



Suicide Prevention Research Impact NeTwork (SPRINT)

Executive Summary

Data Review Meeting September 5, 2019

**Report for VA HSR&D leadership, VA Operations Partners,
Suicide Prevention Researchers, and Other Stakeholders**

Principal Investigators

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- Teresa Hudson, PhD, PharmD, Associate Director, HSR&D's Center for Mental Healthcare & Outcomes Research (CeMHOR)

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Description of the VHA HSRD Suicide Prevention Research Impact NeTwork (SPRINT)

Introduction: Preventing suicide is VHA's number one clinical priority. Many clinical, policy, and research groups within VHA are working to understand why Veterans attempt and die by suicide; and to develop, test, and implement strategies to reduce suicide and suicidal behaviors. These efforts would benefit from greater coordination. Through greater collaboration among investigators and key stakeholders, suicide prevention research can accelerate and more quickly translate into clinical practice. To this end, the Health Services Research and Development (HSR&D) Service of VHA funded the Suicide Prevention Research Impact NeTwork (SPRINT) in July 2019.

Objective: The mission of SPRINT is to accelerate VA health services suicide prevention research that will improve care and reduce suicidal behaviors and suicide among Veterans. SPRINT will:

- 1) Serve as a collaborative network of VHA and non-VHA researchers dedicated to conducting high-quality, high-priority, and high impact health services research;
- 2) Develop and maintain a "state of the science" data inventory containing information about VHA and non-VHA health services suicide prevention research activities, VA clinical operations-funded projects, and up-to-date information on the extent and quality of evidence underlying suicide prevention interventions;
- 3) Work with stakeholders, including HSR&D leadership, VA clinical operations and VA policy makers, to identify key gaps in suicide prevention research in order to create a focused research agenda;
- 4) Provide infrastructure to support innovation and high-impact team science projects that address suicide prevention priorities;
- 5) Support pilot projects for initial testing of innovative and promising suicide prevention research;
- 6) Work with clinical operations partners to disseminate and help implement SPRINT research findings and products into health care for Veterans.

The research agenda for SPRINT will particularly focus on the three following domains:

- 1) Collaborating with communities to facilitate Veteran engagement in health care;
- 2) Matching services to differing Veterans' needs;
- 3) Improving implementation of emerging and evidence-based interventions; for example, brief, structured psychotherapies.

Organization: SPRINT is structured to include three organizational units. A Communications/Organization Hub, located at VA Portland Health Care System and led by Steven Dobscha, MD, coordinates overall SPRINT activities and collects, organizes, and disseminates key information to SPRINT members and other stakeholders. A Data/Methods Hub, located at VA Ann Arbor Healthcare System and led by Mark Ilgen, PhD, provides consultation to researchers on suicide prevention research methods and data sources. A Dissemination/Implementation Hub, located at Central Arkansas Veterans Healthcare System in Little Rock and led by Teresa Hudson, PhD, PharmD, consults with SPRINT members on designing and conducting implementation suicide prevention research and program evaluations.

SPRINT Core activities can be grouped into the following domains (see Figure below):

1. Clearinghouse
 - a. Collect and disseminate key information including:
 - i. Active projects inventory
 - ii. Operations priorities (principally OMHSP)
 - iii. Active NIH and DoD projects; other agencies
 - iv. Veteran perspectives (Via Veteran Engagement Group)
 - v. Prepare and respond to requests for information from stakeholders
2. Team Science Liaison
 - a. Facilitate communication and collaboration among researchers working in common areas

- b. Facilitate development of communities of suicide prevention research
 - c. Connect junior investigators to potential mentors who have shared research interests
3. Support
- a. Consult on new and ongoing health services projects through SPRINT hubs
 - b. Health services career development activities
 - c. Health services Pilot program
 - d. Develop of helpful products (e.g., “best practices” when designing suicide prevention clinical trials)
4. Collaborate and Leverage
- a. Two-way information sharing with ESP Living Systematic Review
 - b. Two-way information sharing with Suicide Clinical Trials Repository
 - c. Two-way information sharing with DoD and potentially other agencies
5. Innovate (aspirational)
- a. Promote/facilitate developing and testing of crowd sourcing capabilities (using researchers and Veterans as participants)
 - b. Promote exploration of new funding approaches in partnership with HSRD and CSRD



5-year Impact Goals: Specific goals over the five years of funding include:

1. Facilitate the development and funding of one or more multisite health services research/implementation projects that address topics across priority domains.
2. Stand up and maintain an inventory that contains and makes information accessible to stakeholders about: A) ongoing and planned VHA and non-VHA health services suicide prevention research and operations projects; B) active suicide prevention investigators, their interests, and expertise; and C) the state of evidence on suicide prevention interventions.
3. Create and disseminate a set of health services suicide prevention “research best practice” materials including recommended core measures and ways of measuring important suicide-related variables to simplify data sharing among researchers.

4. Facilitate funding of one or more HSR&D partnered evaluations of a VA Office of Mental Health and Suicide Prevention (or other operations partners) suicide prevention initiative rollout.
5. Initiate or change national or regional VA policy or practice as a result of SPRINT-facilitated information and/or specific research project products.

SPRINT CORE Team

SPRINT Communications/Organization Hub:

HSRD Center to Improve Veteran Involvement in Care, VA Portland Health Care System:

Steven Dobscha, MD

Lauren Denneson, PhD

Molly Kessner, MPH

Victoria Elliott, MscPH

Annabelle Rynerson, BS

Kim Peterson, MS

Jason Chen, PhD

Alan Teo, MD, MS

Beau Edwards, BS

SPRINT Data/Methods Hub:

HSRD Center for Clinical Management Research, VA Ann Arbor Healthcare System:

Mark Ilgen, PhD

Paul Pfeiffer, MD, MS

Amy Bohnert, PhD, MHS

Dissemination/Implementation Hub:

HSRD Center for Mental Healthcare & Outcomes Research, Central Arkansas Veterans Healthcare System:

Teresa Hudson, PhD, PharmD

Sara Landes, PhD

Mary Bollinger, PhD, MPH

Richard R. Owen Jr., MD

Partners

VHA Office of Mental Health and Suicide Prevention (OMHSP)

Rocky Mountain VA Mental Illness Research, Education and Clinical Center (RM-MIRECC)

VISN-2 Center for Excellence in Suicide Prevention (CoE-SP)

VA Serious Mental Illness Treatment Resource and Evaluation Center (SMITREC)

VA Evidence Synthesis Coordinating Center (ESP)

Quality Enhancement Research Initiative for Team Based Behavioral Health (BH-QUERI)

Purpose and Structure of SPRINT Data Review Meeting: September 5, 2019

Purpose: The SPRINT Core Investigator Team coordinated an in-person meeting which served as a key mechanism for developing working relationships and plans necessary for SPRINT to function optimally and to meet its objectives.

Goals: Conduct a one-day working meeting to synthesize an initial SPRINT research agenda and develop a set of initial project ideas to be supported by SPRINT via communications to stakeholders, pilot funding, and infrastructure. At the meeting, attendees reviewed and discussed 1) published evidence syntheses to identify health services suicide prevention (SP) research gaps; 2) VA and other agency SP priorities, research agendas, strategies, and roadmaps; and 3) information on recent, current, and planned SP projects.

Attendees (in person or via telephone):

HSRD Center to Improve Veteran Involvement in Care, VA Portland Health Care System:

- Steven Dobscha, MD
- Linda Ganzini, MD, MPH
- Lauren Denneson, PhD
- Molly Kessner, MPH
- Victoria Elliott, MscPH
- Annabelle Rynerson, BS
- Kim Peterson, MS
- Jason Chen, PhD
- Alan Teo, MD, MS
- Beau Edwards, BS

HSRD Center for Clinical Management Research, VA Ann Arbor Healthcare System:

- Mark Ilgen, PhD
- Paul Pfeiffer, MD, MS
- Amy Bohnert, PhD, MHS

HSRD Center for Mental Healthcare & Outcomes Research, Central Arkansas Veterans Healthcare System:

- Teresa Hudson, PhD, PharmD
- Sara Landes, PhD
- Mary Bollinger, PhD, MPH
- Richard R. Owen Jr., MD

Partners and Stakeholder Attendees:

- Robert O'Brien, PhD, *Office of Research and Development, VA Central Office, Washington, D.C.*
- Marianne Goodman, MD, *VISN 2 Mental Illness Research, Education, and Clinical Centers (MIRECC), James J. Peters VA Medical Center*
- Gloria Workman, PhD, *Office of Mental Health and Suicide Prevention (OMHSP), VA Central Office, Washington, D.C.*
- John McCarthy, PhD, MPH, *Serious Mental Illness Treatment Resource and Evaluation Center (SMITREC), OMHSP, VA Ann Arbor Healthcare System*
- Nazanin Bahraini, PhD, *Director of Education Rocky Mountain MIRECC, VA Eastern Colorado Health Care System*
- Katherine Nassauer, PhD, *U.S. Army Medical Research and Development Command (USAMRDC)*
- Lisa Colpe, PhD, MPH, *U.S. Department of Health and Human Services, National Institutes of Health (NIH)*
- Vetisha McClair, PhD, *Scientific Program Manager, Clinical Science Research and Development Service, VA Central Office, Washington, D.C.*
- Cendrine Robinson, PhD, *Scientific Program Manager, VA Behavioral Health and Reintegration, VA Central Office, Washington, D.C.*
- Theresa Gleason, PhD, *Director, Clinical Science Research and Development Service, Office of Research and Development, VA Central Office, Washington, D.C.*
- Peter Gutierrez, PhD, *Clinical Psychologist, Rocky Mountain MIRECC, VA Eastern Colorado Health Care System; Core A Director, Military Suicide Research Consortium (MSRC)*

Summary Notes from Group Discussion of Current Partner/Stakeholder Priorities

- Dr. Gleason summarized the President's Executive Order on a National Roadmap to Empower Veterans and End a National Tragedy of Suicide or PREVENTS issued in March of 2019. PREVENTS has a specific requirement for research to contribute to developing the national strategy to prevent Veteran suicide.
- SPRINT could contribute by helping to integrate information focused on Health Services and Implementation Research, as well as helping to determine what evidence syntheses are needed to compliment and be the basis for recommendations in the National Strategic Plan. Establishing and continuing inter-agency and task force communications will be paramount in maximizing collaboration while minimizing duplicative efforts.
- RR&D is interested in enhancing its portfolio in suicide prevention. The office of Behavioral Health and Reintegration is interested in developing interventions that improve functional outcomes for Veterans. For example, interventions might focus on vocational rehabilitation, social relationships, or changes in life roles.
- Current priorities/key activities of OMHSP include launching the third year of the Governors' and Mayors' Challenge; lethal means safety and health care services as a priority; rolling out VA trainings to non-VA clinical and non-clinical staff; and suicide prevention 2.0 to standardize Suicide Prevention Coordinators' roles. The SPRINT inventory of current VA research is in alignment and will prove valuable for the forging of collaborations between research efforts. OMHSP is interested in extending research beyond the 'indicated' public health model domain to the 'selected' and 'universal' domains and working with community partners. As OMHSP receives questions and inquiries, they would like to share some of them with SPRINT for consultation.
- Dr. Goodman noted that the VISN 2 MIRECC has a webpage on suicide and a list of resources they can contribute, and Rocky Mountain MIRECC has a variety of resources available online. Having centralized web resources is beneficial but there also needs to be an element of connectiveness and the ability to form collaborations.
- Dr. Goodman emphasized that researchers who are not affiliated with a Center of Excellence often feel isolated and thus there is also great value in having in-person meetings. One avenue to this end would be to set up subgroup gatherings at larger meetings. For instance, a Special Interest Group meeting at the HSR&D National Meeting. Another approach would be to have a SPRINT "navigator" help make connections, specifically one that has institutional and local knowledge, knowledge of existing partnerships, etc. Finally, having a library online where all articles and papers can be housed could be beneficial.
- SMITREC, a Program Evaluation Center under OMHSP, focuses on epidemiology of suicide and specific areas such as predictive modeling. A public health approach structure allows for a focus on preventing suicide among all Veterans, not just those engaging with VA or VHA. Since 2008, the data and surveillance branch has produced annual reports for VA leadership on suicide for VHA population. Starting around 2012, the focus shifted to include the overall Veteran population, sourcing the data from the National Death Index. The data and surveillance team also collect data on real time reporting of suicides, specifically the number of suicides in the prior six months among people who have recently engaged in VHA or who died from suicide in the context of VHA care. Another focus is on risk variation, for instance suicide rates among Veterans who use the Veteran Crisis Line; VHA patients who call the crisis line have suicide rates about eight or nine times higher than the overall VA patient population. Another focus is on predictive modeling: assessing past data allows for reaching increasingly larger percentages of Veterans at highest risk for suicide. SPRINT can provide a valuable consultation role for SMITREC, which in part could connect researchers interested in identifying risk periods and risk subgroups to the data and surveillance team to help answer specific research questions.
- MIRECC's mission is focused on reducing suicidal ideation and behaviors in the Veteran population. Thus, they focus on clinical interventions as well as trying to understand the cognitive and neurological underpinnings of suicidal thoughts and behaviors. MIRECC is a transitional center focusing on the trajectory from basic science, to identifying biological underpinnings, to translating evidence that's practiced in the community. Several key studies focus on specific conditions related to military service and how they are associated with suicide risk (e.g. traumatic brain injury and suicide). MIRECC's interventions have focused on selective indicated populations looking at specific settings interventions. There is a desire to move more upstream; an attempt to focus more on universal interventions. Access is an on-going issue, especially for rural Veterans. Dr. Bahraini posed the question as to how technology – and specifically, telehealth – can be leveraged to increase access to evidence-based interventions.

- The USAMRMC focuses on environmental health, injury prevention, environmental settings, and psychological health. Currently, \$100M is funding suicide prevention research across more than 40 studies. A large part of the portfolio focuses on risk and resilience in service members (epidemiology). Additionally, MSRC is delivering evidence-based interventions and risk approaches. The portfolio focuses on selective and indicated interventions but is trying to shift more resources to upstream approaches. Major gaps include: community-based SP efforts and matching interventions to risk. Dr. Nassauer expressed interest in SPRINT helping DoD by generating further collaboration.
- NIH's goal is to work with the Action Alliance and stakeholders who can help with implementation of study findings, with broad scale implementation as the goal. NIH is encouraging implementation of the recommended standard of care published by Action Alliance. Dr. Colpe relayed that the focus of recent projects has included: impact issues related to suicide screening efforts and a concentration on health systems, for example, the ED and studying the highest concentration of risk. There is a request for information on telehealth for SP in ED and they are still welcoming input. Also, there is currently a Funding Opportunity Announcement on collaborative care for co-morbid disorders in primary care setting (collaborate care model), opioid use disorders, and mental health issues. NIH is interested in sharing findings related to broad implementation practices and problems encountered.
- The Military Suicide Research Consortium (MSRC) works on studying screening and prevention to downstream interventions and is in the second of five years of funding, giving them operational ability through March 2022. Thus far, over 24 studies have been funded through MSRC. The current portfolio consists primarily of SP specific interventions with active duty military. Four funded studies are doing secondary data analysis of common data elements and have added some long term follow ups as recommended by military advisory board. MSRC is interested in collaborating, leveraging findings, and sharing expertise. Specifically, MSRC is interested in the research gaps identified by SPRINT.

Workgroup Deliberation Summaries

As a key component of the data review meeting, three breakout workgroups convened to discuss, respectively: 1) Partner priorities; 2) the current state of evidence in suicide prevention; and 3) active research and operations projects being conducted in suicide prevention.

Workgroup 1: Partner Priorities

In addition to a large group discussion of Partner Priorities, a smaller workgroup convened to refine a list of priorities that can be used to guide research facilitation efforts of SPRINT. Various research agendas, roadmaps and national strategies were reviewed, including from VHA, HSR&D, DoD, and NIMH (incl. Action Alliance). A subset of high-priority topic areas that were common to these strategies and agendas are:

- 1) How to leverage community resources to treat Veterans
- 2) Studies on how to get communities ready
- 3) Improving care for Veterans at risk in the community
- 4) Families and resilience
- 5) Communication strategies within the public health model
- 6) Access: Rural populations and telemedicine
- 7) Lethal means and safety planning

Workgroup 2: Review of Suicide Prevention Systematic Reviews

The ESP Coordinating Center (ESP CC) responded to a request from the Suicide Prevention Research Impact NeTwork (SPRINT) for a compendium on systematic reviews of suicide prevention topics (**Appendix A**). Findings from this compendium were used to inform discussions at the Data Review Meeting focused on developing future suicide prevention research questions and priorities.

Goal: Use Evidence Syntheses Reviews to identify key gaps in literature and select topics to nominate for updated systematic reviews.

Objectives:

The main goal was to prepare, then review a compendium of the most recent systematic reviews on relevant suicide prevention topics. The focus of the compendium was to provide an accounting of existing systematic reviews on suicide prevention topics, supported by limited data abstraction and limited synthesis of the evidence. The compendium did not include formal and comprehensive critical appraisal of the internal validity of the individual reviews or the strength of the body of evidence, and it had not been externally peer-reviewed. It was intended to be used primarily to guide discussions at the September 5th meeting.

Key Questions used to drive the review process:

1. What methods are effective for detecting and stratifying individual and population-level risk?
2. What healthcare-based interventions are effective for reducing suicide and suicide behaviors at universal, selected, and indicated levels?
3. What community-based (non-healthcare) interventions or approaches are effective for reducing suicide risk?
 - a. How do we identify and respond to risk among Veterans who are not receiving care in VA or not receiving care at all?
 - b. How do we engage Veterans, families, and communities in effective suicide prevention activities?
4. What methods are effective for matching interventions/approaches and their delivery to level of risk?
5. What methods are effective for implementing, sustaining and improving effective healthcare- and community-based interventions?

Summary of findings (see Appendix A for details on methods and findings):

Most reviews had a specific focus, such as the comparison of e-health versus face-to-face delivery of cognitive behavioral therapy,²² or the comparison of direct versus indirect psychosocial and behavioral interventions.²³ Two reviews focused on evidence in Veterans and active-duty service members.^{24, 27} However, no other reviews focused exclusively on any other specific high-risk subpopulations of interest, including LGBTQ, elderly, homelessness, service members separating/transitioning from active duty to civilian life, middle aged, receiving care at VA or not, psychological trauma, or substance use disorder.

When the authors categorized the interventions included in the systematic reviews using CDC’s Social-Ecological Model,^{15, 16, 31} they found that most of the research has been done in the individual-indicated domain (Figure 2, see Appendix A).

Key Gaps Identified in the Literature:

Populations	Transitioning/separating Veterans Veterans not connected to/using VA services Biological markers for suicide
Interventions	Multilevel interventions Community interventions Technological interventions Neuro-imaging/Neuro-psychological testing
Comparators	Head-to-Head comparison of interventions Technological interventions
Outcomes	Minimum effective intervention Differential intervention effect due to therapist level of experience Evaluations of sustainability and scalability Treatment variability due to SUD/OD, PTSD
Timing	Short-term vs. Long-term effects of intervention Effect of upstream vs. crisis interventions

Setting	VA Military Urban/rural
Study Design/Methods	Controlled studies Ecological studies Stepped-wedge design studies Interrupted time-series analysis Standardization of terms, metrics, reporting of results Study replication

Workgroup 3: Review of Suicide Prevention Active Projects Inventory

Goal: Use the Suicide Prevention Active Project Inventory to identify key gaps in research and priority topics to address through SPRINT-funded pilot studies.

Purpose: Beginning in July 2019, working closely with HSRD contractor, Prometheus, the SPRINT CORE Team began to collect, organize and evaluate information on active suicide prevention research and operations projects that are relevant to Veterans. The information here will be used to improve understanding of strengths and gaps to inform a SPRINT research agenda. This initial set of information will be refined and help to inform a focusing of SPRINT's efforts to promote high priority, high quality and high impact suicide prevention research.

Methods and Scope: SPRINT CORE and Prometheus Federal Services conducted a sweep and review of active suicide prevention projects in Veteran and military populations. Active projects include those with current funding during 2018 and/or 2019. Due to the limited timeframe for this review, this list only includes studies that use Veteran and military populations; some potential data sources have not yet been included. Thus, this list should be considered preliminary (designed to be a working document for the September meeting), and we intend to enhance and add more projects to it over time.

Databases and data sources:

- Office of Research and Development (ORD) Review (9/18/18 version; Contact: Goodman)
- FY2018 Office of Mental Health and Suicide Prevention (OMHSP) Operations projects (Contact: Gloria Workman)
- 2019 Partnered Evidence-Based Policy Resource Center (PEPRc) list of ORD projects (Contact: Steve Pizer)
- Clinicaltrials.gov
- NIH Reporter
- Department of Defense [including Congressionally Directed Medical Research Programs [CDMRP]; Defense Suicide Prevention Office [DSPO]; Military Suicide Research Consortium [MSRC] (Contact: Kate Nassauer)

We classified projects according to the following characteristics:

- Study aims, objectives, abstract
- PI & Co-I Name, Location, and Facility
- Funding Agency & Department
- Funding start and end date
- Sample size
- Follow-up Time Period
- Project Funding/ID Number
- Operational Partners
- Database Source

- **Socioecological Level:**
 - Individual - biological traits and personal history
 - Relationship - close relationships, partners, families
 - Community - conditions in setting such as schools, workplaces, and healthcare systems
 - Systems - Societal factors such as social and cultural norms, health, economic, educational, policies
- **Public Health Approach:**
 - Universal - Strategies or initiatives that address an entire population
 - Selective - Strategies that address subsets of the total population, focusing on at-risk groups that have a greater probability of becoming suicidal
 - Indicated - Strategies that address specific high-risk individuals within the population—those evidencing early signs of suicide potential
- **Primary & Secondary Focus:**
 - Risk determination/stratification/prediction
 - Intervention
 - Matching Risk to Intervention
 - Implementation
- **Study Type:**
 - Intervention trial - Clinical trial or non-clinical intervention
 - Other experimental - Includes non-controlled pilot and demonstration projects, pre-post designs
 - Cohort - Includes prospective and retrospective longitudinal observational studies
 - Other observational - Includes other observational studies such as qualitative interview studies, cross-sectional surveys
 - Evidence Synthesis
 - Implementation - Studies that specifically aim to improve or evaluate implementation of existing interventions or treatments

Results: This research sweep identified 182 studies conducted by 109 different principal investigators.

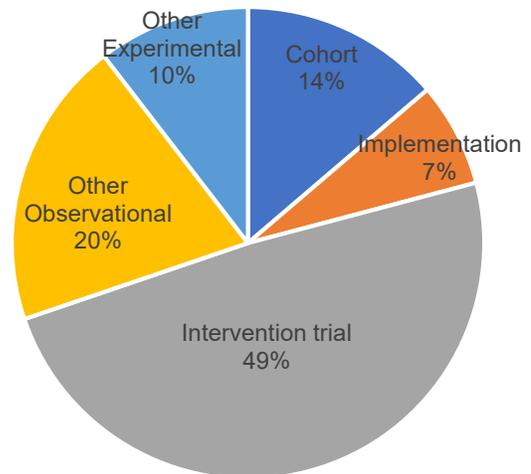
- **Funding:**
 - 86 studies by DoD
 - 64 studies by VA
 - 25 studies by NIH
 - 7 other funding sources
- 49% of the studies have an intervention focus
- **Public Health Approach:**
 - 23% of studies universal
 - 46% of studies selective
 - 31% of studies indicated
- 56% of studies focus on the individual socio-ecological level.
- Based on these data, we identified several specific active project gaps that are relevant for health services research, and consistent with population health framework and partner priorities:
 - Implementation methods
 - E-Health (including but not limited to telehealth)
 - Elderly population
 - Studies of Non-VA-using Veterans
 - Postvention

VA Funded Suicide Prevention Studies:

VA Studies	
Funding Department	Study Count
HSRD	14
CSRD	21
BLRD	1
RRD	7
Cooperative Studies	1
OMHSP	19

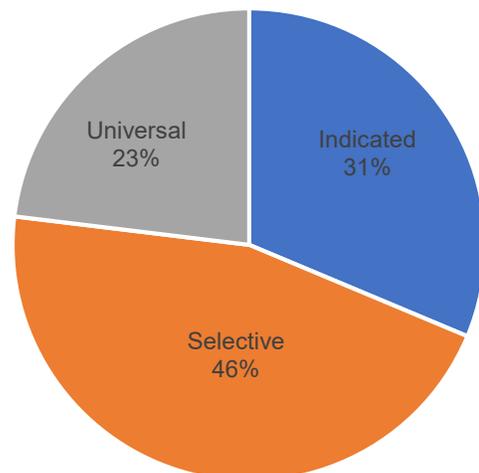
Study Type:

Number of Projects by Study Type	
Study Type	Count of Studies
Cohort	25
Implementation	13
Intervention trial	89
Other Observational	36
Other Experimental	19
Grand Total	182



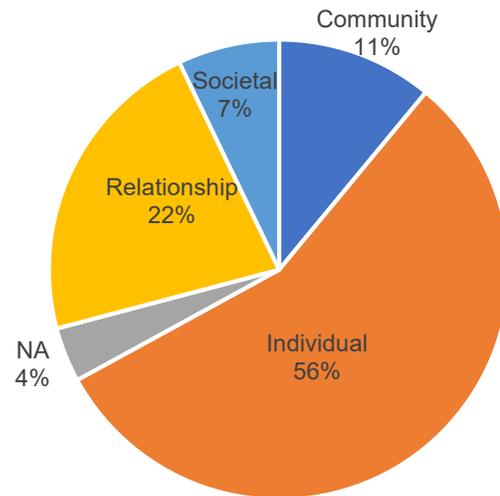
Public Health Approach:

Number of Studies by Public Health Approach	
Public Health Approach Category	Count of Public Health Approach
Indicated	57
Selective	83
Universal	42
Grand Total	182



Socio-Ecological Level:

Number of Studies by Socio-Ecological Level	
Socio-Ecological Level	Count of Studies
Community	20
Individual	103
Relationship	39
Societal	13
Not Rated	7
Grand Total	182



Subpopulations (not mutually exclusive):

Numbers of Studies by Population Studied	
Population	Count
Veterans	125
Service Members	83
Receiving VA Care	83
Mental Illness	80
Recently Separated	12
Opioids/SUDs	11
Female Veterans	8
Elderly Veterans (65+)	6
Homeless (or at risk)	4
LGBTQ	4

Target populations most often included Veterans and Servicemembers, as specified per our search criteria. Studies often have a target population that includes participants with mental illness, as well as those receiving VA care.

Primary Focus by Study Type:

Primary Project Focus by Study Type (numbers of studies)						
Primary Project Focus	Cohort	Implementation	Intervention trial	Other Experimental	Other Observational	Grand Total
Implementation	1	5	1	2	4	13
Intervention	7	3	72	9	7	98
Matching risk to intervention	4	0	7	2	3	16
Risk Determination /Stratification /Prediction	13	6	8	6	22	55
Grand Total	25	13	89	19	36	182

Stratification by Public Health Approach:

Public Health Approach by Subpopulation (numbers of studies)									
Public Health Approach	Veterans	Service members	Elderly Veterans	Receiving VA Care	LGBTQ	Recently Separated Veterans	Mental Illness	Opioids /SUDs	Homeless
Indicated	45	14	1	34	1	0	27	2	0
Selective	57	42	3	36	2	5	35	5	2
Universal	22	27	2	13	1	7	17	4	2

Public Health Approach by Socio-Ecological Model (numbers of studies)						
Public Health Approach	Societal	Community	Relationship	Individual	Not Rated	Grand Total
Universal	8	8	11	15	0	42
Selective	3	8	19	51	2	83
Indicated	2	4	10	36	5	57
Grand Total	13	20	40	102	7	182

SPRINT Data Review Meeting Summary and Next Steps:

Near the end of the Kickoff meeting, each of the breakout work groups’ initial topic priorities were presented to the meeting attendees at large. The topics were consolidated as necessary, and further refined to create a list of 23 potential project topic areas addressing research gaps and high-priority topics that SPRINT would focus on in the near term regarding its facilitations of research (and planning award program—see below). The 23 potential project topic areas were then ranked by SPRINT team members.

Rating Exercise: SPRINT members rated each topic in terms of importance/priority for SPRINT to support over the next 1- to 2-year time-frame. The topics included pilot awards that will be given in FY2020.

Rating Criteria:

- Addresses critical gap
- Reach (e.g. population impacted x effect)
- Partner priority
- Feasibility of conducting research on this topic in general (not just feasibility for a pilot project)
- Potential for impact on care and outcomes

Rankings were submitted and aggregated, and the outcome was a list of 10 topic areas addressing research gaps and high-priority research areas, including:

Topic Area
Risk Factors <ul style="list-style-type: none"> Understanding and addressing how risk varies over time
Outcomes <ul style="list-style-type: none"> Identification and validation of useful proxy outcomes for suicide behaviors (e.g., all-cause mortality, mental health symptoms, well-being or other quality of life indicators)
Populations <ul style="list-style-type: none"> Veterans not connected to VA services; improving engagement of Veterans not connected to VA in healthcare Rural Veterans
Community <ul style="list-style-type: none"> Engaging families and close supports in suicide prevention for Veterans Application of promising community and non-VA systems interventions to Veteran population Communication/messaging: Understanding public and media impacts; testing messaging to decrease stigma and increase engagement
Other interventions* <ul style="list-style-type: none"> Studies of application of technology (including telehealth/mobile solutions) to at-risk Veterans Effectiveness of psychotherapy for Veterans at risk (Large Hybrid) Means Safety

* SPRINT will emphasize implementation science across the spectrum of projects supported (e.g. gathering of pre-implementation information, testing of implementation strategies and use of hybrid designs).

Additional Data Review Meeting Products

Planning Award Request for Applications (RFA):

SPRINT intends to award a total of approximately \$100,000 in planning award (pilot funds) in FY2020. The overall goal of the SPRINT planning award program is to support the transition of innovative and promising research ideas into full scale health services research projects and, ultimately, into effective approaches for suicide prevention. In addition to supporting new research, the SPRINT planning award program is also intended to support new suicide prevention researchers by encouraging applications for mentored projects by investigators new to suicide prevention research. *The priorities identified in the Data Review meeting were listed in the RFA as research topics that would be given preference for funding.* The RFA was sent to roughly 1,400 HSR&D researchers on October 15, 2019 with a deadline for submitting a Letter of Intent (LOI) to apply for planning award funds by November 15, 2019. A total of 24 LOIs were submitted for review. Ten investigators have been invited to submit full proposals.

High priority topic areas identified for planning award RFA:

- 1) How to leverage community resources to treat Veterans
- 2) Studies on how to get communities ready
- 3) Improving care for Veterans at risk in the community
- 4) Families and resilience
- 5) Communication strategies within the public health model
- 6) Access: Rural populations and telemedicine
- 7) Lethal means and safety planning

Evidence-based Systematic Review Request: To further develop research priorities within Health Services Research & Development, based on deliberations which occurred in the Data Review meeting, SPRINT has requested two evidence-based syntheses on suicide prevention literature for FY2020:

- 1) An evidence synthesis on research that addresses community or systems-level (non-clinical) interventions and approaches for suicide prevention. Specifically, we would like to learn about the evidence for interventions among populations that are not necessarily Veterans or service members, but which the findings could be applied/adapted for Veterans, including: interventions in schools, among adolescents, in prisons, among police officers, and/or population-based approaches in other countries.
- 2) An evidence synthesis on research that addresses risk and protective factors across the socio-ecological (SE) levels of risk (systems, community, relationship, and individual). Specifically, we would like to learn about the evidence for risk and protective factors relevant to Veterans, derived from longitudinal research, reflecting original data collection.

Plans for national-level 2020 Meeting: As an outgrowth of the initial data review meeting, OMHSP will provide \$99,000 to host a larger, in-person meeting in FY2020. The objectives of this conference will be to 1) review current scientific evidence and operations, research priorities, and activities related to suicide prevention; 2) discuss and problem-solve around barriers to conducting suicide prevention research and to the implementation of evidence-based and promising interventions and approaches; and 3) develop new or enhance existing collaborations among researchers to facilitate the development and conduct of high priority, high impact team-science suicide prevention research. Specific areas of focus include facilitating research that 1) seeks to understand and address how risk varies over time and how risk factors can be incorporated into personalized approaches to suicide prevention; 2) seeks to identify and validate useful proxy outcomes for suicide behaviors; 3) involves Veterans not connected to VA or other healthcare services, rural Veterans, and Veterans recently separated from the military; 4) engages families and close supports in suicide prevention for Veterans, applies promising community and non-VA systems interventions to the Veteran population, and seeks to understand public and media impacts and testing of messaging to decrease stigma and increase engagement; 5) studies the application of technological solutions to suicide prevention; and 6) uses innovative designs to study the effectiveness and implementation of psychotherapy for Veterans at risk and means safety. The conference will also build on a recent GAO report noting progress in VA's suicide prevention but also calling for better data and monitoring efforts: <https://www.gao.gov/products/GAO-19-66>.

In contrast to a more typical State of the Art (SOTA) Research meeting, which often seeks to identify priority gaps for study, we plan to start with the list of priorities we identified in our Kickoff and focus on bringing people together to discuss development of team science projects to address those gaps, addressing key facilitators and barriers to research on these topics.

Compendium: Systematic Reviews of Suicide Prevention Topics

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PREFACE

The VA Evidence Synthesis Program (ESP) was established in 2007 to provide timely and accurate syntheses of targeted healthcare topics of importance to clinicians, managers, and policymakers as they work to improve the health and healthcare of Veterans. These reports help:

- Develop clinical policies informed by evidence;
- Implement effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and
- Set the direction for future research to address gaps in clinical knowledge.

The program is comprised of four ESP Centers across the US and a Coordinating Center located in Portland, Oregon. Center Directors are VA clinicians and recognized leaders in the field of evidence synthesis with close ties to the AHRQ Evidence-based Practice Center Program and Cochrane Collaboration. The Coordinating Center was created to manage program operations, ensure methodological consistency and quality of products, and interface with stakeholders. To ensure responsiveness to the needs of decision-makers, the program is governed by a Steering Committee comprised of health system leadership and researchers. The program solicits nominations for review topics several times a year via the [program website](#).

Comments on this compendium are welcome and can be sent to Nicole Floyd, Deputy Director, ESP Coordinating Center at Nicole.Floyd@va.gov.

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INTRODUCTION

PURPOSE

The ESP Coordinating Center (ESP CC) is responding to a request from the Suicide Prevention Research Impact NeTwork (SPRINT) for a compendium on systematic reviews of suicide prevention topics. Findings from this compendium will be used to inform discussions at the September 2019 SPRINT Kick-Off Meeting that is focused on developing suicide prevention future research questions and priorities.

BACKGROUND

SPRINT's mission is "To accelerate health services suicide prevention research that will lead to improvements in care, and that result in reductions in suicide behaviors among Veterans." Understanding of the scope of, general findings from, and gaps in the most recent systematic reviews is important in developing suicide prevention future research priorities and questions.

SCOPE

Our objective is to prepare a compendium of the most recent systematic reviews on relevant suicide prevention topics.

KEY QUESTIONS

1. What methods are effective for detecting and stratifying individual and population-level risk?
2. What healthcare-based interventions are effective for reducing suicide and suicide behaviors at universal, selected, and indicated levels?
3. What community-based (non-healthcare) interventions or approaches are effective for reducing suicide risk?
 - a. How do we identify and respond to risk among Veterans who are not receiving care in VA or not receiving care at all?
 - b. How do we engage Veterans, families, and communities in effective suicide prevention activities?
4. What methods are effective for matching interventions/approaches and their delivery to level of risk?
5. What methods are effective for implementing, sustaining and improving effective healthcare- and community-based interventions?

ELIGIBILITY CRITERIA

The ESP included systematic review that met the following criteria:

- **Population:** Veterans/Military Service Members preferred, but accepted studies of adults (≥ 18 years)

- **Interventions:** Any risk assessment tools or interventions with a *focus* on suicide prevention that could be operationalized within the scope of a healthcare system or within engagements of a healthcare system with community partners (excludes: reviews of interventions focusing on the broad range of symptoms of specific mental health conditions; reviews of interventions having operationalization that would generally be considered as outside the scope of healthcare system or engagements of healthcare system with the community, such as pesticides, railway safety; reviews of risk factors, *etc*)
- **Comparators:** Any
- **Outcomes:** Death due to suicide, suicide attempts (excludes: suicidal ideation)
- **Timing:** Published within last 5 years
- **Setting:** Healthcare system or within engagements of a healthcare system with community partners
- **Study design:** Systematic reviews defined as such by meeting a minimum of methodological standards of: (1) searched 2 or more bibliographic databases using an adequately detailed search strategy; (2) used prespecified criteria to assess internal validity of included studies

METHODS

The focus of this compendium is to provide an accounting of existing systematic reviews on suicide prevention topics, supported by limited data abstraction and limited synthesis of the evidence. This compendium does not include formal and comprehensive critical appraisal of the internal validity of the individual reviews or the strength of the body of evidence, and it has not been externally peer-reviewed. It is meant primarily to guide discussions.

DATA SOURCES AND SEARCHES

To identify relevant systematic reviews, we searched MEDLINE (Ovid) and Cochrane Database of Systematic Reviews using terms related to suicide behavior and suicide prevention strategies (see Appendix for complete search strategies). Additional citations were identified from searching the Agency for Healthcare Research and Quality (AHRQ), Canadian Agency for Drugs and Technologies in Health (CADTH), and National Institute for Health and Care Evidence (NICE) websites. We also searched PROSPERO and DoPHER for systematic reviews in progress. We limited the search to published and indexed systematic reviews available in the English language from 2014 through 2019.

STUDY SELECTION

Study selection was based on the eligibility criteria described above. Titles and abstracts were first reviewed by one reviewer and all were checked by another (sequential review). Full-text articles were also sequentially reviewed by 2 reviewers and any disagreements were resolved by a third reviewer.

DATA ABSTRACTION AND SYNTHESIS

All data abstraction was first completed by one reviewer and then checked by another. All disagreements were resolved by consensus. We used a standardized format to abstract data on review characteristics, including their Key Questions, focus, methods, search dates, ecological levels, intervention types, setting, population, citations of studies in Veterans/active duty service members, findings, review author conclusions, and identified gaps (see Appendix A).

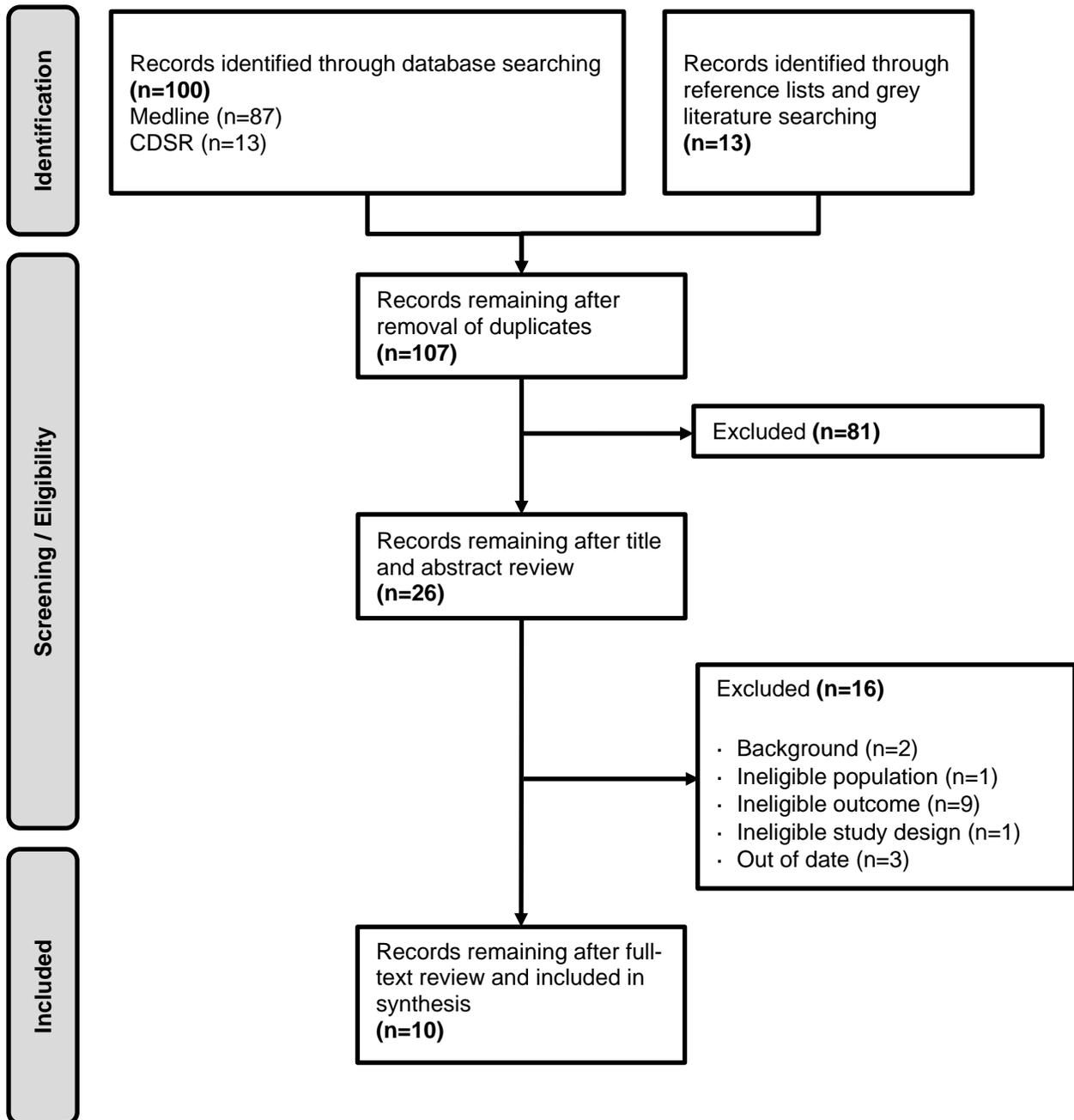
Additionally, we coded studies utilizing the dual axes of the Social Ecological-Universal Selective Indicated (SE-USI) model.^{15, 16} For the social-ecological axis, studies were evaluated with regard to the target of the intervention: the individual that represents the potential suicide death (*eg*, psychotherapy, BIC), relationships between that individual and others (*eg*, gatekeeper training, Signs of Suicide), the community in which that individual resides (*eg*, Youth Aware of Mental Health, workshops and lectures), and the society that is home to both the individual and the community (*eg*, reduction in access to lethal means). We also coded individual studies according to the USI program framework, which describes the intended reach of the intervention: ‘indicated’ for interventions intended to reach one or few people at identified risk, ‘selective’ for interventions intended to reach specific subpopulations at elevated risk, and ‘universal’ for interventions intended for whole populations. In the case of multi-level interventions, the widest programmatic reach was chosen for both axes. For example, while the US Air Force Suicide Prevention Program includes both Trauma Stress Response and Limited Privilege Suicide Prevention components – interventions targeting individuals in crisis (‘Individual – Indicated’, according to the SE-USI grid) – it also includes risk identification and gatekeeper training aspects, and was coded ‘Relationship – Selective’ accordingly. We also categorized suicide attempts and deaths due to suicide as either significantly reduced or not. We categorized gaps and limitations identified in the reviews using the PICOTSS framework (Population, Intervention, Comparison, Outcome, Timing, Setting, and Study Design). We abstracted all data into Excel 2010 (Microsoft Corp, Redmond, WA). We generated figures to visually represent the distribution of studies in the SE-USI model. We used R v. 3.6.0 to generate Figure 1 and Microsoft PowerPoint to generate Figures 2-4, identifying which interventions significantly reduced suicide attempts and deaths due to suicide and the gaps and limitations. We did not conduct formal quality analysis or evaluate the strength of evidence.

RESULTS

LITERATURE FLOW

The literature flow diagram (Figure 1) summarizes the results of search and study selection processes.

Figure 1. Literature Flow Chart



SUMMARY OF FINDINGS

Overview of Characteristics

Our search identified 107 unique, potentially relevant articles. Of these, we included 10 systematic reviews¹⁸⁻²⁷ for analysis.

Table 1 below provides a summary of key characteristics of the included reviews. Most reviews had a specific focus, such as the comparison of e-health versus face-to-face delivery of cognitive behavioral therapy,²² or the comparison of direct versus indirect psychosocial and behavioral interventions.²³ Two reviews focused on evidence in Veterans and active-duty service members.^{24, 27} However, no other reviews focused exclusively on any other specific high-risk subpopulations of interest, including LGBTQ, elderly, homelessness, service members separating/transitioning from active duty to civilian life, middle age, receiving care at VA or not, psychological trauma, or substance use disorder.

When we categorized the interventions included in the systematic reviews using CDC's Social-Ecological Model,^{15, 16, 31} we found that the majority of research has been done in the individual-indicated domain (Figure 2, see Appendix).

Table 1. Key Characteristics of Suicide Prevention Systematic Reviews

Author Year	Unique focus	Search dates	# included studies	Setting: Mostly US, Mostly non-US, Mixed
Hofstra 2019 ²⁵	Suicide prevention interventions	2011-2017	16	Mixed
Hawton 2015 ¹⁸	Pharmacological interventions	1979-2008	7	NR
Hawton 2016 ¹⁹	Psychosocial treatments	1977-2016	55	NR
Khangura 2018 ²⁰	Suicide-specific interventions vs nonspecific	2011-2017	4	Mostly US
Kreuze 2017 ²¹	Technology enhanced interventions on suicide risk	2004-2015	16	Mixed
Leavey 2017 ²²	Efficacy of CBT in face-to-face and eHealth treatment models	1985-2015	26 (19)	Mixed
Meerwijk 2016 ²³	Direct vs. Indirect Psychosocial and Behavioral interventions	1987-2015	44	Mixed
Milner 2017 ²⁶	Suicide prevention provided by GPs	1992-2015	16 (14)	Mixed
Nelson 2017 ²⁴	Accuracy of assessment methods and effectiveness of interventions in reducing suicide	2006-2015	37	Mixed
Peterson 2018 ²⁷	Veteran-specific risk assessment methods and prevention interventions	2010-2017	17	Mostly US

Results from Systematic Reviews by Key Question

Key Question 1. What methods are effective for detecting and stratifying individual and population level risk?

We only identified 2 systematic reviews that evaluated methods for detecting and stratifying individual and population level risk.^{24, 27} Among those, the more recent (2018) review by Peterson and colleagues concluded that: “For risk prediction, the most promising findings are from the Army Study to Assess Risk and Resilience in Service members (Army STARRS), which identified a few large risk prediction models as fairly to highly accurate in predicting suicide risk in active duty Soldiers (AUC 0.72 to 0.97). However, the applicability of these risk prediction models in service members transitioning to civilian life and/or Veteran populations is not yet known.”

The 2017 review by Nelson et al also identified studies of various other clinician-rated or patient-self-reported instruments for assessing suicide risk in a variety of patient groups, including the general population (universal or primary prevention), those likely to be at increased risk (selective or secondary prevention), and those who have already been identified as being at increased risk.²⁴ These studies generally conducted area under the receiver-operator characteristic (ROC) curve analyses to determine optimum cut-points for predicting suicidal behavior based on responses to various scales with multiple items used to indicate the presence and severity of suicide risk factors, such as the Beck Depression Inventory. Nelson et al (2017) concluded that although these instruments may provide diagnostic value to specific patient subgroups, “studies evaluating them are currently inconclusive and limited by small sample sizes, methodological limitations, and unclear applicability to clinical practice.”

Key Questions 2 and 3. What healthcare-based interventions are effective for reducing suicide and suicide behaviors at universal, selected, and indicated levels?

What community-based (non-healthcare) interventions or approaches are effective for reducing suicide risk?

How do we identify and respond to risk among Veterans who are not receiving care in VA or not receiving care at all?

How do we engage Veterans, families, and communities in effective suicide prevention activities?

Tables 2 and 3 below and Figures 3 and 4 (see Appendix) identify the healthcare- and community-based interventions that systematic reviews found to reduce deaths due to suicides and suicide attempts, respectively. The majority of the interventions that the reviews identified as reducing suicide attempts and deaths due to suicide were healthcare interventions in the SE-USI category of Individual-Indicated. The only Community-based interventions identified as reducing deaths due to suicides were English Suicide Prevention Strategy,²⁹ Perfect Depression Care Initiative,¹⁹ Survivor story videos,¹⁸ the Together for Life program,³² the US Air Force Suicide Prevention Program,³³ and the US Army Resiliency Training Program.³⁴

Table 2. Lower Suicide Death Rates with Intervention Group

Review Author Year	Relevant Studies	Intervention*	Healthcare or Community	Risk of Bias	Strength of Evidence
Hawton 2016 ¹⁹	Fleischmann 2008 ³⁵	BIC	Healthcare	NR	NR
Hofstra 2019 ²⁵	Mishara 2012 ³² ; Vijayakumar 2011 ³⁶	Together for Life program†; BIC	Both	Moderate to Serious	Oxford Centre for EBM Level of Evidence=1b (Individual RCT (with narrow Confidence Interval); Oxford Centre for EBM Level of Evidence=2c (“Outcomes” Research; Ecological studies)
Kreuze 2017 ²¹	Ahmadi 2007 ³⁷ ; Fleischmann 2008 ³⁵	BIC; Survivor story videost†	Both	NR	Oxford Centre for EBM Level of Evidence=2b (Individual cohort study (including low quality RCT; eg, <80% follow-up)
Meerwijk 2016 ²³	Bateman 2008 ¹³	MBT	Healthcare	RoB score of 11	NR
Milner 2017 ²⁶	Malakouti 2015 ³⁸ ; Oyama 2006 ³⁹	Collaborative stepped-care intervention; Screening for depression and education	Healthcare	High risk of bias due to observational quasi-experimental study design, but not formally rated	NR
Nelson 2017 ²⁴	Coffey 2007 ⁴⁰ ; Joffe 2008 ⁴¹ ; Knox 2010 ³³ ; Mishara 2012 ³² ; Warner 2011 ³⁴ ; While 2012 ⁴²	Perfect Depression Care Initiative†; Mandated treatment with sanction; AFSPP†; Together for Life†; ARTP†; English Suicide Prevention Strategy†	Both	Before-after study designs with inherently high risk of bias, but not formally rated	Low
Peterson 2018 ²⁷	Knox 2010 ³³ ; Warner 2011 ³⁴ ; Watts 2017 ⁴³	AFSPP; ARTP; MHEOCC	Community	High risk of bias due to before-after study design	Insufficient to draw conclusions

*Control is no treatment or treatment as usual unless otherwise specified.

†Community-based intervention

Abbreviations: AFSPP=US Air Force Suicide Prevention Program; ARTP = US Army Resiliency Training Program; BIC=Brief Interventional Contact; CBT=Cognitive Behavioral Therapy; MBT=Mentalization-Based Treatment; MHEOCC=VA Mental Health Environment of Care Checklist

Table 3. Lower Suicide Attempt Rates with Intervention Group

Review Author Year	Relevant Studies	Intervention*	Healthcare or Community	Risk of Bias	Strength of Evidence
Hawton 2016 ¹⁹	Brown 2005 ⁸ ; Salkovskis 1990 ¹⁰	CBT (2/12 studies)	Healthcare	NR	NR
Hofstra 2019 ²⁵	Cebria 2013 ³⁰ ; Gysin-Maillart 2016 ⁶ ; Hassanian-Moghaddam 2011 ²⁸ ; Rudd 2015 ⁷ ; Schilling 2016 ² ; Wasserman 2015 ³	Brief CBT; ASSIP; OPAC; SOS†; YAMH†; Telephone follow-up; Postcard intervention	Both	Low (2) to Serious (5) Cochrane Risk of bias in Non-randomised Studies – of Interventions	Oxford Centre for EBM Level of Evidence: mostly 1bs
Kreuze 2017 ²¹	Asetline 2004 ¹ ; Cebria 2013 ³⁰	SOS†; Telephone follow-up	Community	NR	Oxford Centre for EBM Level of Evidence=2c (“Outcomes” Research; Ecological studies); Oxford Centre for EBM Level of Evidence=3b (Individual Case-Control Study)
Leavey 2017 ²²	Brown 2005 ⁸ ; Rudd 2015 ⁷	Face-to-face CBT	Healthcare	CTAM score: 58/100, 84/100	NR
Meerwijk 2016 ²³	Bateman 2008 ¹³ ; Brown 2005 ⁸ ; Esposito-Smythers 2011 ⁹ ; Hassanian-Moghaddam 2011 ²⁸ ; Hvid 2011 ¹⁴ ; Linehan 2006 ⁴⁴ ; Rudd 2015 ⁷ ; Salkovskis 1990 ¹⁰ ; Wang 2016 ¹⁷	Brief CBT; CBT (3/5 studies); DBT (1/3 studies); MBT (1/2 studies); OPAC; Crisis coping cards; Postcard intervention	Healthcare	Scores ranging from 2-15 Average score = 7.1	NR
Milner 2017 ²⁶	Hegerl 2006 ⁴	Education - management of depression	Healthcare	High risk of bias due to observational quasi-experimental study design, but not formally rated	NR
Nelson 2017 ²⁴	Linehan 2006 ⁴⁴ ; Rudd 2015 ⁷	Brief CBT; DBT (1/3 studies)	Healthcare	Unclear	Low
Peterson 2018 ²⁷	Rudd 2015 ⁷ ; Smith-Osborne 2017 ⁵	Brief CBT; ASIST	Healthcare	Unclear or high	Low or insufficient

*Control is no treatment or treatment as usual unless otherwise specified.

†Community-based intervention

Abbreviations: ASIST=Applied Suicide Intervention Skills Training; ASSIP=Attempted Suicide Short Intervention Programme; CBT=Cognitive Behavioral Therapy; DBT=Dialectical Behavior Therapy; MBT=Mentalization-based treatment; OPAC=Outreach, Problem Solving, Adherence, Continuity; SOS=Signs of Suicide; YAMH=Youth Aware of Mental Health Programme

Additionally, in table 4 below, we have alphabetically listed each of the individual interventions identified by reviews published since 2015 as significantly reducing risk of death due to suicide or suicide attempts, along with a very brief description of their characteristics, and their key

components. The interventions that reviews identified as promising for reducing death by suicide have most commonly been multicomponent, with community education and access as the first and second most common components, respectively. Those that are most promising for reducing risk of suicide attempts have most commonly been single-component, with psychotherapy and community education as being the first and second most common, respectively.

Table 4. Promising Interventions for Reducing Risk of Death or Attempts

Intervention Name	Description	Reduced death due to suicide	Reduced suicide attempts	Key Components
AFSPP ³³	An 11-initiative suicide prevention program that emphasizes leadership, education, and treatment.	x		Community Education Access
ARTP ³⁴	Education, identification, and intervention programs implemented at specific points in the deployment cycle, based on unit activities and predicted stressors.	x		Community Education
ASIST ⁵	A two-day workshop focused on teaching suicide first aid, risk factors, and community networks.		x	Community Education
ASSIP ⁶	A brief therapy program composed of an early therapeutic alliance, psychoeducation, cognitive case conceptualization, safety planning, and long-term outreach contact.		x	Patient Education Psychotherapy
BIC ^{35,36}	1-hour individual information session near discharge, followed by multiple brief follow-up phone or visit sessions to provide information, education, and practical advice.	x		Patient Education
CBT ^{7-10,13}	A series of therapy appointments of various length and duration focused on combining behavior change and cognitive information processing methods to facilitate skill development.		x	Psychotherapy
Collaborative stepped-care intervention ³⁸	A series of capacity-building activities in the community followed by the establishment of a screening questionnaire, a "Suicide Prevention and Consultation Office", new referral pathways, and training for health staff.	x		Access Provider Education
Crisis Coping Cards ¹⁷	6-week training that focused on self-awareness of suicide ideation, coping with suicide ideation by emotion regulation, seeking and using resources, and a 24-hour crisis hotline; information was distilled on a 'crisis coping card' that the participant could carry on them at all times.		x	Patient Education
DBT ¹²	A cognitive behavioral treatment program to treat suicidal patients with borderline personality disorder, composed of weekly individual psychotherapy, group skills		x	Psychotherapy

	training, telephone consultation, and weekly therapist consultation team meetings.			
Education – management of depression ⁴	A two-year community program conducted at four levels: training of family physicians; a public relations campaign about depression; collaboration with community facilitators; and support for self-help activities.		x	Community, Provider, & Patient Education
English Suicide Prevention Strategy ⁴²	Implementation of suicide prevention strategies including environmental hazards, outreach and follow-up, 24-hour crisis teams, policy development, and clinical training.	x		Access Means Reduction Community & Provider Education
Mandated treatment with sanction ⁴¹	Mandatory attendance at four professional assessment sessions following student suicide attempt, with threat of expulsion from university if this requirement is not met.	x		Care management
MBT ¹³	An 18-month individual and group psychotherapy within a structured and integrated program provided by a supervised team.	x	x	Psychotherapy
MHEOCC ⁴³	A set of standards for the physical environment of inpatient mental health units, with the goal of removing suicide hazards.	x		Means Reduction
OPAC ¹⁴	A rapid response active outreach and enhanced contact program focused on counseling, adherence motivation, continuity of care.		x	Psychotherapy Care Management
Perfect Depression Care Initiative ⁴⁰	Performance improvement activities in the areas of patient partnerships, clinical care, access, and information flow.	x		Care Management
Postcard intervention ²⁸	Systematic one-year postcard follow-up program following suicide attempt – nine postcards sent over 12 months.		x	Caring Contacts
Screening for depression and education ³⁹	A two-step depression screening program (questionnaire and telephone call) linked to care and support services, combined with public education about depression.	x		Access Community Education
SOS ^{1,2}	A school-based intervention program combining suicide awareness education and depression screening.		x	Community Education Access
Survivor story videos ³⁷	Videos of suicide survivors' stories were shown to high-risk populations in the community.	x		Community Education
Telephone Follow-Up ³⁰	Systematic one-year telephone follow-up program following ED discharge – phone calls at 1 week, then 1, 3, 6, 9, and 12-month intervals.		x	Care management

Together for Life program ³²	Training program for police, supervisors, and union representatives, combined with the establishment of a volunteer helpline and a publicity campaign.	x		Community Education
YAMH ³	3-hour role-play session with interactive workshops combined with educational materials and two 1-hour interactive lectures, to improve suicide awareness.		x	Community Education

*Control is no treatment or treatment as usual unless otherwise specified.

Abbreviations: AFSPP=US Air Force Suicide Prevention Program; ARTP = US Army Resiliency Training Program; ASIST=Applied Suicide Intervention Skills Training; ASSIP=Attempted Suicide Short Intervention Programme; BIC=Brief Interventional Contact; CBT=Cognitive Behavioral Therapy; DBT=Dialectical Behavior Therapy; MBT=Mentalization-based treatment; MHEOCC=VA Mental Health Environment of Care Checklist; OPAC=Outreach, Problem Solving, Adherence, Continuity; SOS=Signs of Suicide; YAMH=Youth Aware of Mental Health Programme

Key Question 4. What methods are effective for matching interventions/approaches and their delivery to level of risk?

We did not identify any reviews that addresses this Key Question.

Key Question 5. What methods are effective for implementing, sustaining and improving effective healthcare- and community-based interventions?

We did not identify any reviews that addresses this Key Question.

Gaps Identified in Included Systematic Reviews

Figure 5 summarizes the Evidence Limitations and Gaps identified in the included systematic reviews, organized by the PICOTSS framework. Available systematic reviews have identified significant gaps across all PICOTSS domains, particular in study design/methodology.

Limitations of this Compendium of Systematic Reviews

The purpose of this compendium was to describe content of reviews published in last 5 years. It is not meant to reflect the totality of primary evidence published either before or after the review search dates. Therefore, its primary limitation is that it does not reflect information about the complete range of available interventions. For example, when we informally compared findings of this ESP compendium to the recent VA/DoD clinical practice guideline (CPG) for assessing and managing patients at risk for suicide,^{45,46} which was published after our search date and included evaluation of the primary literature, we noted several differences between the strength of the recommendations between the CPG and other reviews (see Table 4 below). This is likely due to differences in the strength of evidence/recommendation processes used. We also noted a few instances in which the CPG included recommendations for interventions that were not at all addressed in any reviews that the ESP identified that were published since 2014. These differences were generally due to the systematic reviews published since 2014 not including those interventions (eg, ketamine) and/or the CPG’s assessment of a broader range of outcomes than assessed in the ESP compendium of reviews.

Another limitation of this compendium is that, among the interventions that reviews published within the past 5 years identified as effective for significantly reducing deaths due to suicide or suicide attempts, evaluating their comparative effectiveness was outside of the scope of this review. However, as noted in several previous reviews, future research directly comparing 2 or



more suicide-specific interventions would be useful for better determining which provide the greatest benefits and harms and for which specific patient groups.

Table 5. Comparisons of CPG Recommendations to Findings in ESP Compendium of Reviews Published Since 2014

Intervention category	Specific interventions	CPG recommendation	ESP review of reviews	Reason for occasions of CPG including recommendations that are not addressed in ESP review of reviews
Detection	Suicide Risk Identification	Weak For	Army STARRS most promising	N/A
Non-Pharmacologic	CBT	Strong For	Limited For	N/A
	DBT	Weak For	Limited For	N/A
	Crisis Response Plan	Weak For	Limited for	N/A
	Problem-solving based Psychotherapies	Weak For	None For	CPG based conclusions on suicidal ideation or general self-harm, which ESP SR did not evaluate.
Pharmacologic	Ketamine	Weak For	N/A	None of the SRs evaluated by ESP looked at ketamine treatments; ESP did not evaluate suicidal ideation
	Lithium	Weak For	None For	CPG based on Cipriani 2013 SR, which was published before our search start date of 2014. Only review of pharmacotherapy published in last 5 years was Hawton 2015, which evaluated Lauterback 2008 for lithium and found no difference in suicide outcomes.
	Clozapine	Weak For	N/A	None of the SRs evaluated by ESP looked at clozapine treatments
Post-Acute Care	Active Outreach (Periodic Caring Communications)	Weak For	Limited For	N/A
	Home visits	Weak For	None For	Neither of the two studies included in the SRs ESP reviewed (Allard 1992; van Heeringen 1995) found an effect of home visits on either suicide attempts or suicide deaths (Meerwijk 2016)
	BIC	Weak For	Limited For	N/A

	Technology-based Interventions	None For	Limited For	N/A
Population	Reducing Access to Lethal Means	Weak For	N/A	No review in ESP review of reviews identified any published evidence on reducing access to lethal means and CPG recommendation was also not based on published evidence.
Community	Community-based Interventions	None For	Limited For	N/A
	Gatekeeper Training	None For	Limited For	N/A
	Buddy Support Programs	None For	None For	N/A

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APPENDIX

Figure 2. Distribution of Reviewed Studies in the SE-USI Framework

Individual – Indicated (138): Antipsychotics, Assertive case management, Assertive Intervention for Deliberate self-harm (AID), Attachment-Based Family Therapy (ABFT), Attempted Suicide Short Intervention Programme (ASSIP), Behaviour therapy, Brief Cognitive-Behavioural Therapy (BCBT), Brief Intervention and Contact (BIC), Brief Mobile Treatment (BMT), Brief problem-oriented counseling, Case management, electronic Cognitive Behavioural Therapy (e-CBT), Cognitive Behavioural prevention of Suicide in Psychosis protocol (CBSPp), Cognitive Behavioural Therapy (CBT), Cognitive Behavioural Therapy for Personality Disorders (CBT-pd), Collaborative Assessment and Management of Suicidality (CAMS), Collaborative stepped-care intervention, Crisis coping cards, Crisis Response Planning – standard (CRP-s), Crisis Response Planning – enhanced (CRP-e), Culturally adapted Manual-Assisted Problem-solving therapy (C-MAP), Day hospital, DBT-oriented therapy, DBT prolonged exposure protocol, Dialectical Behavioural Therapy (DBT), Early psychosis treatment, eBridge, Educational intervention, Emergency cards, Emergency Department Safety Assessment and Follow-up Evaluation (ED-SAFE), General hospital admission, General practitioner’s letter, Group-based emotion-regulation psychotherapy, Home-based problem-solving therapy, Home visits, IMCP/targeted PSA, Integrated treatment, Intensive case management, Intensive inpatient and community treatment, Intensive outpatient treatment, Intensive psychosocial treatment, Interpersonal problem-solving skills training, Long-term therapy, Mandated treatment with sanction, Manual Assisted Cognitive Therapy (MACT), Manualised Cognitive Behavioural Therapy (CBT-m), Mentalisation-Based Treatment (MBT), Mixed multimodal interventions, Mobile telephone-based psychotherapy, Mood stabilizers, Natural products, Newer generation antidepressants, Outreach case management, Outreach, Problem solving, Adherence, and Continuity (OPAC), Personal construct psychotherapy, Postcards, Problem-solving skills training, Provision of information and support, Skill-based treatment, Systems Training for Emotional Predictability and Problem Solving (STEPPS), Telephone contact, Telephone follow-up, Treatment adherence enhancement, Treatment for alcohol misuse, Virtual Hope Box (VHB), Web-based Cognitive Behavioural Therapy (CBT-w), Youth-nominated Support Team I & II (YST-I, YST-II)

Individual – Selective: Screening for depression and education

Relationship – Indicated: Education – management of depression, GP guidelines on management of suicidality, GPs trained by care managers on management of depression, Guidelines for management of deliberate self-poisoning, Lectures and workshop – management of depression, Lectures and workshop – management of depression & panic disorders, Lectures and workshop – management of suicide



Relationship – Selective: Applied Suicide Intervention Skills Training (ASIST), Youth suicide prevention workshop

Relationship – Universal: Education program for GPs, Garrett Lee Smith youth suicide prevention program, Question, Persuade, and Refer (QPR), Signs of Suicide (SOS), SMaRT Oncology-2, Together for Life (TfL), US Air Force Suicide Prevention Program (AFSPP), US Army Resiliency Training Program (ARTP), Youth Aware of Mental Health (YAMH)

Community – Selective: English Suicide Prevention Strategy, Perfect Depression Care Initiative, Survivor story videos

Community – Universal: Distribution and promotion of household lockable pesticide storage, VA Mental Health Environment of Care Checklist (MHEOCC)

Figure 3. Promising Interventions: Suicide Attempts

	Societal	Community	Relationship	Individual
Universal			SOS ^{1, 2} , YAMH ³ , Education – management of depression ⁴	
Selective			ASIST ⁵	
Indicated				ASSIP ⁶ , BCBT ⁷ , CBT ⁸⁻¹⁰ , CRP ¹¹ , DBT ¹² , MBT ¹³ , OPAC ¹⁴ , Crisis Coping Cards ¹⁷ , Postcards ^{28, 29} , Telephone follow-up ³⁰

^a ASIST = Applied Suicide Intervention Skills Training; ASSIP = Attempted Suicide Short Intervention Program; BCBT = Brief Cognitive-Behavioral Therapy; CBT = Cognitive Behavioral Therapy; CRP = Crisis Response Plan; DBT = Dialectical Behavioral Therapy; MBT = Mentalization-Based Treatment; OPAC = Outreach, Problem solving, Adherence, and Continuity; SOS = Signs of Suicide; YAMH = Youth Aware of Mental Health

^b These interventions are supported by low strength evidence at best. This list is not intended as an endorsement or promotion of any of these interventions.

Figure 4. Promising Interventions: Suicide Deaths

	Societal	Community	Relationship	Individual
Universal		MHEOCC ²⁸	AFSPP ^{33, 47} , ARTP ³⁴ , TiL ³²	
Selective		English Suicide Prevention Strategy ⁴² , Perfect Depression Care Initiative ⁴⁰ , Survivor story videos ³⁷		Screening for depression and education ³⁹
Indicated				BIC ^{35, 36} , MBT ¹³ , Collaborative stepped-care intervention ^{38, 48} , Mandated treatment with sanction ⁴¹ , Provision of information and support ³⁵

^a ASIST = Applied Suicide Intervention Skills Training; ASSIP = Attempted Suicide Short Intervention Program; BCBT = Brief Cognitive-Behavioral Therapy; CBT = Cognitive Behavioral Therapy; DBT = Dialectical Behavioral Therapy; MBT = Mentalization-Based Treatment; OPAC = Outreach, Problem solving, Adherence, and Continuity; SOS = Signs of Suicide; YAMH = Youth Aware of Mental Health

^b These interventions are supported by low strength evidence at best. This list is not intended as an endorsement or promotion of any of these interventions.

Figure 5. Gaps Identified in the Literature

Populations	<ul style="list-style-type: none"> Transitioning/separating Veterans Veterans not connected to/using VA services Biological markers for suicide
Interventions	<ul style="list-style-type: none"> Multilevel interventions Community interventions Technological interventions Neuro-imaging/Neuro-psychological testing
Comparators	<ul style="list-style-type: none"> Head-to-Head comparison of interventions Technological interventions
Outcomes	<ul style="list-style-type: none"> Minimum effective intervention Differential intervention effect due to therapist level of experience Evaluations of sustainability and scalability Treatment variability due to SUD/OD, PTSD
Timing	<ul style="list-style-type: none"> Short-term vs. Long-term effects of intervention Effect of upstream vs. crisis interventions
Setting	<ul style="list-style-type: none"> VA Military Urban/rural
Study Design/ Methods	<ul style="list-style-type: none"> Controlled studies Ecological studies Stepped-wedge design studies Interrupted time-series analysis Standardization of terms, metrics, reporting of results Study replication