Compendium: Systematic Reviews of Suicide Prevention Topics

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Prepared by:
Evidence Synthesis Program (ESP)
Coordinating Center
Portland VA Health Care System
Portland, OR
Mark Helfand, MD, MPH, MS, Director

Authors:
Kim Peterson, MS
Nathan Parsons, MS
Kathryn Vela, MLIS
Lauren M. Denneson, PhD
Steven K. Dobscha, MD

VA | U.S. Department of Veterans Affairs
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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).

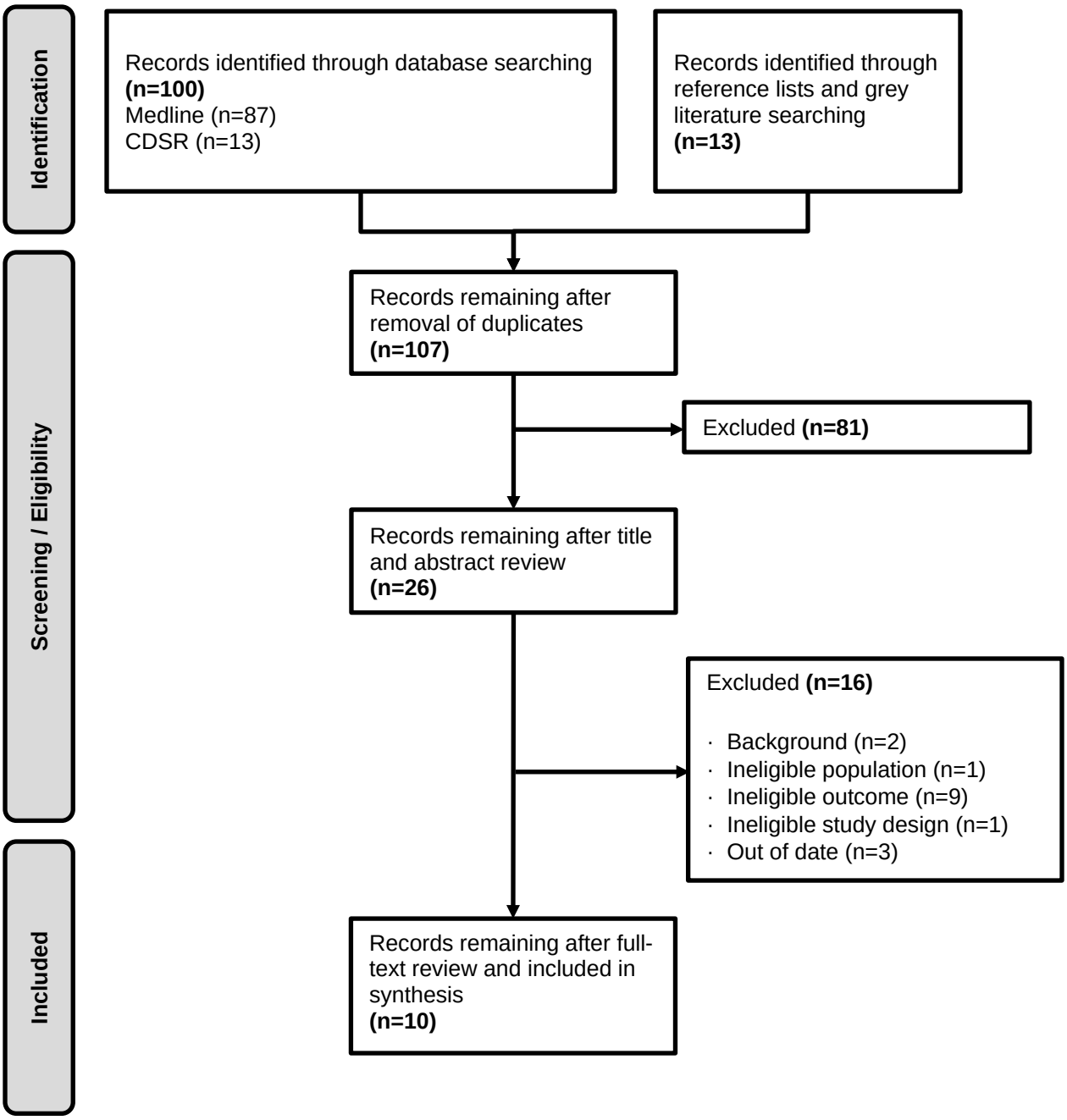
Additionally, we coded studies utilizing the dual axes of the Social Ecological-Universal Selective Indicated (SE-USI) model.[15, 16] For the social-ecological axis, studies were evaluated with regard to the target of the intervention: the individual that represents the potential suicide death (*eg,* 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 reviews[18-27] 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 videos†	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]	Aseltine 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-initative 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 is 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,[1] 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

REFERENCES

1. Aseltine RH, DeMartino R. An outcome evaluation of the SOS suicide prevention program. *American Journal of Public Health.* 2004;94(3):446-451.
2. Schilling EA, Aseltine RH, Jr., James A. The SOS suicide prevention program: Further evidence of efficacy and effectiveness. *Prevention Science.* 2016;17(2):157-166.
3. Wasserman D, Hoven CW, Wasserman C, et al. School-based suicide prevention programmes: The Seyle cluster-randomised, controlled trial. *The Lancet.* 2015;385(9977):1536-1544.
4. Hegerl U, Althaus D, Schmidtke A, Niklewski G. The alliance against depression: 2-year evaluation of a community-based intervention to reduce suicidality. *Psychological Medicine.* 2006;36(9):1225-1233.
5. Smith-Osborne A, Maleku A, Morgan S. Impact of applied suicide intervention skills training on resilience and suicide risk in army reserve units. *Traumatology.* 2017;23(1):49.
6. Gysin-Maillart A, Schwab S, Soravia L, Megert M, Michel K. A novel brief therapy for patients who attempt suicide: A 24-months follow-up randomized controlled study of the attempted suicide short intervention program (ASSIP). *PLoS Medicine.* 2016;13(3).
7. Rudd MD, Bryan CJ, Wertenberger EG, et al. Brief cognitive-behavioral therapy effects on post-treatment suicide attempts in a military sample: Results of a randomized clinical trial with 2-year follow-up. *American Journal of Psychiatry.* 2015;172(5):441-449.
8. Brown GK, Ten Have T, Henriques GR, Xie SX, Hollander JE, Beck AT. Cognitive therapy for the prevention of suicide attempts: A randomized controlled trial. *Journal of the American Medical Association.* 2005;294(5):563-570.
9. Esposito-Smythers C, Spirito A, Kahler CW, Hunt J, Monti P. Treatment of co-occurring substance abuse and suicidality among adolescents: A randomized trial. *Journal of Consulting and Clinical Psychology.* 2011;79(6):728-739.
10. Salkovskis PM, Atha C, Storer D. Cognitive-behavioural problem solving in the treatment of patients who repeatedly attempt suicide. A controlled trial. *British Journal of Psychiatry.* 1990;157(DEC.):871-876.
11. Bryan CJ, Mintz J, Clemans TA, et al. Effect of crisis response planning vs. Contracts for safety on suicide risk in u.S. Army soldiers: A randomized clinical trial. *Journal of Affective Disorders.* 2017;212:64-72.
12. Linehan MM, Comtois KA, Murray AM, et al. Two-year randomized controlled trial and follow-up of dialectical behavior therapy vs therapy by experts for suicidal behaviors and borderline personality disorder. *Archives of General Psychiatry.* 2006;63(7):757-766.
13. Bateman A, Fonagy P. 8-year follow-up of patients treated for borderline personality disorder: Mentalization-based treatment versus treatment as usual. *American Journal of Psychiatry.* 2008;165(5):631-638.
14. Hvid M, Vangborg K, Sørensen HJ, Nielsen IK, Stenborg JM, Wang AG. Preventing repetition of attempted suicideii. The amager project, a randomized controlled trial. *Nordic Journal of Psychiatry.* 2011;65(5):292-298.
15. Institute of Medicine. *Reducing suicide: A national imperative.* Washington, D.C.: The National Academies Press; 2002.
16. Centers for Disease Control and Prevention. The social-ecological model: A framework for prevention. 2019; https://www.cdc.gov/violenceprevention/publichealthissue/social-ecologicalmodel.html. Accessed August 21, 2019.

17. Wang YC, Hsieh LY, Wang MY, Chou CH, Huang MW, Ko HC. Coping card usage can further reduce suicide reattempt in suicide attempter case management within 3-month intervention. *Suicide and Life-Threatening Behavior.* 2016;46(1):106-120.
18. Hawton K, Witt KG, Taylor Salisbury TL, et al. Pharmacological interventions for self-harm in adults. *Cochrane Database of Systematic Reviews.* 2015(7).
19. Hawton K, Witt KG, Taylor Salisbury TL, et al. Psychosocial interventions for self-harm in adults. *Cochrane Database of Systematic Reviews.* 2016(5).
20. Khangura SD KI, Seal K, Spry C. Suicide-specific psychotherapy for the treatment of suicidal crisis: A review of clinical effectivness. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2018.
21. Kreuze E, Jenkins C, Gregoski M, et al. Technology-enhanced suicide prevention interventions: A systematic review. *Journal of Telemedicine & Telecare.* 2017;23(6):605-617.
22. Leavey K, Hawkins R. Is cognitive behavioural therapy effective in reducing suicidal ideation and behaviour when delivered face-to-face or via e-health? A systematic review and meta-analysis. *Cognitive Behaviour Therapy.* 2017;46(5):353-374.
23. Meerwijk EL, Parekh A, Oquendo MA, Allen IE, Franck LS, Lee KA. Direct versus indirect psychosocial and behavioural interventions to prevent suicide and suicide attempts: A systematic review and meta-analysis. *The Lancet Psychiatry.* 2016;3(6):544-554.
24. Nelson HD, Denneson LM, Low AR, et al. Suicide risk assessment and prevention: A systematic review focusing on veterans. *Psychiatric Services.* 2017;68(10):1003-1015.
25. Hofstra E, van Nieuwenhuizen C, Bakker M, et al. Effectiveness of suicide prevention interventions: A systematic review and meta-analysis. *General Hospital Psychiatry.* 2019;Article in press.
26. Milner A, Witt K, Pirkis J, et al. The effectiveness of suicide prevention delivered by gps: A systematic review and meta-analysis. *Journal of Affective Disorders.* 2017;210:294-302.
27. Peterson K, Anderson J,Bourne D. *Evidence brief: Suicide prevention in veterans.* Portland, Oregon: Evidence-based Synthesis Program;2018.
28. Hassanian-Moghaddam H, Sarjami S, Kolahi AA, Carter GL. Postcards in Persia: Randomised controlled trial to reduce suicidal behaviours 12 months after hospital-treated self-poisoning. *British Journal of Psychiatry.* 2011;198(4):309-316.
29. Hassanian-Moghaddam H, Sarjami S, Kolahi AA, Lewin T, Carter G. Postcards in Persia: A twelve to twenty-four month follow-up of a randomized controlled trial for hospital-treated deliberate self-poisoning. *Archives of Suicide Research.* 2017;21(1):138-154.
30. Cebria AI, Parra I, Pàmias M, et al. Effectiveness of a telephone management programme for patients discharged from an emergency department after a suicide attempt: Controlled study in a spanish population. *Journal of Affective Disorders.* 2013;147(1-3):269-276.
31. Dahlberg LL, Krug EG. Violence - a global public health problem. In: Krug EG, Dahlberg LL, Mercy JA, Zwi AB, Lozano R, eds. *World report on violence and health.* Geneva: World Health Organization; 2002.
32. Mishara BL, Martin N. Effects of a comprehensive police suicide prevention program. *Crisis.* 2012;33(3):162-168.
33. Knox KL, Pflanz S, Talcott GW, et al. The US Air Force Suicide Prevention Program: Implications for public health policy. *American Journal of Public Health.* 2010;100(12):2457-2463.

34. Warner CH, Appenzeller GN, Parker JR, Warner C, Diebold CJ, Grieger T. Suicide prevention in a deployed military unit. *Psychiatry.* 2011;74(2):127-141.
35. Fleischmann A, Bertolote JM, Wasserman D, et al. Effectiveness of brief intervention and contact for suicide attempters: A randomized controlled trial in five countries. *Bulletin of the World Health Organization.* 2008;86(9):703-709.
36. Vijayakumar L, Umamaheswari C, Shujaath Ali ZS, Devaraj P, Kesavan K. Intervention for suicide attempters: A randomized controlled study. *Indian Journal of Psychiatry.* 2011;53(3):244-248.
37. Ahmadi A, Ytterstad B. Prevention of self-immolation by community-based intervention. *Burns.* 2007;33(8):1032-1040.
38. Malakouti SK, Nojomi M, Poshtmashadi M, et al. Integrating a suicide prevention program into the primary health care network: A field trial study in iran. *BioMed Research International.* 2015;2015.
39. Oyama H, Goto M, Fujita M, Shibuya H, Sakashita T. Preventing elderly suicide through primary care by community-based screening for depression in rural japan. *Crisis.* 2006;27(2):58-65.
40. Coffey CE. Building a system of perfect depression care in behavioral health. *Joint Commission Journal on Quality and Patient Safety.* 2007;33(4):193-199.
41. Joffe P. An empirically supported program to prevent suicide in a college student population. *Suicide and Life-Threatening Behavior.* 2008;38(1):87-103.
42. While D, Bickley H, Roscoe A, et al. Implementation of mental health service recommendations in England and Wales and suicide rates, 1997-2006: A cross-sectional and before-and-after observational study. *The Lancet.* 2012;379(9820):1005-1012.
43. Watts BV, Shiner B, Young-Xu Y, Mills PD. Sustained effectiveness of the mental health environment of care checklist to decrease inpatient suicide. *Psychiatr Serv.* 2017;68(4):405-407.
44. Linehan MM, Comtois KA, Brown MZ, Heard HL,Wagner A. Suicide attempt self-injury interview (sasii): Development, reliability, and validity of a scale to assess suicide attempts and intentional self-injury. *Psychological Assessment.* 2006;18(3):303-312.
45. Assessment and Management of Suicide Risk Work Group. *VA/DOD clinical practice guideline for the assessment and management of patients at risk for suicide.* 2019.
46. Sall J, Brenner L, Bell AMM, Colston MJ. Assessment and Management of Patients at Risk for Suicide: Synopsis of the 2019 U.S. Department of Veterans Affairs and U.S. Department of Defense Clinical Practice Guidelines. Ann Intern Med. [Epub ahead of print 27 August 2019].
47. Knox KL, Litts DA, Talcott GW, Feig JC, Caine ED. Risk of suicide and related adverse outcomes after exposure to a suicide prevention programme in the US Air Force: Cohort study. *British Medical Journal.* 2003;327(7428):1376-1378.
48. Malakouti SK, Nojomi M, Ahmadkhaniha HR, Hosseini M, Fallah MY, Khoshalani MM. Integration of suicide prevention program into primary health care network: A field clinical trial in Iran. *Medical Journal of the Islamic Republic of Iran.* 2015;29.

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], TfL[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	**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/OUD, 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**