



Strategies for Suicide Prevention in Veterans

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PREFACE

VA's Health Services Research and Development Service (HSR&D) works to improve the cost, quality, and outcomes of health care for our nation's veterans. Collaborating with VA leaders, managers, and policy makers, HSR&D focuses on important health care topics that are likely to have significant impact on quality improvement efforts. One significant collaborative effort is HSR&D's Evidence-based Synthesis Pilot Project (ESP). Through this project, HSR&D provides timely and accurate evidence syntheses on targeted health care topics. These products will be disseminated broadly throughout VA and will: inform VA clinical policy, develop clinical practice guidelines, set directions for future research to address gaps in knowledge, identify the evidence to support VA performance measures, and rationalize drug formulary decisions.

HSR&D provided funding for the two Evidence Based Practice Centers (EPCs) supported by the Agency for Healthcare Research and Quality (AHRQ) that also had an active and publicly acknowledged VA affiliation—Southern California EPC and Portland, OR EPC—so they could develop evidence syntheses on requested topics for dissemination to VA policymakers. A planning committee with representation from HSR&D, Patient Care Services, Office of Quality and Performance, and the VISN Clinical Management Officers, has been established to identify priority topics and to insure the quality of final reports.

Comments on this evidence report are welcome and can be sent to Susan Schiffner, ESP Program Manager, at Susan.Schiffner@va.gov.

This report is based on research conducted by the Greater Los Angeles Veterans Affairs Healthcare System and Southern California Evidence-based Practice Center (EPC) under contract to the Department of Veterans Affairs. The findings and conclusions in this document are those of the author(s) who are responsible for its contents; the findings and conclusions do not necessarily represent the views of the Department of Veterans Affairs. Therefore, no statement in this article should be construed as an official position of the Department of Veterans Affairs.

This report is intended as a reference and not as a substitute for clinical judgment.

This report may be used, in whole or in part, as the basis for development of clinical practice guidelines and other quality enhancement tools, or as a basis for reimbursement and coverage policies. The Department of Veterans Affairs endorsement of such derivative products may not be stated or implied.

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STRATEGIES FOR SUICIDE PREVENTION IN VETERANS

EXECUTIVE SUMMARY

BACKGROUND

Suicide is a devastating outcome of major public health importance. Suicide rates for patients abusing alcohol and other substances, or suffering from other mental health conditions may be elevated. Because suicide prevention is a priority of the Veterans Health Administration, the VA wishes to expand and enhance use of evidence-based prevention or reduction methods..

The Key Questions were:

Key Question 1. What are the new or improved suicide prevention strategies (e.g. hotlines, outreach programs, peer counseling, treatment coordination programs, and new counseling approaches) that show promise for Veterans?

Key Question 2. What solid evidence base supports the most promising strategies?

Key Question 3. What evidence is still needed to establish various strategies as the most promising (framed as research questions to guide and focus continued research to expand knowledge regarding the effectiveness of suicide prevention approaches)?

METHODS

Mann et al. completed a systematic review of the literature on suicide prevention from 1966 through June 2005.¹ They searched MEDLINE, the Cochrane Library, and PsychINFO databases. We updated this using the same search strategy, starting from June 2005 through May 2008. Only studies reporting direct effects of interventions on suicide attempts or completions were considered. Studies reporting results from any country for military or veterans were included, as were studies in Anglo/American countries with adult populations reporting interventions other than strictly mental-health interventions. Titles, abstracts, and articles were reviewed by a psychiatrist trained in the critical analysis of literature. Data were narratively summarized.

RESULTS

We screened 3,406 titles and performed a more detailed review on 261 articles. We identified seven multifaceted studies of military personnel, five in the US, and two multifaceted national suicide prevention programs. We identified three studies of US veterans. We found 20 randomized or controlled clinical trials of interventions post-suicide attempt. We found a large number of observational studies of restricting access to lethal means, and a small number of heterogeneous trials and studies.

KEY QUESTION #1: What are the new or improved suicide prevention strategies (e.g. hotlines, outreach programs, peer counseling, treatment coordination programs, and new counseling approaches) that show promise for Veterans?

KEY QUESTION #2: What solid evidence base supports the most promising strategies?

Multicomponent interventions in military personnel probably reduce the risk of suicide. The largest and best described such study was implemented for the US Air Force, and this study provides the most convincing evidence of effectiveness. The report of success of a program in Yugoslavia modeled after the USAF program increases our confidence that the effect is real. A similar program was developed for the US Navy and Marine Corps. However, as with any multicomponent intervention shown to be successful, there are still numerous questions about the relative merit of inclusion of each individual component (could the same effect be achieved with fewer components?) or the possible increase in effectiveness of adding other components, and optimizing the effectiveness of each additional component. Additionally, there are no data about its effect in non-military populations, although veterans would seem to be sufficiently close to a military population that some transferability of results could be assumed. (GRADE quality of evidence = Low, meaning further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate)

There are insufficient studies of suicide prevention programs specifically in veterans to draw conclusions (GRADE quality of evidence = Very Low, meaning any estimate of effect is uncertain)

Psychosocial interventions following a suicide attempt are, at the very best, only minimally effective (GRADE quality of evidence = Moderate, meaning further research is likely to have an important impact on our confidence in the estimate of the effect and may change the estimate).

There are insufficient data to reach conclusions about Community-based Suicide Prevention Centers (GRADE quality of evidence = Very Low , meaning any estimate of effect is uncertain)

We found no studies that assessed the specific effectiveness of any of hotlines, outreach programs as primary prevention interventions, peer counseling, treatment coordination programs, and new counseling programs.

Restriction of access to lethal means probably has an effect on cause-specific suicides, although its effect on total suicides is less clear (GRADE quality of evidence = Low, meaning further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate)

KEY QUESTION #3: What evidence is still needed to establish various strategies as the most promising (framed as research questions to guide and focus continued research to expand knowledge regarding the effectiveness of suicide prevention approaches)?

Multifaceted interventions are supported by consistent evidence, although of very mixed quality.

Even if such programs are later determined to be robustly successful, the question of which components in those programs are causally related to the reduction in suicides has not been addressed. This sets as a research issue determining which components work best in which combinations for which populations. The issue of whether some sets of components may have facilitative or synergistic effects has not been addressed.

Psychosocial intervention for suicide attempters have considerable face validity as they address a group with manifest evidence of suicide risk, but there is no consistent evidence in their support in spite of a moderate number of randomized controlled trials that been conducted. This is an area of obvious and considerable interest to the VA, which is now using similar approaches in its clinical programs to identify and track those at high risk with suicide risk flags, screening tools, and suicide prevention coordinators. An additional factor that seems relevant but rarely directly studied is the effect of forming a consistent relationship with a single provider, a therapeutic alliance, and its role in providing a protective degree of social connection, and reducing the harmful consequences of social isolation.

Further randomized controlled trials and high-quality observational studies are definitely needed. Without waiting for such to be completed, and independent of which program components the VA decides to pursue, there are two supporting initiatives that could be implemented in parallel. The first concerns standardizing vocabulary, and the second concerns electronic medical records.

First, all suicide prevention programs are dependent on the accuracy with which assessments of suicidality are conducted. The term “suicide attempt” covers a very broad array of self-injurious behaviors, from intentionally planned, high lethality events that were interrupted by mere happenstance, through low lethality acts marked by a small risk of physical harm, impulsivity, and a high likelihood of discovery by others. Others have noted the importance of establishing and using a consistent nomenclature in this area. It is critical for further advances in suicide reduction that such attempts are carried through.

A very important reason for accurately describing the severity of suicide attempts is that an attempt is widely recognized as a significant risk factor for completions. Although most completed suicides are first attempts² and attempters vary in important ways from completers,³ it is known that survivors of highly lethal attempts have similar clinical and psychosocial profiles to antemortem profiles of suicide completers. This suggests that subcategorization of attempt by lethality (or perhaps other factors) may be clinically useful.

Second, because the VA uses a single, integrated computerized medical record system for all of its clinical activities, any improvements in vocabulary along with new screening and tracking tools would allow for data gathering as part of routine practice – especially for establishing patterns and risk factors for suicide attempts – in advance of formally conducted observational studies or controlled trials.

INTRODUCTION

BACKGROUND

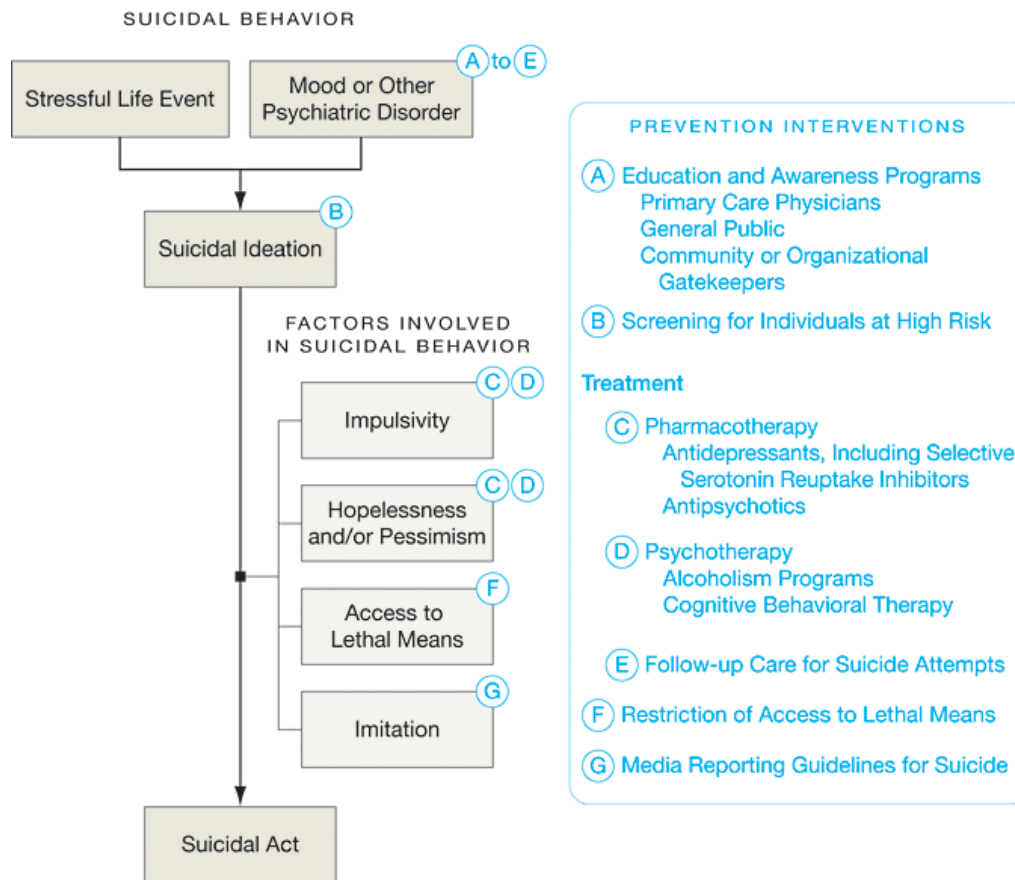
Suicide is a major problem in public health. In the US suicide is roughly the 10th leading cause of death, corresponding to about 30,000 deaths per year. Suicide is now understood as a multifactorial phenomenon, with biological, psychological, and social/environmental risk vulnerabilities and triggers. The majority of suicides – at least 90% by some studies – in the US implicate a psychiatric disorder, usually a mood disorder.^{1,2}

US military veterans are a large population with multiple, and often significant risk factors for suicide. The Veterans Health Study, which screened 2160 male outpatients at Boston-area VA clinics, reported depressive symptoms in 31% of the sample, a rate more than twice that of the general population.⁴ A study of over 800,000 depressed veterans reported a suicide rate about 7 times higher than the baseline risk in the general population.⁵ The same study also showed that substance abuse elevated the suicide risk in depressed veterans. A recent report on the prevalence of mental health disorders in soldiers returning from the current Iraq conflict found clinician-identified mental health problems in 20% of active duty personnel, and in over 40% of National Guard and reserve personnel.⁶ Suicide in these newly discharged veterans has also received considerable political and media scrutiny.

The main problem confronting those working in suicide prevention is that while the absolute number of suicides in a population is cumulatively quite large, the risk of suicide to any given individual, even those with multiple risk factors, is by relative measures quite small. This problem is illustrated in an example in Gaynes et al.⁷ who show that for reasonable assumptions of sensitivity and specificity, a screening test for suicide risk would have a positive predictive value of 0.3% and generate an overwhelming number of false positives. These same factors complicate any attempt at constructing randomized clinical trials of suicide prevention efforts. It is widely recognized that the problem of accurate suicide prediction at the clinical level is currently an intractable one.³

In spite of the difficulties with prediction, structured approaches to suicide prevention have been developed. The multifactorial nature of the problem of suicide has required the adoption of a multifaceted approach to intervention, combining population-based screening and education, with more targeted efforts for those at above-baseline risk. These methods were reviewed by Mann et al.¹ and their conceptual model will organize the interventions we review in this report (Figure 1).

Figure 1. Targets of Suicide Prevention Interventions from Mann et al.¹



In their model life stressors and psychiatric disorders combine to produce suicidal ideation, which is modulated by impulsivity, hopelessness/pessimism, access to lethal means, and imitation, leading to the final suicidal act. The interventions correspond to different points in this causal network. The set of interventions, adapted from Mann et al., that are considered in this review appear in Table 1 and described in detail in the following.

Table 1. Set of interventions from Mann et al.¹

Education and Awareness Programs
Primary Care Physicians
General Public/Population
Community or Organization Gatekeepers
Screening for individuals at high risk
Pharmacotherapy or ECT
Psychotherapy
Follow-up care for suicide attempts
Restriction of access to lethal means
Media reporting guidelines for suicide

Other Education and awareness programs can have various audiences; they can be aimed at primary care physicians to improve detection of mental health issues or significant stressors with the goal of referring to mental health clinicians for diagnosis and treatment, at a particular population (or the general public) to educate them about suicide and the availability of resources for getting help, and at nonclinical gatekeepers, such as medical clerks, chaplains, or military unit commanders, who as part of their work activities come into contact with large groups and who could, with improved training, provide education or identify those at high risk.

Screening programs for those at high risk target interventions towards those with known risk factors for suicide. These include patients who have previously expressed suicidal ideation or made suicide attempts, or those with mood disorders or substance abuse disorders, who are higher risk than the general population.

Mental health treatment is typically organized into biological therapies, including both pharmacotherapy (e.g., antidepressants), and electroconvulsive therapy (ECT), and psychosocial approaches, such as psychotherapy (e.g., cognitive-behavioral therapy), supportive counseling or treatment for substance abuse.

Because suicide attempts are known to be a strong predictor of future attempts (and completions), specific intervention efforts have been directed to this high-risk population. Typically this involves tracking individuals after emergency room visits for suicide attempts, providing close mental health follow up, therapy, or case management.

Restriction of access to lethal means covers a variety of population-wide measures that limit the availability of commonly used methods of suicide. These include restricting access to highly lethal means (firearms through background checks, waiting periods, licensing laws, or bans, jumping by installing barriers on bridges), common means (limiting package sizes or configurations of pharmaceuticals used in overdose, most commonly acetaminophen), and other community or social interventions (such as changing the source and composition of domestic gas to have a lower carbon monoxide content, and requiring the installation of catalytic converters on all newly manufactured vehicles to reduce the level of carbon monoxide in the exhaust gas). An important issue in means restriction is whether reducing the availability of one mechanism will reduce the suicide rate overall, or merely shift suicides towards other available methods.

Media reporting guidelines are designed to address the problem of imitation or contagion: widely publicized suicides, especially of celebrities, are thought to temporarily increase the suicide rate, especially of suicides that mimic the reported mechanism. More information about the media and imitative suicides can be found in a recent review by Pirkis.⁸

Suicide prevention programs, especially those designed for very large organizations such as military forces, or for entire nations, are typically multifaceted programs comprising a variety of different interventions just mentioned; most often the multifaceted programs combine population-based programs that use education and screening with more targeted interventions for those with identified risk factors.

Other factors not explicitly listed above, such as substance abuse, and homelessness, are also relevant because they affect impulsivity or hopelessness, and are also obvious targets of both mental health and broader social interventions.

Because completed suicide is a very rare event in small samples, various approaches have been taken in assessing the efficacy of intervention programs. First, intermediate or proxy outcome measures can be used. Relevant outcomes would be decreases in depression rating scores, or decreased reports of suicidal ideation. However, the use of these measure greatly inflates the number of implicated studies for review – the examples mentioned would involve nearly all the published literature on the treatment of mood disorders – or involve subjective assessments of the strength of the suicidal ideation and whether the ideation was the precursor of an intended act or merely a means of communication to others or of obtaining hospital admission. Because of these concerns, the outcomes used in this report are suicide attempts, and completed suicides.

In this report we review the state of the evidence for suicide prevention, with a special focus on the military and veteran populations. The interventions are organized into the taxonomy presented above. The three key questions were:

1. What are the new or improved suicide prevention strategies (e.g. hotlines, outreach programs, peer counseling, treatment coordination programs, and new counseling approaches) that show promise for Veterans?
2. What solid evidence base supports the most promising strategies?
3. What evidence is still needed to establish various strategies as the most promising (framed as research questions to guide and focus continued research to expand knowledge regarding the effectiveness of suicide prevention approaches)?

METHODS

TOPIC DEVELOPMENT

This project was nominated by the Office of Research and Development for the Evidence Synthesis Project. Key questions were discussed and finalized during a conference call that included the Steering Committee of the Evidence Synthesis Project and the VA Greater Los Angeles project site director. The final key questions are:

1. What are the new or improved suicide prevention strategies (e.g. hotlines, outreach programs, peer counseling, treatment coordination programs, and new counseling approaches) that show promise for Veterans?
2. What solid evidence base supports the most promising strategies?
3. What evidence is still needed to establish various strategies as the most promising (framed as research questions to guide and focus continued research to expand knowledge regarding the effectiveness of suicide prevention approaches)?

SEARCH STRATEGY

Mann et al. completed a systematic review of the literature on suicide prevention from 1966 through June 2005.¹ As we scored this article well on those aspects of the Oxman-Guyatt Overview Quality Assessment Questionnaire⁹ and the AMSTAR Systematic Review Checklist¹⁰ that dealt with the rigor of the search and selection process, we judged the articles identified by this review as a suitable starting place for our own review. They searched MEDLINE, the Cochrane Library, and PsychINFO databases. We updated this using the same search strategy, starting from July 2005 through May 2008.

The search strategy is listed below:

DATABASES SEARCHED & TIME PERIOD COVERED:

PubMed

June 2005 – May 2008

LIMITERS: ENGLISH

SEARCH STRATEGY:

Suicide/prevention and control

OR

suicide, attempted/prevention and control

OR

suicide AND (prevent*[tiab] OR depression OR health education OR health promotion OR public opinion OR mass screening OR family physicians OR medical education OR primary health care OR antidepressive agents OR psychotherapy OR schools OR adolescents OR methods OR firearms OR overdose OR poisoning OR gas poisoning OR mass media)

NOT

case report* OR editorial* OR letter

TOTAL RESULTS – 3,212⁺

⁺references to “suicide cells” & “suicide genes” were manually removed and are not included in this number

In addition to our PubMed search, we performed reference mining of retrieved articles, references of prior reviews, and solicited articles from experts.

STUDY SELECTION

In consultation with the ESP Advisory Committee and VA policymakers in mental health, we developed the following criteria to guide study selection. Our focus was on veterans and active military duty persons, consequently studies of children and adolescents were excluded. All studies of veterans and military personnel (from any country) were included. In addition to this, we included studies of the non-veteran population from the US and countries sufficiently similar to the US in terms of culture (Canada, United Kingdom, Ireland, Australia, New Zealand). Only studies that reported outcomes as suicides or suicide attempts were included; studies reporting only other proxy outcomes were excluded. Studies of strictly mental health interventions (psychotherapy, pharmacotherapy) have been reviewed by others and were therefore excluded unless they included military or veterans.

DATA ABSTRACTION

Data were abstracted by a psychiatrist with prior experience in systematic reviews. The following data were abstracted from included trials: population, mean and median age, setting, country, interventions, outcomes, and study design. Data abstraction forms are provided in Appendix A.

QUALITY ASSESSMENT OF INDIVIDUAL ARTICLES

To assess the quality of the RCT and CCTs we used was a modification of the Delphi List.¹¹ We abstracted data on whether or not the study was described as randomized; treatment allocation; was the method of randomization performed and was the treatment allocation concealed; were the groups similar at baseline regarding the most important prognostic indicators; were the eligibility criteria specified; was the outcome assessor blinded; was the care provider blinded; was the patient blinded; were point estimates and measures of variability presented for the primary outcome measures; were all randomized participants analyzed in the group to which they were allocated; were co-interventions avoided or similar; was compliance in all groups acceptable; was the timing of the outcome assessment in all groups similar.

RATING THE BODY OF EVIDENCE

We assessed the overall quality of evidence for outcomes using a method developed by the Grade Working Group, which classified the grade of evidence across outcomes according to the following criteria:¹²

- **High** = Further research is very unlikely to change our confidence on the estimate of effect.
- **Moderate** = Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
- **Low** = Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
- **Very Low** = Any estimate of effect is very uncertain.

GRADE also suggests using the following scheme for assigning the “grade” or strength of evidence:

Criteria for assigning grade of evidence
<p>Type of evidence Randomized trial = high Observational study = low Any other evidence = very low</p> <p>Decrease grade if:</p> <ul style="list-style-type: none">• Serious (-1) or very serious (-2) limitation to study quality• Important inconsistency (-1)• Some (-1) or major (-2) uncertainty about directness• Imprecise or sparse data (-1)• High probability of reporting bias (-1) <p>Increase grade if:</p> <ul style="list-style-type: none">• Strong evidence of association-significant relative risk of > 2 (< 0.5) based on consistent evidence from two or more observational studies, with no plausible confounders (+1)• Very strong evidence of association-significant relative risk of > 5 (< 0.2) based on direct evidence with no major threats to validity (+2)• Evidence of a dose response gradient (+1)• All plausible confounders would have reduced the effect (+1)

For this report, we used both this explicit scoring scheme and the global implicit judgment about “confidence” in the result. Where the two disagreed, we went with the lower of the two classifications.

DATA SYNTHESIS

The studies included in this review were too heterogeneous to statistically pool, and we therefore summarized these narratively, in the following categories multifaceted interventions for military personnel; other multifaceted programs (national suicide prevention programs); interventions for veterans; psychosocial interventions post-suicide attempt; postal or telephone follow up post-suicide attempt; hospital admission for attempted suicide; and restriction of access to lethal means.

PEER REVIEW

This report was reviewed by 6 experts selected by the VA ESP Advisory Committee for their expertise in this area and their knowledge of VA. Peer review comments received, and the changes we made to the report as a result, are presented in Appendix D.

RESULTS

LITERATURE FLOW – UPDATE

In total, we examined 3,406 titles. The electronic literature search identified 3,212 articles. An additional 196 articles were identified through reference mining. A content expert identified 5 more articles.

Of the titles identified through our electronic literature search, 3,140 were rejected at title review as clearly irrelevant to the project. This left 273 from all sources. Seven articles were rejected as not relevant. Five titles could not be located after contacting many sources. (Figure 2)

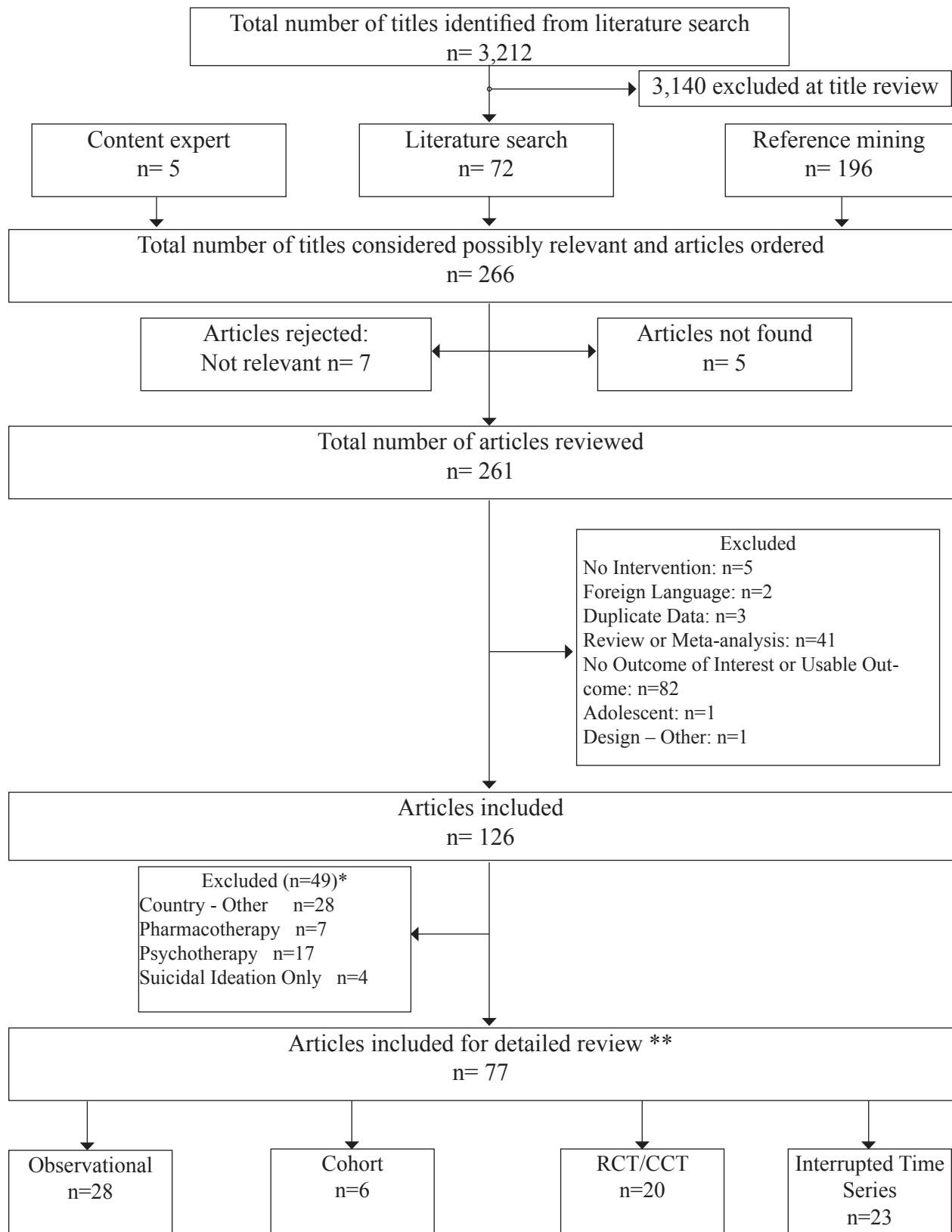
We reviewed a total of 261 articles. Initial screening of the articles resulted in three articles that included veterans and seven articles that included military personnel. We excluded 135 articles for the following reasons: five because they did not include an intervention, two foreign language articles, three articles contained duplicate data, 41 review or meta-analyses, 82 articles with no outcome of interest or no usable data, one study of adolescents only, and one editorial. This left 126 articles included for further review.

Following guidance from the ESP Advisory Committee in our further inclusion criteria we excluded an additional 49 studies. Studies were excluded for studies conducted in countries other than US, Canada, United Kingdom, Ireland, Australia, or New Zealand and not containing military personnel or veterans; only reporting suicidal ideations, or being a strictly psychotherapy or pharmacotherapy study. Of studies that met our inclusion criteria we found 20 RCT or CCT studies, 28 observational studies, 6 cohort studies, and 23 interrupted time series studies.

Excluded articles and reasons for exclusion are listed in Appendix B.

The results have been grouped together by the kind of intervention, and within that, by study design. We first report on studies of military or veterans that use multifaceted (multi-component) interventions. This includes all the studies (of any type) that directly studied military personnel. For comparison, we then present other multifaceted interventions, both of which are national suicide prevention programs. We then report on several other interventions identified that included veterans.

Figure 2. Literature Flow



*Studies excluded for multiple reasons

KEY QUESTION #1: What are the new or improved suicide prevention strategies (e.g. hotlines, outreach programs, peer counseling, treatment coordination programs, and new counseling approaches) that show promise for Veterans?

KEY QUESTION #2: What solid evidence base supports the most promising strategies?

OVERVIEW

This results section is organized by the target and the method of the intervention, first with studies of multifaceted interventions. We found studies of multifaceted interventions only for military personnel or the general population. We did not find any studies of multifaceted interventions for veterans. Following the review of multifaceted interventions is a review of the studies that did include veterans. The report then discusses evidence from other populations using interventions post-suicide attempt, suicide prevention centers, hospital admission for attempted suicide, collaborative care for depression, and an intervention for the identified patient's support network. Then observational studies for restricting access to lethal means (firearms, acetaminophen, other toxic agents, and bridge barriers), and restrictions of media reporting of suicides are presented.

Multifaceted interventions for military personnel

Seven studies involving military personnel were identified. All were prospective cohort studies in which the intervention was implemented for the entire population. The characteristics, interventions, and outcomes of the military studies are shown in Evidence Table 1 in Appendix C.

James and Kowalski¹³ described a suicide prevention program for the US Army 25th Infantry Division (Light) that was started in 1992 and fully implemented by early 1994. Psychological autopsy data from 1985 to 1993 identified various risk factors in this population including demographics (all male), mental status (depression), substance abuse, and relationship problems (all the suicides involved marital or relationship discord or alleged infidelity). The intervention reported was multifactorial and multidisciplinary. The disciplines involved included the chaplain (to provide individual counseling and division-wide education), the psychologist (to coordinate training, and assist in identifying high-risk soldiers), the social worker (to provide a liaison for the soldier, their family, and the soldier's commander). Specific components of the intervention as reported included: lectures by chaplains, lectures at training programs (for division commanders and enlisted soldiers), pocket-sized cards with warning signs and contact information for emergency services, "crisis-intervention command consultations" (special meetings with soldier, their commanders, and division mental health officer), a "high-risk book" (once identified as high risk, the soldier's commander provide bi-monthly written assessments on the soldier's progress), outpatient follow up care with mental health services, and mental

health services for the soldier and their family, along with a substance abuse prevention program. The size of the study population was not reported. The program was not formally evaluated, but in a postscript the authors noted, “the suicide rate has decreased to three in the past 2 years.” Unfortunately, the baseline comparison rate was not clearly reported, so we cannot reach any conclusions about effectiveness.

McDaniel et al.¹⁴ reported on a suicide prevention program at a US Navy Training Command that was implemented after a cluster of suicides in 1986. The target of the intervention was the petty officers and chief petty officers who were the instructors at the command. They were educated to recognize risk factors likely to be common in the students of the training command (recent interpersonal losses, substance abuse, social isolation, and personality disorders and psychiatric illnesses), and about the goals of fostering group cohesiveness and ensuring treatment compliance for those referred for treatment. The size of the study population was not reported. The main outcome assessed was suicide attempts at the training command in comparison with that reported at a similarly sized operational command nearby. They reported a statistically significant negative correlation between the number of instructors trained and the number of suicide attempts. They concluded that the program reduced the number of suicide attempts at the training command. However, there were a number of complicating factors, including seasonal factors stemming from start dates for cohorts of students at the training command and limited hours of operation when potentially suicidal students were referred to the operational command for evaluation (thus inflating the number of suicide attempts reported at the latter facility).

Knox et al.¹⁵ described a multifactorial suicide prevention program implemented in the US Air Force, comprising over 5,000,000 active duty personnel. The intervention was designed to reduce stigma and risk factors, and strengthen protective factors in a population-based approach. The program had 11 components. There was training for squadron commanders, addition of suicide prevention into required training, use of guidelines for mental health referral, addition of staff to support community-based preventive services at mental health centers, and required training for non-professionals in suicide risks and referral procedures. The program also assessed for suicide risk those under investigation for legal problems, established teams to respond to traumatic events including suicides, integrated the delivery system for human services prevention activities, established patient privilege in psychotherapy, conducted a behavior health survey, and established a suicide event surveillance system for tracking risk factors. To evaluate the program, the USAF population from 1990-6 was the control cohort, and the 1997-2002 population was the treatment cohort. No differences in demographic characteristics or in rates for mental health disability were found between the two groups. There was a statistically significant trend for decline in suicide rate over time, with a 33% reduction of risk for completed suicide compared to the baseline rate. The average rate in the pre-intervention period was 13.5 per 100,000, and 9.2 in the post-intervention period.

Jones et al.¹⁶ described a US Navy and Marine Corps initiative to reducing suicide using “best practice strategies.” They identified existing resources relevant to suicide prevention, which included awareness (education about suicide prevention for all personnel and in leadership schools), life skills training (for substance abuse, stress and anger management, conflict resolution), post-suicide attempt interventions (family support, critical event stress debriefing),

and data collection (suicide incident reports with explicit monitoring and tracking of data). A training video on suicide prevention was developed for all personnel; it highlighted positive role models and early identification of those at risk by co-workers, and was included as part of the required annual General Military Training (GMT) starting in the summer of 2000. The size of the study population was not reported. The authors reported that, “the introduction of annual suicide prevention GMT requirement coincided with a drop in Navy suicide rate for FY-01 to 9.2/100K. This is the lowest rate in 10 years.” The Marine Corps rate for the same year was 15.6/100,000, but no baseline rate or comparison was provided.

Kennedy et al.¹⁷ described an overseas gambling treatment program for the US Navy. Pathological gambling was recognized to have significant psychiatric comorbidity, including substance abuse, mood disorders, and suicidality. The program focused on overseas gambling because of the relative lack of restriction on slot machines in military clubs overseas, and the lack of overseas treatment options for pathological gambling. The services were provided at a naval base in Okinawa, Japan within the context of a substance abuse rehabilitation program, and included psychological evaluation, individual and group counseling, patient and family education, Gambler’s Anonymous, and access to a gambling crisis counseling around the clock. The program was evaluated for a year (roughly, the calendar year 2004) during which 35 individuals were referred. Twenty percent of those reported suicidal ideation, and 3 had made gambling-related suicide attempts before referral. During the treatment period, there were no attempted suicides and no suicidal ideation recurred.

Two suicide military-based suicide prevention programs outside the US have been reported. Rozanov et al.¹⁸ described a program implemented in a military unit of size 10,000 in the Ukrainian Army. The program set up training seminars about suicide, risk factors, and prevention for commanders, officers, and basic soldiers. Training booklets were also distributed. The suicide rates in the years 1988-1999 (pre-implementation) were compared to the rates in 2000 and 2001. The total suicide rate over all military personnel in the pre-implementation period was 32.6 per 100,000. The rate for 2000 was 0 and 16.7 for 2001.

Gordana and Milivoje¹⁹ reported on a suicide prevention program in the Army of Serbia and Montenegro, influenced by the USAF program of Knox,¹⁵ above. The program components included selection (to remove recruits with serious mental problems), education about suicide risk factors, and motivation for military duty. Training was provided to soldiers about maladjustment and substance abuse. Unit and central command physicians, psychologists, and officers were also involved. The program was fully implemented in December 2003. The size of the study population was not reported. The annual suicide rate for the Yugoslav Army for the years 1999 to 2003 was 13 per 100,000, declining in the post-implementation period to 5 per 100,000 in 2004.

In summary, seven studies of suicide prevention for military personnel were identified. All used a conceptual model of risk factor identification, based on review of suicides in the population under study, augmented with factors previously identified by others, followed by educational and organizational changes to reduce those factors or increase education and awareness about them. All were multifaceted programs, and all reported declines in suicides or suicide attempts.

However, the reporting of sufficient data to make proper comparison was incomplete, and the quality of the analysis that was reported was generally poor. The largest studies were deployed for the US Navy and Marine Corps and for the US Air Force. The clearly methodologically strongest study was that of Knox et al.¹⁵ for the US Air Force, which also appears to have influenced other studies. However, much more data are needed in order to better understand what are the most effective components to include in a multicomponent intervention, and how each component can be both internally optimized and made most synergistic with the other components.

Other multifaceted programs (national suicide prevention programs)

Two studies reporting results of multicomponent national suicide prevention programs were identified, one for Australia, and one for England. Both were prospective, cohort designs.

Robinson et al.²⁰ published a commentary on Australia's National Suicide Prevention Strategy. They divided the interventions in the NSPS into universal (targeting populations), selective (groups with risk factors), and indicated (for groups that have already displayed some suicidal thoughts or behaviors). Most of the interventions were universal interventions aimed at young people or minorities. They noted that neither those with mental illness nor those with previous suicide attempts had been the targets of any of the national initiatives. During the interval of the program's existence, 1999 to 2004, the suicide rate dropped from 22 to 17 for men, and 5 to 4 for women, both measured per 100,000. As they note, this decline "cannot necessarily be attributed to the NSPS."

In 2002, England started a national suicide prevention program, the status of which has been documented in a series of yearly updates, the latest of which covers through year 2006.²¹ Their multifaceted program includes mental health (focus on post-hospital discharge and non-compliance with treatment), study of self-harm as a risk for suicide, mental health promotion projects for young men and for those in the prison system. Their program also includes efforts to reduce access to lethal means (removing points for hanging on psychiatric wards, and a phased withdrawal of co-proxamol, a painkiller lethal in overdose), and establishment of systems to conduct suicide audits through Primary Care Trusts. The program set a target of a 20% reduction in suicides during the implementation period. Using age-standardized rates, the rate for 2003-5 was compared the baseline rate for 1995-7. The post-intervention rate was 8.5 deaths per 100,000, which represented at 7.4% decrease from the baseline rate.

In summary, two national suicide prevention programs reported declines in suicide rates coincident with the introduction of those programs. Both published reports provided scant details on methodology.

Interventions for veterans

Three reports involving US veterans were identified. This is a heterogeneous set. One was an RCT using psychotherapy for female veterans with borderline personality disorder. One study

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