

Suicide is an urgent public health problem in America. Between 1999 and 2017 the age-adjusted suicide rate in the United States rose 33%.¹ Because most individuals make an outpatient health care visit in the year prior to their suicide death and almost half have a visit within a month of their death,² health care visits are suicide prevention opportunities. However, patients at risk for suicide are not always recognizable to clinicians.

Across medicine, machine learning is increasingly being used to identify patients at risk for various adverse health outcomes. In the area of suicide prevention, electronic health record (EHR) and insurance claims data have been used to predict suicide attempts or deaths.³⁻⁹ For example, the Mental Health Research Network (MHRN) recently developed algorithms that accurately identify people at risk for a suicide attempt or suicide death in the 90 days following an outpatient health care visit.¹⁰ The MHRN algorithms outperform previous suicide risk prediction models and routinely used suicide risk screening measures. Several MHRN-affiliated health systems are planning to deploy these models as part of ongoing suicide prevention initiatives.

While risk prediction algorithms hold promise for suicide prevention, there are pragmatic concerns about how they should be integrated into clinical workflows, what liabilities and responsibilities they introduce for clinicians and health systems, and how they might influence patient visits, risk communication and decision making, the clinician-patient relationship, and other clinical interventions. For example, as is currently done in the Veteran's Administration (VA), suicide risk models could be used to prompt stand-alone outreach independent of any healthcare visit.⁵ Another approach is to create point-of-care tools, such as automated best practice alerts, that notify a clinician of a high-risk patient during a health care visit. Each of these approaches has merit but introduces unique implementation considerations. The former approach could potentially identify at-risk patients who are not coming in for services however outreach efforts might be perceived by patients as intrusive. The latter approach introduces complexity and time burden to the health care visit and could also be perceived as intrusive if suicide risk is not the patient's reason for seeking care. How risk prediction tools should be implemented in routine clinical practice and the contextual factors that influence their use are understudied. Implementation science frameworks such as the Consolidated Framework for Implementation Research (CFIR)¹¹ are useful to guide attention to the multiple levels of context that would potentially influence the effectiveness and utility of such tools. The potential benefits of risk prediction models are dependent on making sure that these kinds of tools are deployed in a manner that does not harm patients, supports clinical care management, and is sustainable for health care delivery systems.

We propose a pre-implementation pilot study to explore health system administrators', clinicians', and patients' expectations, concerns, suggestions and experiences with the early use of suicide risk prediction algorithms.

Aim 1: Identify administrator and clinician expectations for or experiences with suicide risk prediction tools, any current or future implementation plans, and clinician preferences for risk tool development.

Aim 2: Interview at-risk patients to describe preferences for or experiences with health system-initiated suicide risk discussions resulting from risk identification by suicide risk prediction algorithms.

The long-term goal of this pilot project is to prevent suicides by optimizing the use of suicide risk prediction tools through a rigorous and systematic pre-implementation evaluation. Results of this study will inform large-scale implementation in MHRN health systems and other systems across the US. Aim 1 interviews will reveal health systems' plans for and real-time deployment of the MHRN suicide risk prediction models and the extent to which guidance about the appropriate uses, strengths, and limitations of predictive modeling is needed. We will also summarize clinicians' preferences for risk prediction tool development and return this information to the administrators to inform decision making. Aim 2 interviews focus on patients' preferences for how they would like to be notified of their suicide risk, by whom, and situations where notification would be unwelcomed. Already health system leaders have approached us with new ideas for future risk models. This pilot will inform development of future risk prediction tools tailored to what, when, and where stakeholders want to predict.

The results of this study will have important clinical implications and inform ongoing health system-level efforts to reduce suicide prevalence. Our team of MHRN-affiliated investigators with expertise in suicide prevention, risk prediction, decision support tool development, qualitative and implementation research and an extensive history of previous collaborations within and across our health systems is ideally suited to conduct the proposed study. Results will also influence future development of improved prediction models aligned with stakeholder needs.