RESEARCH STRATEGY

A. BACKGROUND & SIGNIFICANCE

A.1. Suicide Epidemiology in the United States (US): Suicide is a major public health concern. It is the 10th leading cause of death and the #1 cause of injury-related death in the US.[1,2] Suicide accounts for >40,000 lost American lives per year.[1] Unfortunately, national suicide rates have not improved over time, despite implementation of numerous initiatives.[3-6] In fact, US Centers for Disease Control and Prevention (CDC) data indicate that national suicide rates actually increased by nearly 25% in the last 15 years.[7,8]

A.2. US National Strategy for Suicide Prevention and Research Objectives: National concern about rising US suicide rates prompted the National Action Alliance for Suicide Prevention (NAASP) and the US Surgeon General to publish the 2012 *National Strategy for Suicide Prevention* (NSSP) outlining a series of Aspirational Goals (AG) aimed at reducing suicide.[9] A major NSSP goal is promotion of the "Zero Suicide" mission (i.e., zero defects in health care with the goal to prevent 'every' suicide). The measureable national target is a 20% suicide rate reduction.[9-11]

To determine research needs to accomplish this task, the National Institute of Mental Health (NIMH) organized the NAASP Research Prioritization Task Force (RPTF). In their "Prioritized Research Agenda for Suicide Prevention," the RPTF identified six key research questions and affiliated objectives. Question #4 states, ***"What services are most effective for treating the suicidal person and preventing suicidal behavior?"*** The 2nd major long-term objective under this question is to *"Reduce suicide attempt and death outcomes through multiple, synergistic components of quality improvement within and across responsible systems."*[11,12] The Prioritized Research Agenda (and specifically this goal and objective) are a major focus of RFA-MH-16-800: *Applied Research Toward Zero Suicide Healthcare Systems*.

According to the NSSP report, *one of the most promising environments to implement suicide prevention practices is within healthcare settings*.[9,11,12] In these settings, patients may have access to, and may be seen by, providers, who can be trained to detect suicide risk and intervene with effective care. Since the US healthcare system has been chronically fragmented, at-risk patients are apt to fall through the cracks without receiving services they need. As such, a reinvigorated national effort to mitigate suicide offers opportunities for improvement across all health system service settings moving forward.[13]

A comprehensive approach to coordinated care within healthcare settings may not only reduce suicide, but may be feasible within the current health insurance landscape. This is the major reason that the Substance Abuse and Mental Health Services Administration (SAMHSA) has funded the National Zero Suicide (ZS) Initiative through Education Development Center's (EDC) Suicide Prevention Resource Center (SPRC).[14] The National ZS Initiative promotes implementation of a series of specific quality improvement practices in US health systems – titled the *National Zero Suicide Model (NZSM)* – with the goal to reduce the national suicide rate.[15] In support, The Joint Commission (the major hospital accreditation body) just released sentinel event alert #56 recommending NZSM implementation for "detecting and treating suicide ideation in all settings"."[16,17] Our team's research was used as evidence in this sentinel alert.

A.3. Suicide Risk & Protective Factors: The NZSM is a health system model offering a menu of evidence-based interventions within a series of overarching components targeting major risk and protective factors for suicide.[17,18] Evidence suggests that there are a series of major risk factors for suicide, such as prior suicide attempts, substance use, mood disorders, and access to lethal means.[19-23] Research also indicates that there are several protective factors for suicide, including effective mental health care, connectedness, problem-solving skills, and contacts with caregivers.[5,19,24,25] The NZSM is particularly appealing, because healthcare settings with trained and caring providers have the opportunity to offer each of these protective factors to address many of the major risk factors for suicide. For example, many health systems have infrastructure to provide effective mental health care and offer access to caregivers. Trained behavioral health providers can work with individuals on problem-solving skills and coping strategies through evidence-based therapies, such as Dialectical Behavior Therapy (DBT) and Cognitive Behavioral Therapy (CBT).[26,27] Finally, individuals often have close relationships with their health providers and many feel a sense of connectedness within a health system.[28] In addition, recent evidence from our team suggests that >90% of individuals have a healthcare visit soon before suicide or a suicide attempt.[29,30] These reasons are why there is so much promise and opportunity for effective suicide prevention within the healthcare environment. Nonetheless, there are a limited number of examples of how these health resources have been used to prevent suicide. One of the few examples is our team's Perfect Depression Care (PDC) ZS initiative at Henry Ford Health System (HFHS). Our program was highlighted within RFA-MH-16-800. Implementation of the program was associated with an immediate decline of nearly 80% in the suicide death rate in the behavioral health patient population – a rate that was sustained for 15 years.[31-35] The NZSM is modeled directly on the HFHS PDC program, but allows

flexibility to adjust the 'intervention bundle' to the local culture, population, and health system resources.

A.4. Suicide and Theory: According to the Interpersonal Theoretical Model of Suicide, suicidal desire is a product of two constructs: "thwarted belongingness and perceived burdensomeness."[36] This theory is consistent with the suicide risk and protective factors outlined above. More specifically, mood and substance use disorders are burdensome and result in isolation and loss of connectedness. Treatment early in the disease cycle has shown to be effective.[37] However, it takes an estimated 5-8 years between the onset of psychiatric disorders and specialty treatment receipt.[38] As such, while most people make general health visits before suicide, they rarely receive specialty behavioral healthcare during the same period that they have suicidal thoughts or before a suicide attempt.[29,39] *This theory supports the hypothesis that a model to improve provider skills, identification, connectedness, access to treatment, and frequent contact from health providers within a system would be effective to prevent suicide.* These are the primary NZSM objectives.

A.5. Evidence-Based Suicide Prevention in Healthcare: There are several evidence-based approaches to suicide prevention in healthcare. First, a series of *brief* screening and assessment measures have shown to predict suicidal behavior, including the Columbia Suicide Severity Rating Scale (CSSRS) and the 9th item of the Patient Health Questionnaire.[40,41] Second, whereas the long-used 'no-suicide contract' approach has shown to be ineffective, recent evidence supports the use of safety planning.[42] Rather than asking patients to 'promise' they will not attempt suicide, a safety plan recognizes that individuals may have suicidal thoughts and creates a collaborative patient-provider approved solution for what patients can do in the moment they feel suicidal.[43,44] One evidence-based component of safety planning within the HFHS PDC ZS initiative (and the NZSM) has been means restriction.[31,32] Means restriction approaches have shown to reduce suicide.[45] Third, treatment approaches need to target suicidality specifically, rather than only focusing on mental health or substance use concerns more broadly.[46] To date, there are 3 main evidence-based therapeutic frameworks specifically designed for suicidal behavior, including DBT, CBT, and Collaborative Assessment and Management of Suicidality (CAMS).[26,27,47,48] These approaches have also been successfully integrated within comprehensive stepped care models in health systems.[25,49] Finally, access to, and engagement in, care, including continuity of care, care management, and follow-up, have all demonstrated initial promise as components of suicide prevention.[24,25,50] It is unclear whether any component alone can serve to prevent suicide at a health care system level or whether a 'bundle' of components is required. Since most effective, population-based approaches include multiple components, we hypothesize that a comprehensive multi-component model is necessary.[35,51-53]

Integrating a 'bundle' of these evidence-based strategies within clinical care, followed by regular outcome surveillance and rapid-cycle quality improvement demonstrates a 'Learning Healthcare System.'[33,54] HFHS has championed this model in suicide prevention for >15 years.[33] In addition, there are few groups of health systems with more expertise in the 'Learning Healthcare System' approach than our team's NIMH-funded Mental Health Research Network (MHRN). The **'Learning Healthcare System'** consortium approach in MHRN, which includes all of the participating health systems in this application, has been outlined in our team's recent paper.[54] It has also been highlighted by NIMH as part of their strategic plan for future research[55] and by the NIMH Director as an essential model to join real-world practice and research.[56]

The 6 healthcare systems proposed for this study have all committed to participation in a national learning collaborative to implement and evaluate specific components of the NZSM. All 6 systems have a diverse set of available resources, clinicians, leaders, expertise, services, patient populations, local cultures, and geography. As such, the specific interventions they implement SHOULD vary to fit their local environment. One of the major critiques of prior suicide research is that while interventions may have demonstrated strong effects in controlled studies, the effects have not translated into clinical practice.[11,12,25] A 'Learning Healthcare System' adapts interventions to fit within the local culture – and then adjusts the intervention over time based on surveillance data of high priority processes and outcomes. As such, the NZSM recommends a suicide prevention framework that includes a series of components (not a single model).[18] The NZSM offers evidence-based intervention options within each component, but the specific interventions chosen for implementation must fit the local environment. For example, while all sites in this application screen for suicide, they each choose to use different validated tools. In order to determine whether the NZSM works, we have to examine fidelity and outcomes using pragmatic research designs appropriate for this type of real-world implementation.

Importantly, while virtually any healthcare system can implement NZSM components, accurate capture of suicide attempt and death outcomes requires a defined patient population with comprehensive electronic health records (EHR) and insurance claims data available to track healthcare use within and outside of each participating system. For example, accurately capturing suicide attempts requires having access to external utilization records, since individuals may be treated for a suicide attempt at a non-system hospital. As such,

the combination EHR and insurance claims data for a defined population allows capture of utilization both within (via EHR) and outside (via claims) of the health system. All of the participating systems in this study have large, defined patient populations which allow complete data capture.

As described below, random assignment of entire health systems to research-determined implementation plans is neither practical nor scientifically advisable. First, this evaluation focuses on system-level interventions, so we could not randomly assign patients, providers, or clinics. Second, randomly assigning entire systems to implement or not implement specific interventions would not be acceptable to health system leaders, and simultaneously would limit our sample size to 6 systems. Finally, some interventions can be assigned at the patient-level, but our SPOT trial (see Section D.3.) is already doing that. As our team has previously described, "other research designs – including observational studies, pre/post designs, stepped wedge designs, and others – may be both scientifically strong and more compatible with care system needs," especially in 'Learning Healthcare Systems.'[54] Thus, our study seeks to use a strong Interrupted Time-Series with Control Series Design approach along with comprehensive EHR and insurance claims data to evaluate intervention fidelity and suicide behavior outcomes for NZSM approaches implemented across multiple 'Learning Healthcare Systems for Suicide Prevention.'

We should emphasize that selection and implementation of specific NZSM strategies in each health system will be led by delivery system leaders and supported by health system resources. While research teams at each site will collaborate in development of metrics and reporting systems, NZSM implementation will not depend on research resources or grant funds. The commitment of these 6 health systems to collaborate in a national learning collaborative offers a unique opportunity to rigorously evaluate a "real world" care improvement program.

A.6. The Proposed Study – Overview and Conceptual Model: Given evidence supporting the various individual strategies in suicide prevention practice (discussed in Section A.5.), a comprehensive multi-component approach within a flexible framework should provide an optimal suicide prevention strategy. This comprehensive approach represents the NZSM components. Preliminary evidence from our HFHS PDC Initiative (including these NZSM components) has demonstrated a dramatic reduction in annual suicide rates among the behavioral health population.[35]

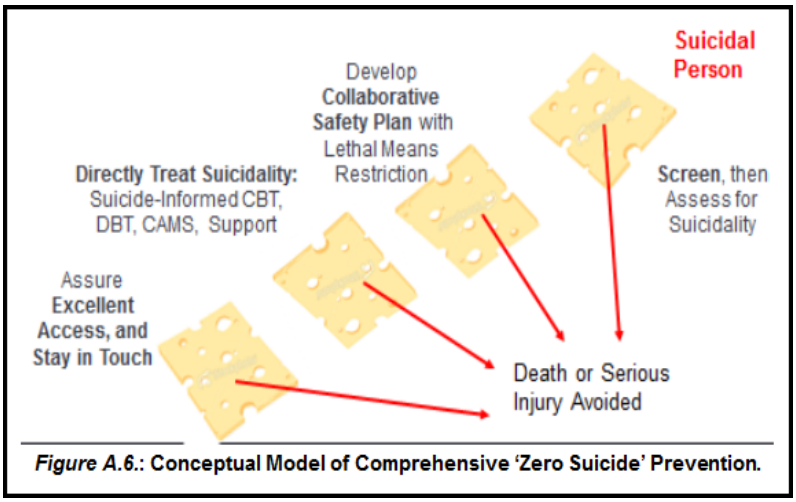


Figure A.6.: **Conceptual Model of Comprehensive 'Zero Suicide' Prevention.**

The conceptual model is depicted in **Figure A.6.** This project applies Reason's 'Swiss Cheese Model'[57] for safety to the problem of suicide in healthcare. Patients often slip through holes in care, including failures to: identify suicidality, take practical steps for their safety, treat suicidality directly, and provide supportive contacts. The NZSM embedded in a 'Learning Healthcare System' closes these gaps through a series of evidence-based approaches recognizing that suicide can be prevented at each point along the care pathway.

The proposed study seeks to conduct a comprehensive evaluation of NZSM implementation in real-world settings across 6 large, diverse 'Learning Healthcare Systems.' The participating health systems include Henry Ford Health System (HFHS; Michigan), Group Health Cooperative (GHC; Washington state), and Kaiser Permanente (KP) health care systems in Colorado (KPCO), Northern California (KPNC), Northwest (KPNW; Oregon), and Southern California (KPSC). These systems will jointly participate in a Zero Suicide Academy launch meeting in Seattle in November 2016 to finalize plans for implementation within and across sites. Drs. Ahmedani and Simon (Co-PIs) will participate in the meeting and collaboratively work with each sites' health system leaders to finalize their plans.

In each health system, prioritization of specific NZSM strategies and selection of specific improvement targets will be guided by a current state assessment (see example in **Table A.6.**) evaluating health system contacts (i.e. potential opportunities for prevention) prior to suicide death and non-fatal suicide attempt. In this sample, over 80% of patients dying by suicide made at least one mental health specialty visit in the year prior to death, and over 50% made a mental health visit in the month before. In contrast, only 11% had a mental health inpatient stay and only 18% had an ER visit with mental health diagnosis. While over half made a mental health visit in the month prior to death, only 12% completed screening for suicidal ideation (PHQ item 9). This pattern suggests a focus on more systematic screening for suicidal ideation in specialty mental health

(NZSM Identify) and maintaining contact with those found to be at risk (NZSM Engage). A focus on follow-up after ER visit or hospitalization (NZSM Transition) would reach only a small proportion of those at risk. A different pattern of prior utilization might suggest different priority areas for care improvement.

Table A.6. Example current state assessment for one of the participating systems.

Deaths by suicide 2014-2015	30 days before event		90 days before event		Year before event	
	% Yes	Median # if Yes	% Yes	Median # if Yes	% Yes	Median # if Yes
Enrolled	97	N/A	93	N/A	76	N/A
Mental health Inpatient stay	3	1	5	1	11	1
Mental health ER Visit	7	1	10	1	18	1
Mental health specialty outpatient visit	51	2	73	3	83	10
Primary care visit with MH diagnosis	15	1	20	2	42	2
Diagnosis of definite self-inflicted injury	4	4	4	4	10	4
Completed PHQ9 item 9	12	1	17	1	25	4

As part of our application, we have included letters of support from health system leaders at each of these systems to demonstrate their commitment to participating in the Academy launch meeting, to identify and implement specific NZSM components within their service delivery settings, and to join the learning collaborative. Our study approach for this project will begin with collaboration with health system leader partners to optimize fidelity and outcome metrics to measure each unique intervention implemented. We will then use longitudinal EHR data to evaluate fidelity to the unique NZSM approaches implemented at each site. Finally, we will measure suicide attempt and mortality outcomes associated with each unique intervention, and bundle of interventions, implemented at each site and then overall across all sites. While not all sites will implement the same NZSM interventions, we will capture the same metrics across all sites, such that certain sites will be 'intervention' sites for a specific NZSM component, but other sites will serve as 'control' sites. The study will leverage the data definitions and resources already established by our NIMH-funded MHRN, including metrics already developed to accurately and consistently measure suicide attempts across sites using the EHR. Overall, w*e hypothesize that an NZSM bundle of components reduces suicide behavior.*

A.7. Clinical & Public Health Significance: The proposed project has a high degree of clinical and public health significance. Given that the NZSM is being promoted nationally by SAMHSA[14] and The Joint Commission,[16] and there are plans for its implementation across 17 countries,[58] it is essential that we evaluate intervention fidelity and outcomes in real-world healthcare systems. While the HFHS PDC program has provided preliminary evidence in behavioral health settings, there is no information on the effectiveness of NZSM to reduce suicide behavior within other health systems, including service settings such as primary care, or across geographically and demographically diverse patient populations. It is also unclear whether health systems will demonstrate a high level of fidelity to the implemented model. If shown to be feasible to implement as well as effective to reduce suicide behavior, this model has the possibility to revolutionize suicide prevention in healthcare settings in the US (and across the world). If the NZSM is not found to be effective and feasible, then resources and funding can be shifted towards a different suicide prevention approach.

In addition, because we will involve stakeholders within our partner health systems as co-investigators, they we will easily be able to use data from the project to inform local quality improvement efforts – potentially allowing this study to save lives by informing practice change. Given that surveillance and quality improvement are major parts of NZSM, any system response to study data will not interfere with our ability to learn about the program. Rather, it demonstrates real-world system response to surveillance, reflecting true implementation.

Finally, since EDC/SPRC is a partner in this project and all affiliated health systems are members of MHRN, we will be able to quickly disseminate the results of this project to a broad national audience. EDC's SPRC oversees dissemination of the National ZS Initiative, hosts regular ZS Training Academies, and maintains the ZS toolkit and website.[15] MHRN has developed 'Learning Healthcare System' models for data infrastructure, implementation, and researcher-stakeholder engagement.[59] Learnings from this study will be immediately available on the ZS and MHRN websites, shared directly with SAMHSA (thru the SPRC) and NIMH (thru the MHRN), and disseminated broadly to health systems via ZS Training Academies well before published data are available. As such, we pledge rapid dissemination and translation to practice, as opposed to the standard research-to-practice model – which the NIH and others estimate can take 17 years.[60,61]

B. INNOVATION

The project is responsive to the NAASP RPTF recommendations that future suicide research include large sample sizes from real-world settings, pragmatic study designs, and suicide behavior outcomes.[11] Major

innovations include:

- Examination of fidelity AND outcomes from REAL-WORLD implementation across 6 health systems;
- Investigation of NZSM clinical components in a single study implemented using various approaches in diverse settings;
- Capture of suicide mortality and suicide attempt data, including using official government mortality records already linked to health system records at each site to measure suicide death;
- Defined patient populations with large sample sizes (and power) to test for suicidal behavior outcomes;
- Use of already established and validated healthcare data definitions and variables created by MHRN;
- Leveraging EHR systems for fidelity and outcome data capture;
- Demonstrating a 'Learning Healthcare System for Suicide Prevention' by involving stakeholders in every study component, including clinical champions as co-investigators. Selection and implementation of specific NZSM strategies in each health system will be led by delivery system leaders;
- Rapid-cycle dissemination and translation of study findings to practice (along with traditional publication);
- Use of strong, Interrupted Time-Series study designs appropriate for Learning Healthcare Systems;
- Re-usable EHR tools for implementation and evaluation that can be replicated at other health systems.

C. APPROACH

D.1. Overview: The proposed study seeks to conduct an evaluation of intervention fidelity and suicide behavior outcomes of the NZSM across 6 diverse 'Learning Healthcare Systems'. Participating health systems are at different stages of implementing NZSM strategies. For example, HFHS and GHC have already implemented some components in specialty mental health clinics, and KPNC has implemented some components in emergency departments. While this variation poses methodological challenges (such that we cannot conduct a randomized trial of a single improvement strategy across all systems), our strong approach using interrupted time-series designs will provide generalizable evidence of fidelity and outcomes for unique components and bundles of components of NZSM. Of particular importance, the study will focus data collection on leveraging EHR systems, so that all products from the study can be easily replicated by other health systems as they work to implement their own versions of NZSM. Overall, data collection will include longitudinal EHR and insurance claims data as well as official government mortality records across sites. All of the participating health systems are locally funding and supporting their own NZSM initiatives, and we are able to collaborate to leverage those efforts in this study. Below, we describe our proposed team, preliminary studies, intervention, methods, and analyses.

D.2. Research Team: Our team has considerable expertise in all aspects of the project.

- Brian K. Ahmedani, PhD (Co-PI) is Director of Psychiatry Research at HFHS. He is PI on several suicide prevention studies, including a study assessing treatment utilization before suicide (TUBS) across 8 health systems (R01MH103539). He is also Co-PI of the Trans-America Consortium of the HCSRN – a healthcare provider organization in NIH's Precision Medicine Initiative Cohort Program (OT2OD024610). He is Site-PI or Co-I for several other large multi-site consortia (UG1DA040314, U19MH092201) and other suicide projects (e.g., U01CE002661, UH2AT007755) and has published >50 manuscripts since 2011.[25,29,30,34,39,54,62,63] This includes publications on the HFHS PDC Initiative and a major synthesis for the RPTF. Dr. Ahmedani chairs MHRN's Suicide Prevention Scientific Interest Group and is a member of the Zero Suicide Advisory Group.
- Greg Simon, MD, MPH (Co-PI) is an internationally known scientist and psychiatrist at Group Health Cooperative in Seattle, WA. He has co-led efforts at GHC and across participating KP regions to begin implementation of NZSM, and has led preliminary evaluation of multi-site suicide prevention practices to prepare for launch of the initiative across KP sites. Dr. Simon is PI of MHRN (U19MH092201), the Suicide Risk Calculator Project, and SPOT (UH3MH007755) – the largest suicide prevention trial in a US health system (currently enrolling 18,000 patients). He is also Site-PI for the TUBS project and has published numerous landmark papers on suicide risk and prevention.[29,30,40,54,64-70] Dr. Simon was a long-time NIMH Council member and is now an Advisory Board member for the NIH Precision Medicine Initiative.
- Robert Penfold, PhD (Co-I) is a Scientist at GHC, who is PI of multiple federally funded projects, and has particular expertise using interrupted time-series designs and segmented regression analyses to evaluate health system policies and interventions[63,71] – which are the methods/analyses proposed for this study.
- Karen Coleman, PhD (Site-PI) is a Research Scientist at KPSC and is Site-PI for MHRN. She is Chair of MHRN's Diversity Scientific Interest Group, and is lead on multiple NIH grants and manuscripts.[63,64,72-74]
- Stacy Sterling, DrPH (Site-PI) is a Scientist at KPNC, Site-PI for MHRN, and expert in adolescent mental health and implementation of behavioral health interventions. She is PI of numerous projects, including a multi-site study investigating development of substance use disorders in youth using EHR data.[75-77]
- Arne Beck, PhD (Site-PI) is Director of Quality Improvement and Strategic Research at KP Colorado. He

serves as Site-PI for MHRN, TUBS, and SPOT. He is also widely regarded for leading large evaluations of healthcare implementation within and across health care systems.[73,78,79]

- Bobbi Jo Yarborough, PsyD (Site-PI) is a KPNW psychologist and investigator. She leads federal studies, and is Co-I on MHRN and Site-PI for the NIDA CTN Health Systems Node (UG1DA040314).
- Frances Lynch, PhD (Co-I) is a Senior Scientist at KPNW, where she is PI for several NIH studies. She serves as Site-PI for MHRN, and with Dr. Ahmedani on TUBS.[29,30] Dr. Lynch worked with NIMH to develop a population health outcome model for suicide prevention.[80]
- Julie Goldstein-Grumet, PhD (Site-PI) is a psychologist and Program Director at SPRC for the National ZS Initiative (U79SM062297). She leads development of the NZSM tools and resources and collaborates with healthcare systems to assist with local implementation of the NZSM.[17,81]

D.3. Preliminary Studies: Our team has conducted preliminary studies, including several on NZSM.

- *HFHS Perfect Depression Care Zero Suicide Initiative* (***Lead Evaluator: Ahmedani***): This is the original model ZS program for health systems throughout the US, and internationally.[58] To date, analysis has been conducted on the suicide mortality rate for behavioral health patients (**Figure D.3a**). These analyses demonstrate a substantial reduction in the suicide rate of nearly 80% for this population.[31-34] Of note, stronger and more inclusive research designs and analyses are needed. In addition, research is needed to estimate change in suicide attempts and replication across multiple sites and patient populations. The analyses do not include the model implemented for the entire health system (including primary care settings in 2010), and does not provide information on fidelity. These limitations are the focus of this proposed study.

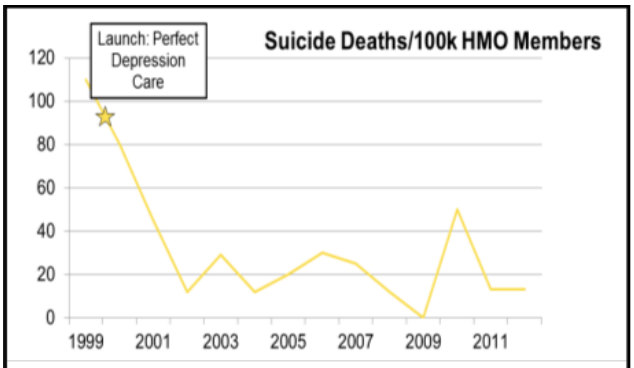


***Figure D.3a*: Annual Suicide Rates from the Perfect Depression Care ZS Initiative at Henry Ford Health System.**

- *Mental Health Research Network (MHRN,* **PI: Simon; Site-PIs: Ahmedani, Lynch, Coleman, Beck; Co-I: Yarborough***)*: This NIMH-funded consortium (U19MH092201) established researcher-stakeholder partnerships and data resources across 13 health systems – becoming the 1st national consortium of US 'Learning Healthcare Systems' for mental health. Infrastructure development includes EHR data validation for use in research. This includes generating accurate counts/rates of diagnoses, medications, and procedures. MHRN has used CDC processes to match government cause-of-death with healthcare records[29] and validated EHR algorithms to detect suicide attempts.[30,40,63,82] The group regularly involves stakeholders, and prioritizes research topics based on system priorities. This consortium demonstrates our experience involving stakeholders, creating infrastructure, using/validating EHR data, and conducting multi-site research.[29,82-84]
- *National Zero Suicide Initiative* (***National Program Manager: Goldstein-Grumet***)*:* SPRC has developed the NZSM tools and resources to support health system implementation via funding from SAMHSA (U79SM062297; U79SM0559945). SPRC trains and assists with NZSM implementation across sites.[17,81]
- *Treatment Utilization Before Suicide (TUBS;* ***PI: Ahmedani, Site-PIs: Lynch, Simon, Beck****):* This study (R01MH103539) examines variation in patterns of care before suicide using EHR data across 8 systems (including HFHS, KPNW, GHC, and KPCO). Using EWAS, latent class analysis, and regression, the aim is to develop an EHR algorithm to predict suicide. The first paper found that >80% of individuals make a healthcare visit in the year before suicide.[29]
- *Development of a Population-based Risk Calculator for Suicidal Behavior* (**PI: Simon; Site-PIs: Beck, Ahmedani, Coleman, Lynch**): This Suicide Risk Calculator Project (U19MH092201-S2) seeks to develop a population-based suicide risk calculator using patient-reported and other health system records data across 7 MHRN affiliated health systems (including all 6 sites proposed for this study). This study demonstrates our team's ability to measure suicide attempts and other healthcare utilization across our participating sites.
- *Suicide Prevention Outreach Trial (SPOT;* ***PI: Simon; Site-PI: Beck; Co-I: Ahmedani, Lynch***): This large pragmatic trial in 4 health systems (UH2AT007755, UH3MH007755) evaluates the effectiveness of two programs to prevent suicide attempts among patients who report suicidal ideation. One program includes an online program to develop emotion regulation skills, supported by outreach and coaching. The other program includes systematic outreach to assess risk and encourage follow-up care.[70]
- *SSRI Warnings and Suicidality among Youth (****Site-PIs: Ahmedani, Simon, Coleman****):* This study (U19MH092201) used an interrupted time-series design with EHR and insurance claims data (as proposed in this study) to examine the impact of the FDA black box warning (BBW) on use of antidepressants and youth

suicide across 11 systems (including all 6 sites in this study). The main paper, in *BMJ*, identified a decrease in antidepressant dispensings and corresponding increase in suicide behavior after the BBW (see **Figure D.3b**).[63]

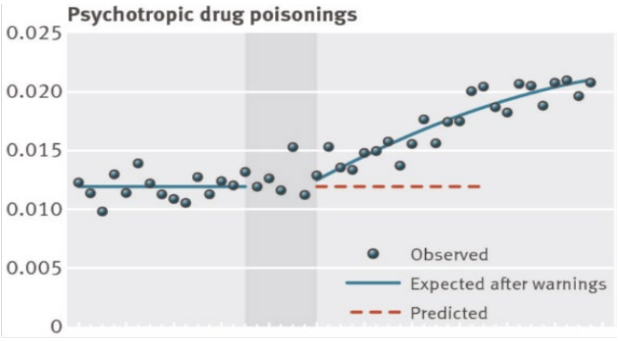


Figure D.3b: Suicide attempts due to psychotropic drug poisoning among young adults before and after the FDA Black Box Warning on Antidepressants: An Interrupted Time-Series Study across 11 health systems.

D.4. Study Setting and Population: The proposed study seeks to examine NZSM implementation fidelity and outcomes across 6 health systems (see **Figure D.4.**). Generalizability is enhanced by the geographically diverse locations, demographically diverse populations, and variation in implementation time periods and strategies. All participating healthcare systems provide both comprehensive health care (outpatient and inpatient, general medical and behavioral health) as well as insurance coverage to defined member/patient populations. Linkage of EHR and insurance claims data allows each system to accurately and completely ascertain all suicide attempts across a defined population, including suicide attempts among individuals presenting at external facilities. Linkage of insurance coverage and state vital statistics data allows each system to accurately and completely ascertain suicide deaths for all member/patients, including those who have disengaged from care. As described below (see section D.13. regarding generalizability), this organizational and business structure is not necessary for successful implementation of NZSM strategies, but it is absolutely essential for the complete and unbiased ascertainment of suicide attempt and suicide death outcomes needed to evaluate NZSM strategies. Each healthcare setting is described briefly below.

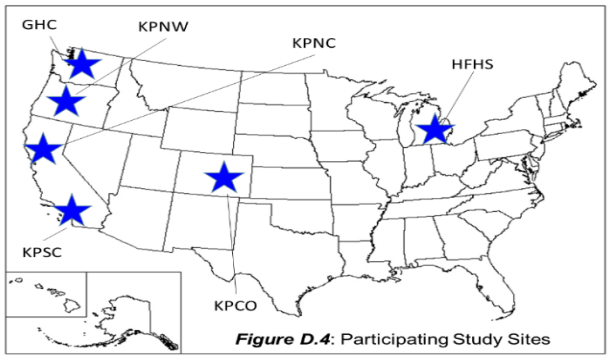


Figure D.4: Participating Study Sites

- ***Henry Ford Health System (HFHS)*** serves a defined population of 200,000 member/patients through a network of 300 primary care and 100 mental health providers across 40 facilities in Michigan.
- ***Group Health Cooperative (GHC)*** serves a defined population of 700,000 member/patients through a network of 390 primary care and 61 mental health providers across 27 facilities in Washington.
- ***Kaiser Permanente Northern California (KPNC)*** serves a defined population of 3.8 million member/patients who receive care through its health plan, at its hospitals and facilities in Northern California.
- ***Kaiser Permanente Colorado (KPCO)*** serves a defined population of 668,000 member/patients through a network of 400 primary care and 140 mental health providers across 28 facilities in Colorado.
- ***Kaiser Permanente Northwest (KPNW)*** serves a defined population of 490,000 member/patients through 27 clinics and 2 hospitals across Oregon and Washington.
- ***Kaiser Permanente Southern California (KPSC)*** serves a defined population of 4.2 million members/patients and has 14 hospitals and nearly 200 other medical offices with a partnership of over 5,700 physicians and hundreds of behavioral health providers.

Table D.4. Demographic characteristics of member/patient populations.

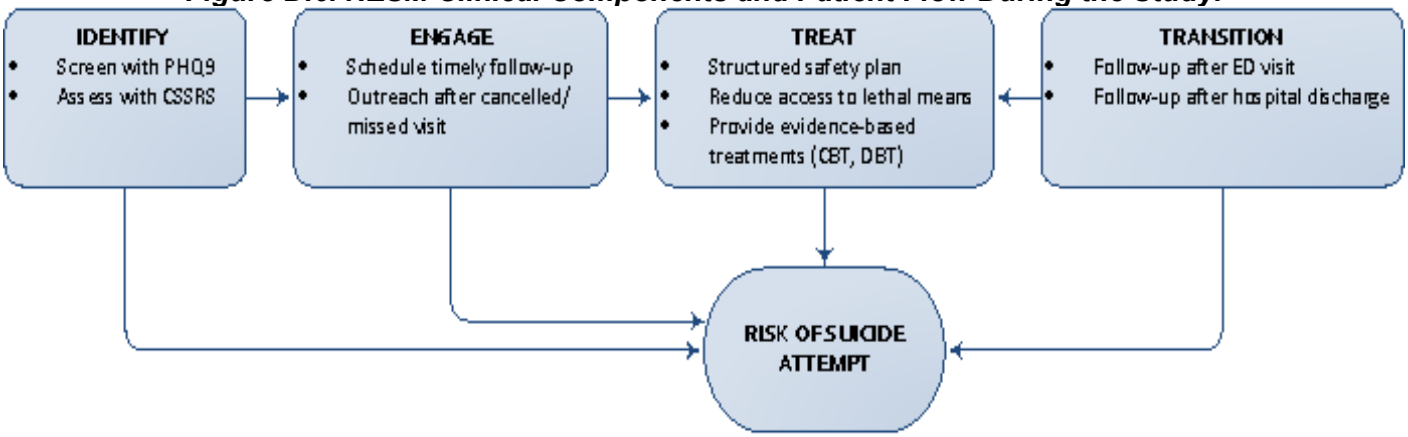
	KPSC	KPNC	KPNW	KPCO	HFHS	GHC
Age 0 to 19	25.6%	24.1%	22.6%	22.8%	14.2%	17.5%
Age 20 to 39	25.5%	25.0%	24.0%	25.7%	18.1%	23.5%
Age 40-64	34.0%	34.9%	36.1%	35.5%	39.4%	40.8%
Age 65+	14.9%	15.0%	17.3%	16.0%	28.4%	18.2%
Female	51.8%	51.9%	52.1%	47.2%	55.8%	54.2%
Asian	9.8%	18.3%	5.3%	3.4%	3.6%	7.0%
African American	9.2%	7.3%	3.2%	4.9%	36.5%	3.6%
Hispanic	39.2%	19.9%	7.5%	16.3%	2.1%	3.8%
Native American	0.3%	0.5%	0.9%	0.5%	0.4%	1.2%
Insured by Medicaid	7.7%	5.6%	6.4%	9.5%	0.0%	0.1%
Insured by Medicare	14.0%	19.6%	18.7%	15.5%	27.8%	20.1%
Lower SES Neighborhood	55.7%	37.0%	48.6%	21.0%	56.7%	40.6%
Any Mental Health Diagnosis in 2014	14.5%	13.9%	20.4%	16.6%	10.0%	19.9%

D.5. Study Sample: We will establish an overall defined patient population denominator, such that all individuals will be health system members – including combined patient members of the affiliated medical group and health insurance plan. This combination provides comprehensive capture of electronic health records and insurance claims data for all patients. We will define our denominator in quarterly periods. Each observation quarter at each site will include unique patients, who were enrolled in the health plan for that quarter. Data from MHRN indicate that there are >9 million patients across the 6 systems each year. As described below, specific analyses will focus on denominator populations relevant to evaluation of a specific NZSM component or improvement strategy (e.g. analyses regarding fidelity and impact of screening/identification in specialty mental health care will focus on patients making at least one specialty mental health contact). Based on data from these healthcare systems in 2014 and 2015, we anticipate observing approximately 4,500 non-fatal, medically treated suicide attempts and 225 suicide deaths in each quarter of the study period.

D.6. The National Zero Suicide Model (NZSM): A series of NZSM components either have been, or will be, implemented across all study sites using various approaches. The model is not a one-size-fits-all approach, rather it is a framework, and is adaptable. While the NZSM offers four clinical/quality components, specific implementation strategies can be tailored for each organization. Our study includes representation of a variety of approaches given that the National ZS Initiative (and The Joint Commission) promotes the NZSM across various service settings. The chosen model represents each system's approach to suicide prevention for their patient population. As such, we focus this study on each of the approaches and service settings specifically chosen by each system, consistent with a "Learning Healthcare System" model. HFHS and GHC have already implemented several approaches in various settings, and KP regions will finalize their implementation plan in fall 2016 during the launch meeting. Our plan is to capture data for each metric across all sites, such that sites choosing not to implement a certain intervention will serve as 'control' sites for those that do. Our analyses will first focus on changes within each site, and then model changes across sites, using stratification by approach to provide meaningful and translational information for future practice. The NZSM components are described below, including a menu of the corresponding evidence-based strategies available for each system.[15,17,18]

- ***Identify:*** All health system patients are screened for suicide upon their first visit, and annually thereafter if negative or every visit if positive. Strategies: 1) Item 9 of PHQ-9, 2) C-SSRS, 3) EHR risk algorithm, 4) SAFE-T, and 5) clinical suicide risk assessment.[31,40,41,85-87]
- ***Engage:*** All individuals identified as at-risk are engaged in a Care Management Plan, documented in the medical chart note. Strategies: 1) Care manager, 2) Clinical care pathway established, 3) Schedule follow-up visit, 4) Involve family in treatment planning, and 5) Outreach after cancelled/missed appointment.[43,45,88-90]
- ***Treat:*** Clients with suicide risk receive evidence-based specialty treatment to address suicidal thoughts and behaviors directly. Treatment should be documented in the patient's medical chart note. Strategies: 1) Structured safety plan with means restriction, 2) Behavioral Health Services visit within 1-month, 3) Suicide specific treatment using an evidence-based model: CAMS, DBT, or CBT for Suicide .[24,26,27,48]
- ***Transition:*** Access to specialty care, uninterrupted care transitions, and continuity of specialty treatment after first receipt – all should be documented. Strategies (all are required): 1) Follow-up visit within 7 days of first positive screen, and 2) contact within 24-48 hours after emergency or inpatient discharge.[50]

Figure D.6. NZSM Clinical Components and Patient Flow During the Study.



In **Figure D.6.**, we depict the process whereby the participating systems have chosen, or will choose, NZSM strategies within components to reduce suicide. The model for the general population depicts patient

flow from identify to engage to treat, such that an intervention to increase identification would also lead to greater engagement and more frequent delivery of effective treatment. Similarly, an intervention to increase identification could have direct effects on reducing risk (not mediated by either improved engagement or treatment) and indirect effects (mediated by improved engagement or treatment). Because transition begins with a patient in the emergency setting or hospital after a suicide attempt, the flow begins with transition and may or may not flow through treatment. We will evaluate each of the pathways shown in our analytic models for each of the approaches implemented by our health systems. The model begins with identification (identification of risk in outpatient settings) or transition (following emergency or hospitalization visit for suicide attempt or ideation). Each pathway will be modeled directly for its impact on suicide behavior outcomes as well as in combination with other components in a multi-component pathway to determine whether individual components or bundles of components work better to mitigate suicide risk. Before evaluation of suicide outcomes, we will first optimize fidelity metrics and use those metrics to determine whether systems are actually implementing each proposed intervention as planned.

D.7. Specific Aim 1: Collaborate with health system leaders to develop EHR metrics to measure specific quality improvement targets and care processes tailored to local NZSM implementation.

This study will optimize a series of metrics to assess fidelity and outcomes for each of the chosen interventions at each site. While GHC and HFHS have already implemented several NZSM components, the four Kaiser sites will finalize their protocols in fall 2016. We will use EHR data to capture fidelity and outcomes for strategies implemented corresponding to each of the four NZSM clinical components. Below, in **Table D.7.**, we provide a chart to demonstrate our initial set of proposed metrics to evaluate each component. The first aim will be used to tailor these metrics to each site and approach. All metrics will be captured across sites, so as to measure variation between intervention and control sites on each proposed component.

Table D.7. Preliminary set of process and outcome measures for NZSM components across sites.

	Example Process Improvement	Corresponding Process Measure	Population-Specific Outcome Measure
Identify	Administer PHQ9 at all MH specialty visits for patients age <=13	PHQ9 item 9 recorded for all MH specialty visits for patients age >=13	Rate of suicide attempt and suicide death in 90 days following specialty MH visit
Identify	Administer CSSRS for all MH specialty patients scoring 2 or 3 on PHQ item 9	CSSRS recorded for all MH specialty patients scoring 2 or 3 on PHQ item 9	Rate of suicide attempt and suicide death in 90 days following score of 2 or 3 on item 9
Engage	Schedule f/u visit within 2 weeks for every patient scoring >=3 on CSSRS	f/u visit scheduled within 2 weeks for every patient scoring >=3 on CSSRS	Rate of suicide attempt and suicide death in 90 days following CSSRS score >=3
Engage	Schedule f/u visit within 2 weeks for every patient with diagnosis of suicidal ideation at MH specialty visit	f/u visit scheduled within 2 weeks for every patient with diagnosis of suicidal ideation at MH specialty visit	Rate of suicide attempt and suicide death in 90 days following diagnosis of suicidal ideation at MH specialty visit
Engage	Immediate telephone or secure message outreach following missed mental health appointment for any patient with CSSRS score >=3 within last month	Telephone or secure message outreach documented on same day of missed mental health appointment for any patient with CSSRS score >=3 within last month	Rate of suicide attempt and suicide death in 90 days following missed mental health visits in patients with CSSRS score of 3 in prior 30 days.
Treat	Record standardized safety plan for every patients scoring >=3 on CSSRS	Standardized safety plan recorded for every patients scoring >=3 on CSSRS within 24 hours.	Rate of suicide attempt and suicide death in 90 days following CSSRS score >=3
Treat	Provide counseling regarding reducing access to lethal means for every patient scoring 2 or 3 on PHQ item 9	EHR documents counseling regarding reducing access to lethal means for every patient scoring 2 or 3 on PHQ item 9 within 24 hours of first elevated score	Rate of suicide attempt and suicide death in 90 days following score of 2 or 3 on item 9
Treat	Provide Dialectical Behavior Therapy skills training to every patient with history of suicide attempt	EHR documents delivery of >=6 individual or group DBT skills training sessions within 6 months of program start (for established patients) or index suicide attempt (for new patients)	Rate of suicide attempt and suicide death in 360 days following program start (for established patients) or index suicide attempt (for new patients)
Transition	Telephone outreach within 72 hours of discharge from inpatient	Documented telephone contact within 72 hours of discharge from	Rate of suicide attempt and suicide death in 90 days following

	stay for suicidal ideation or suicide attempt	inpatient stay for suicidal ideation or suicide attempt	discharge from inpatient stay for suicidal ideation or suicide attempt
Transition	Telephone outreach within 72 hours of emergency department visit for suicidal ideation or suicide attempt	Documented telephone contact within 72 hours of emergency department visit for suicidal ideation or suicide attempt	Rate of suicide attempt and suicide death in 90 days following emergency department visit for suicidal ideation or suicide attempt
Transition	Mental health specialty follow-up visit within 7 days of discharge from inpatient stay for suicidal ideation or suicide attempt	Mental health specialty follow-up visit within 7 days of discharge from inpatient stay for suicidal ideation or suicide attempt	Rate of suicide attempt and suicide death in 90 days following discharge from inpatient stay for suicidal ideation or suicide attempt
Transition	Mental health specialty follow-up visit within 7 days of emergency department visit for suicidal ideation or suicide attempt	Mental health specialty follow-up visit within 7 days of emergency department visit for suicidal ideation or suicide attempt	Rate of suicide attempt and suicide death in 90 days following emergency department visit for suicidal ideation or suicide attempt

D.8. Specific Aim 2: Examine the fidelity of the specific NZSM care processes implemented in each system. *Hypothesis: NSZM components will be implemented with fidelity across sites.*

Research Design*:** Using the final fidelity metrics created in Aim 1, this aim will use a ***stepped wedge, interrupted time-series with control series research design to measure change in the rate of each care process before and after implementation of each intervention strategy and allow for comparison to other non-intervention sites. For example, for the ENGAGE component (**Table D.7.**), we would calculate the proportion of patients who scheduled a follow-up visit within 2 weeks among the total number of patients who were eligible to have scheduled a 2-week visit during that period based on the proposed intervention. A separate metric would be calculated for each quarterly period – both at the intervention and the control site.

The interrupted time-series (ITS) design is arguably the strongest quasi-experimental design available to examine the effect of intervention implementation, when randomization is not feasible.[71,91] This research design allows us to estimate change in both the intercept and slope of a process (i.e., screening rate) or outcome (i.e., suicide rates) before and after implementation of an intervention (i.e., the NZSM). Members of the research team have successfully used this approach in other studies.[63,71,92-95] We also use an interrupted times series design, because it provides evidence of causal effects by controlling for secular trends in study outcomes. The population rates for each outcome will be divided into three periods: baseline (pre-implementation) period, implementation 'phase-in' period, and intervention period. Because implementation of the NZSM occurred at different times across each site (retrospective for some components at GHC and HFHS), we will also apply a stepped wedge design. Stepped wedge designs are strong designs to evaluate quality improvement initiatives implemented at different time periods across multiple sites, especially since health systems typically implement initiatives for all patients at once rather than use randomization, as in standard trials.[78,96] Therefore, using the combination of stepped wedge and interrupted time-series designs, we will measure outcomes in 12 quarterly periods pre-implementation at each site, observe a 4 quarter 'phase-in' period, and then measure 12 quarterly periods after the full NZSM intervention is implemented. Our 12 quarters of observation both before and after implementation exceeds the minimum 8 observation periods required for this design.[71] The observation periods for each individual site will correspond to the NZSM implementation time frame described for each system in Section D.4. Also, because we plan to capture all metrics across sites, we will be able to compare 'intervention' sites (i.e., sites that implement a specific NZSM strategy) to 'control' sites (i.e., sites that do not implement the same NZSM strategy).

***Data Collection*:** All participating systems have an EHR and insurance claims records, which includes extensive clinical and demographic information for all patients. Data on demographics, encounters, prescriptions, diagnoses, and procedures are available and coded using the same standard, national coding schemes across sites.[97-100] Using the data quality processes developed in MHRN, data for this study will be quality checked locally before secure file transfer to GHC / HFHS and then cross-validated between sites.

Analysis Plan: After basic descriptive analyses, including the characteristics of the populations stratified by site, the main analysis will use segmented regression models to estimate changes in the rates of each care process from baseline through the intervention period. The basic regression model includes a constant term; a continuous variable indicating time in quarters (t) from the start of the observation period; an implementation indicator, depicting the immediate period after the initiative was implemented; and an interaction between implementation and time. The coefficient associated with time (β1) estimates the baseline trend in the rate of each care process (β 0) during the first 12 quarters of observation. This variable controls for most internal threats to validity (e.g., history and maturation) by estimating a 12-quarter baseline expected trend.[71] The coefficient associated with the implementation indicator (β2) estimates the immediate level change

in the rate of each process. The coefficient associated with the intervention variable (β3) estimates the change in trend (slope) in the rate of each process. Together, β2 and β3 provide an estimate of the overall change in each process controlling for baseline expected trends. Because there is an implementation phase-in period, when NZSM components are integrated in usual care, data from this period are censored from the analysis, but will still be included in the figures, similar to our previous studies.[63] These analyses will be stratified by demographics and sites – the latter will allow us to generate data and compare processes between intervention sites and control sites.

The data will allow us to understand whether sites are actually carrying out the processes proposed in their implementation of each component (i.e., fidelity of each component). Stratified analyses will test whether the program has varying effects among different population subgroups, approaches, and sites.

Power: Given that we have >9 million patients across sites, and >200,000 at each individual site, we will have more than 80% power to detect medium effect size change with $p \leq 0.05$ for all of the proposed analyses according to standard power calculations.[101-103] For example, to evaluate change in the % of mental health specialty patients completing screening with item 9 of PHQ, we anticipate that approximately 10% of all health system patients have a behavioral health visit each year, based on data captured from MHRN. In this example, we would have at least 15,000 patients at each health system, and 900,000 patients across all health systems in our sample. Our MHRN estimates suggest that the baseline completion rate of PHQ item 9 screening is 11% in this setting. Thus, we would have at least 1,650 unique patients who were screened for suicide ideation at each system (>400 per quarter) and 99,000 patients per year overall at baseline.

D.9. Specific Aim 3: Investigate suicide attempt and mortality outcomes within and across NZSM system models. *Hypothesis: NSZM components will be associated with reductions in suicide attempts and deaths within and across sites.*

***Research Design*:** We will employ the same research design, a stepped-wedge interrupted time series with control series design, for Aim 3. However, rather than measuring processes/fidelity, we will measure suicide attempt and death outcomes before and after implementation of each component, and bundle of components, within and across sites.

***Data Collection*:** We will measure 2 suicide behavior outcomes. Suicide outcomes for each patient will be defined within the 12-month period following the first visit date in each quarter.

- ***Suicide death***. Suicide will be determined using official, government mortality and cause-of-death records. Suicide will be classified using the official CDC scheme, including ICD-10 codes X60–X84 and Y87.0. Mortality records are already matched to EHR records at all sites.[29,34,104]
- ***Suicide attempts***. In prior studies, our team has developed a validated algorithm derived from ICD-9 diagnosis codes to identify medically treated suicide attempts, even when e-codes (the primary identification method) are missing.[30,40,63,82,105] We will use this method to detect suicide attempts in partner system records thru September 2015. Beginning in October 2015 (when US health systems switched to ICD-10 via federal mandate), we will adopt the latest metric validated in MHRN.[59] As an extra data quality-check, we will use MHRN procedures to cross-validate the ICD-10 algorithm in our study samples via clinician-review of medical chart notes.[40]

Analysis Plan: We propose the same basic segmented regression analysis plan as proposed in Aim 2. Here, we propose to separately evaluate each of the individual health system strategies, and each of the pathways shown in Figure D.6. above (and described in Section D.6.).

We will conduct an additional set of analyses at intervention sites, which will stratify outcomes for each NZSM component and pathway by fidelity (i.e., outcomes for each component and pathway when the model was followed as designed vs. outcomes when the model was not followed). This will allow us to measure whether outcomes vary within sites dependent upon whether processes were followed as proposed.

Power: Again, given our overall sample size of >9 million patients, and >200,000 at each site, we will have more than 80% power to detect medium effect size change with $p \leq 0.05$ *for* all of the proposed analyses according to standard power calculations.[101-103] For example, to evaluate change in the suicide attempt and mortality rate among *mental health specialty* patients, we estimate having at least 15,000 patients with a behavioral health visit per site and 900,000 patients across sites each year. Our MHRN data suggest that the suicide attempt and mortality rate among this population is 1.2% each year. This suggests that we would have between 180 and 4,200 attempts/deaths per year at each site and 10,800 overall across sites. Overall, the suicide attempt rate for the entire population across sites is 0.2% (~18,000 per year).

Exploratory Aim: Exploratory analyses will examine heterogeneity of effects on care processes and suicidal behavior outcomes across important demographic and clinical subgroups (sex, age, race/ethnicity, neighborhood socioeconomic status, mental health diagnosis). Selection of specific tests for interaction or

effect modification will depend on findings from Aim 2 regarding effects on care processes and Aim 3 regarding suicidal behavior outcomes. Consequently, findings of these analyses will be considered exploratory or hypothesis-generating.

D.10. Timeline. Drs. Ahmedani and Simon will oversee the project (see ***Table D.10.***). Meetings will be convened monthly via phone conference for all sites, and annually in-person at a different participating health system site each year on a rotating basis.

Table D.10. Timeline	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Study Preparation (e.g., IRB, DUA, staffing)																				
Study Team Meetings																				
Aim 1: Optimize Process and Outcome Metrics																				
Metrics Completion; Submit Paper																				
Aim 2: Process / Fidelity EHR data extraction																				
Fidelity ITS Analysis; Submit Papers																				
Aim 3: Outcomes EHR data extraction																				
Outcomes ITS Analysis; Submit Papers																				

D.11. Decisions. Several major decisions on the study design and analyses are described below.

- ***Pragmatic Study Design:*** Given our 'Learning Healthcare System' focus and multi-site study with >9 million patients, a trial was not feasible. Rather, we use strong compatible designs to measure outcomes.
- ***Inclusion of Integrated Health Systems:*** We chose to include multiple, large integrated health systems. While these systems are comprised of only patients who have health insurance (commercial, Medicare, Medicaid), they provide a very large sample and defined patient population with comprehensive capture of EHR and insurance claims records, which allows capture of all utilization both inside and outside of the system (a necessary element to accurately measure suicide attempts).
- ***Various Implementation Approaches:*** Health systems have all made decisions to implement different components and strategies of NZSM based on their needs, resources, and populations. While the approach varies across systems, we feel this is a strength because it more strongly mirrors real-world implementation. We've proposed strong designs to measure these diverse approaches across systems.
- ***Patient-level Data Collection:*** This study is 'system' focused, and designed to develop and use easily implementable approaches to measuring fidelity and outcomes using EHR data, so that the approaches can be used by other health systems moving forward.

D.12. Generalizability. As discussed above, the structure of participating health systems will permit a robust evaluation of the impact of specific NZSM strategies on population-level rates of suicide attempt and suicide death. But the care improvement strategies and care process metrics developed in this project should be readily disseminated to a wide range of general medical and specialty mental health care settings and delivery systems. Care improvement strategies are not limited to "bounded" healthcare systems, but the characteristics of bounded systems (defined member/patient populations, linkage of EHR and insurance claims data) are essential for a robust and unbiased assessment.

D.13. Dissemination. We are committed to widespread and rapid dissemination of all tools and resources developed in this project. Specific strategies to facilitate that dissemination will include:

- **Use of common informatics standards** – All process metrics and outcome measures will be defined according to either common EHR (Epic/Clarity) database standards or public-domain data model specifications (PCORnet/Sentinel/HCSRN VDW CDM). All specifications and code for these measures will be made available without restriction to any interested users via the MHRN public GitHub repository (www.github.com/MHResearchNetork)
- **Use of standard EHR technology** – Tools for implementation of specific NZSM strategies (e.g. screening questionnaires, safety planning templates, follow-up registries) will be implemented using standard Epic EHRs across participating health systems. Use of this standard platform will facilitate dissemination to other Epic-using health systems (estimated to now exceed 50% of practices in the US).
- **Collaboration with EHR vendors** – MHRN has established a collaboration with Epic Systems mental health leaders to standardize and disseminate EHR tools for suicide prevention as part of core Epic functionality.
- **Partnership with SPRC** – Our ongoing collaboration with SPRC will also facilitate rapid dissemination of care improvement and assessment resources across mental health and primary care settings nationwide.