk factors, the use of any indicator as a risk stratification resulted in the highest sensitivity (85%) and the poorest specificity (13%). In effect, using any single indicator as a screening threshold would not have much merit over just applying the higher-level intervention to all individuals in the population. Using any two risk indicators as a criterion resulted in the best configuration of sensitivity and specificity at about 60% each.

	No. Suicides	No. Larger Population	Sensitivity (%)	Specificity (%)
Single indicators				
Prior suicide attempt/self-harm	10	2,636	9.2	98.9
Inpatient mental health	37	19,972	33.9	91.8
Mood	45	70,291	41.3	71.0
Anxiety	38	77,905	34.9	67.9
Adjustment	54	107,308	49.5	55.7
Substance use	31	79,775	28.4	67.1
Indicator frequency				
1	93	209,483	85.3	13.6
2	67	91,576	61.5	62.2
3	37	38,894	33.9	84.0
4	13	13,824	11.9	94.3
5	4	3,695	3.7	98.5
6	1	415	0.9	99.8

Limitations

The data sources for the suicide cases and the larger population were not identical, so these values serve only as a rough approximation of what to expect in an applied setting. This approach may have positive impacts on access to care; however, those impacts may be limited in reach given historical data on uptake of the inTransition program. Sharing this information with Veterans Affairs may be of benefit; however, a direct measure of that benefit may be difficult.

References

[1]Franklin, J. C., Ribeiro, J. D., Fox, K. R., Bentley, K. H., Kleiman, E. M., Huang, X., ... & Nock, M. K. (2017). Risk factors for suicidal thoughts and behaviors: A meta-analysis of 50 years of research. *Psychological Bulletin*, *143*(2), 187.

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[3]Nelson, H. D., Denneson, L. M., Low, A. R.,Bauer, B. W., O'Neil, M., Kansagara, D., & Teo, A. R. (2017). Suicide risk assessment and prevention: A systematic review focusing on veterans. *Psychiatric Services*, *68*(10), 1003–1015. doi:10.1176/appi.ps.201600384.

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