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Systematic Evidence Review
Number 32

Screening for Suicide Risk: A Systematic Evidence Review for the U.S. Preventive Services Task Force

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Preface

The Agency for Healthcare Research and Quality (AHRQ) sponsors the development of Systematic Evidence Reviews (SERs) through its Evidence-based Practice Program. With guidance from the U.S. Preventive Services Task Force* (USPSTF) and input from Federal partners and primary care specialty societies, the Evidence-based Practice Center at the Oregon Health Sciences University systematically review the evidence of the effectiveness of a wide range of clinical preventive services, including screening, counseling, and chemoprevention, in the primary care setting. The SERs—comprehensive reviews of the scientific evidence on the effectiveness of particular clinical preventive services—serve as the foundation for the recommendations of the USPSTF, which provide age- and risk-factor-specific recommendations for the delivery of these services in the primary care setting. Details of the process of identifying and evaluating relevant scientific evidence are described in the "Methods" section of each SER.

The SERs document the evidence regarding the benefits, limitations, and cost-effectiveness of a broad range of clinical preventive services and will help further awareness, delivery, and coverage of preventive care as an integral part of quality primary health care.

AHRQ also disseminates the SERs on the AHRQ Web site (http://www.ahrq.gov/clinic/uspstfix.htm) and disseminates summaries of the evidence (summaries of the SERs) and recommendations of the USPSTF in print and on the Web. These are available through the AHRQ Web site and through the National Guideline Clearinghouse (http://www.ngc.gov).

We welcome written comments on this SER. Comments may be sent to: Director, Center for Practice and Technology Assessment, Agency for Healthcare Research and Quality, 540 Gaither Road, Suite 3000, Rockville, MD 20850.

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*The USPSTF is an independent panel of experts in primary care and prevention first convened by the U.S. Public Health Service in 1984. The USPSTF systematically reviews the evidence on the effectiveness of providing clinical preventive services--including screening, counseling, and chemoprevention--in the primary care setting. AHRQ convened the USPSTF in November 1998 to update existing Task Force recommendations and to address new topics.

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Structured Abstract

Objective: To review systematically the literature regarding whether screening for suicide risk in primary care results in decreased morbidity, mortality, or both.

Design and Data Sources: We searched MEDLINE from 1966 to June 30, 2002 using the Medical Subject Headings "suicide" and "suicide, attempted" and combined these terms with predefined strategies to identify screening and treatment studies relevant to our inclusion criteria. We supplemented this information by searching the Cochrane Collaboration Library; using the same search terms in PsycINFO; and hand searching the bibliographies of systematic reviews, relevant original articles, and the 1996 US Preventive Services Task Force review on suicide risk.

Study Selection: We developed an analytic framework consisting of 8 key questions. For screening studies, we included only those studies whose test characteristics were assessed in a primary care setting. For treatment studies, we included randomized controlled trials (RCTs) and cohort studies from primary care or specialty care settings for which suicide completions, suicide attempts, or suicidal ideation were reported.

Data Extraction: Two authors reviewed abstracts and articles independently and excluded those that they agreed clearly did not meet inclusion criteria. The reviewers then examined the full articles of the remaining studies and determined final eligibility by consensus. For the included studies, a primary reviewer abstracted relevant information using standardized abstraction forms, and a secondary reviewer checked the clarity of the information in the evidence tables. Outcomes were categorized as either main (involving suicide attempts or

completions) or intermediate (involving suicidal ideation, decreased morbidity, or increased quality of life). We graded the quality of all included articles according to USPSTF criteria.

Data Synthesis: No studies exist addressing the overarching question of whether screening for suicide risk in primary care patients reduces morbidity and mortality; the remainder of the review focused on the linkage questions. We identified 1 screening study involving patients ages 18 to 70 years that provided limited evidence for the accuracy of a suicide screen in the primary care setting. The evidence is fair and mixed that interventions to treat those at risk of suicide reduce the number of suicide attempts or completions. The evidence suggests mild to moderate improvement for interventions addressing intermediate outcomes such as suicidal ideation, decreased depressive severity, decreased hopelessness, or improved level of functioning for those at risk for suicide. We identified no information directly addressing the harms and costs of either screening or treatment.

Conclusions: Because of the complexity of studying the risk of suicide and the paucity of well-designed research studies, there is limited evidence to guide the primary care clinician's assessment and management of suicide risk.

I. Introduction

Morbidity and Mortality

Suicide is a major public health problem in the United States. In 1999, suicide was the eleventh leading cause of death in the United States, accounting for approximately 30,000 deaths with an age-adjusted rate of 10.7 per 100,000 persons.[1] Suicide accounts for 1.3% of total deaths, more than double those due to HIV/AIDS.[2] It is the seventh leading cause of years of potential life lost, with a total similar to years lost from perinatal deaths and greater than years lost from diabetes, liver disease, and HIV.[1] Annually, approximately 500,000 individuals require emergency room treatment in US medical centers as the result of attempted suicide.[3] The public health significance of this problem is underscored by *The Surgeon General's Call to Action to Prevent Suicide*,[3] which proposed completion of a National Strategy to Prevent Suicide.[4]

The risk of completed suicide is highest for individuals 65 years and older; white men over 85 years have an especially high rate (59/100,000).[4] It is also a major factor in adolescent mortality; suicide was the third leading cause of death among persons 15 to 24 years of age (10.3/100,000), following unintentional injuries and homicide.[1]

Risk factors for all age groups are similar, although particular clinical risk factors are notable for younger populations. The strongest risk factors for attempted suicide in adults are mood disorders and comorbid substance use disorders. The strongest risk factors for attempted suicide in youth include mood disorders and comorbid substance use disorders, but they also involve aggressive or disruptive behaviors and history of physical and sexual abuse.[2] In general,

hopelessness and a history of previous suicide attempts are strong prospective risk factors for a suicide attempt.[5]

Suicide completion is closely related to psychiatric illness as well. More than 90% of those with completed suicide have a diagnosable psychiatric illness at the time of death, usually depression, alcohol abuse, or both.[6] The US Preventive Services Task Force considered the evidence for screening for depression in a separate review.[7] Of note, the standard of care in evaluating an individual with depressive illness includes assessing suicide risk.[8]

Although the risk factors have been identified and the public health significance of suicide and attempted suicide are clear, the clinical management of suicide risk is complicated. Suicide is a rare event. It has a low prevalence in the general population (0.01%)[9] and, despite a 10-fold increase in adults with depression, most depressed patients (99.9%) do not commit suicide.[10]

As a result, many clinical trials on the management of suicide risk have focused on patients at high risk for suicide, such as those with a history of deliberate self-harm (DSH). DSH, which is understood as intentionally initiated acts of self-harm with nonfatal outcome (including self-poisoning and self-injury), encompasses terms such as attempted suicide and parasuicide.[11] DSH is not synonymous with attempted suicide—attempted suicide, understood as a self-initiated act with the intent of ending one's own life, is but a single example of DSH. Still, DSH is a recurrent behavior with important long-term risks. Between 15% and 23% of patients who are seen for DSH will be seen for treatment of a subsequent episode within 1 year,[12,13] with a high risk of repeat DSH in the weeks following an episode.[14] Of those with an episode of DSH, 3% to 5% die by suicide within 5 to 10 years.[15] Identification of DSH is quite relevant to primary care practice: two-thirds of patients who deliberately harm themselves visit

their general practitioner within 12 weeks of the episode.[16] Patients with borderline personality disorder are at increased risk of DSH, with groups form psychiatric and primary care settings having similar self-harm profiles.[17,18]

Suicidal Ideation

From a clinical perspective, suicide may be a final common pathway with a variety of antecedent causes and an unclear mechanism of disease. Suicidal ideation is generally understood as having thoughts of wanting to end one's own life. Traditionally, clinicians view severity of suicide risk along a continuum, ranging from suicidal ideation alone (relatively less severe) to suicidal ideation with plan (highest severity), the latter of which is a significant risk factor for suicide attempts.[19]

Suicidal ideation itself, whether over a lifetime, the prior year, or the past month, is remarkably common. In 2001, in a nationally representative sample of US high school students, 23.6% of female and 14.2% of male students reported that they had seriously considered attempting suicide in the previous 12 months; 17.7% of female and 11.8% of male students reported that they had made a specific plan to attempt suicide in the past year.[20] In the US general population, 16.3% of young adults (ages 17 to 39 years) describe having suicidal ideation at some point in their life according to results from a national probability survey of individuals.[21] Within this group, the prevalence of lifetime suicidal ideation increases to 25% for those with 1 general medical condition, and to 35% for those with 2 or more medical conditions.

In primary care settings, 2.6% of patients receiving general medical care within the past 6 months report having experienced suicidal ideation within the prior year.[22] Approximately one-third of those with suicidal ideation meet criteria for major depression, indicating that a substantial proportion present with conditions other than depressive illness. Indeed, major

depression (odds ratio [OR] = 10.3), panic disorder (OR = 5.2), an alcohol use disorder (OR = 2.0), and a phobic disorder (OR = 1.6) all were significantly associated with suicidal ideation within the past year.[22] Similar 1-month prevalence rates of 2% to 3% of primary care patients expressing suicidal ideation have also been reported.[23,24]

Suicide Attempts and Suicide Completions

Suicide attempts, understood as self-initiated acts with the intention of ending one's own life, are less frequent than suicidal ideation, although no annual national data on attempted suicides are available. Of US high school students, 10.9% of the females and 5.7% of the males reported having attempted suicide at least once in the previous 12 months. Of those students, 2.6% reported an attempt that resulted in injury, poisoning, or overdose requiring treatment by a physician or nurse.[20] In a national probability survey of US young adults (ages 17 to 39 years), 5.5% of respondents reported a lifetime suicide attempt.[21] The relationship between suicide attempts and completions is complicated. First attempts are especially fatal; two-thirds of suicides occur on the first attempt,[25] although this varies by age, discussed in detail below. A previous suicide attempt is a strong predictor of completed suicide even when controlling for the predictive effects of mood disorders.[5] Still, suicide attempts are substantially more common than completed suicides by a factor between 10 and 20.[6] Consequently, data generated from suicide attempters may not generalize to suicide completers.[2]

Rates of suicide attempts and completions differ by sex. In 1999 suicide was the eighth leading cause of death in men and the 19th leading cause of death in women. In general, men have a higher reported rate of suicide completion than do women; the latter have a higher rate of attempted suicide.[26] Men tend to use means that carry greater lethality (such as firearms), whereas women use less lethal means (self laceration and medications);[25] nevertheless, suicide

by firearms is the most common method used by both male and females who complete suicide.[2] In the adolescent age group, girls attempt suicide much more frequently than boys, but male adolescents are 2 to 3 times more likely than adolescent females to complete suicide. In this age group, overdose is the most common method of attempt, whereas firearms, jumping, and hanging are more common methods in completed suicides.[19]

Rates of suicide attempts and completions also differ by age. The ratio of suicide attempts to suicide completions is substantially higher among youth compared to adults.[27] In 1999, 5.9% of deaths among adolescents 10 to 14 years of age (rate = 1.2/100,000), 11.7% of deaths among adolescents 15 to 19 years of age (rate = 8.2/100,000), and 13.5% of deaths among young adults 20 to 24 years of age (rate = 12.7/100,000) were due to suicide.[27] The male suicide rate tends to peak in the young adult age groups, then fall and remain relatively constant until after age 65, when rates begin to climb dramatically. Indeed, the prevalence of suicidal ideation appears slightly higher in older primary care[28,29] and general population samples.[30] Thus, groups near the beginning and end of the life span seem to be most at risk.[31]

Finally, suicide behaviors vary widely by race and ethnicity. Nearly three-fourths (72%) of all completed suicides are by white males,[2] who have a 2-fold higher risk for suicide compared with black men (19.1/100,000 vs. 10.4/100,000).[1] However, other race and ethnicity groups are at particularly high risk, such as Native American males in general[31] and Native American youth (both male and female) in particular.[32]

Role of Primary Care Physicians

Primary care physicians have a key role in the identification and management of this problem. Nearly one-half (47%) of primary care physicians surveyed in Maryland reported that 1 or more of their adolescent patients had attempted suicide in the past year, and 5% reported

ever having had an adolescent complete suicide.[33] Approximately one-half to two-thirds of individuals who commit suicide visit physicians less than 1 month before taking their lives; 10% to 40% visit in the week before.[34-37] Of particular relevance to the role of geriatric physicians, older adults have higher rates of contact with primary care providers within one month of suicide than younger adults.[36]

Case reports illustrating potential missed opportunities for primary health care professionals to identify patients at risk of suicide shortly before suicide completion are particularly poignant.[9,38]

Previous Recommendations

In the 1996 edition of the *Guide to Clinical Preventive Services*, the US Preventive Services Task Force (USPSTF) reported that there was "insufficient evidence to recommend for or against routine screening by primary care clinicians to detect suicide risk in asymptomatic patients."[39] In addition, the Task Force recommended training primary care clinicians in recognizing and treating affective disorders in order to prevent suicide.

This review from the RTI International – University of North Carolina Evidence-based Practice Center examines evidence about primary care identification and treatment of suicide risk that has been produced since the last edition of the *Guide*. When possible, we highlight issues that are of particular importance to adolescents.

II. Methods

Analytic Framework and Key Questions

Using methods established by the US Preventive Services Task Force (USPSTF),[40] members of the RTI International – University of North Carolina Evidence-based Practice Center (RTI-UNC EPC) developed an analytic framework (Figure 1, see page 13) and 8 key questions (Table 1, see page 14) to guide our literature search. Our population of interest was primary care patients with unidentified suicide risk.

The first key question examined direct evidence connecting screening with decreased suicide attempts, fewer suicide completions, or both. Because we found no evidence for our overarching key question, we searched for indirect evidence for key questions 2 through 4. Key question 2 focused on the existence of validated screening tests for identifying suicide risk in a primary care setting. Key question 3 examined the efficacy of treatments to reduce suicide attempts or mortality (i.e., completed suicides) for those at risk of attempting suicide; key question 4 looked at intermediate outcomes, such as reducing suicidal ideation, reducing depressive severity, reducing hopelessness, and improving level of functioning. Key question 5 concerned the harms of screening; key question 6 examined the costs of screening. Similarly, key question 7 concerned the harms of treatment, and key question 8 examined the costs of treatment.

Literature Search Strategy

We prospectively developed inclusion and exclusion criteria for selecting the evidence relevant to answering the key questions (Table 2, see page 15). We conducted 4 individual searches: (1) screening for suicide in primary care settings only, (2) randomized controlled trials (RCTs) of treatments for suicide risk in primary or specialty care settings, (3) cohort studies of treatment for suicide risk in primary care or specialty care settings, and (4) primary care reviews and meta-analyses for suicide in general. This search strategy reflected our conceptualization that screening must be performed in primary care but that, should suicide risk be identified, a primary care physician could refer for subsequent treatment. Furthermore, this strategy reflected the decision by the EPC staff and our Task Force liaisons, with concurrence by the entire USPSTF, that our systematic review of treatments initially consider only trials with prospective study designs. Should there not be a sufficient number of studies for review by this strategy, we would then consider a search of trials with retrospective study designs, such as case-control studies.

All searches began with the terms "suicide" or "suicide, attempted", and we subsequently used MEDLINE's "explode" feature, which takes advantage of the MeSH heading tree structure and picks up all terms that are more specific than the target term as well as the target term. We re-ran our searches after this initial pass and clarified that this search successfully identified all relevant studies involving "parasuicide," "suicidal ideation," "suicidal," and "deliberate self-harm." In addition, any studies conducted in community settings (such as a school) were excluded, as a separate review will address this milieu.

For screening studies, inclusion required comparison with a "gold standard." For treatment studies, we included only those trials reporting suicide completions, suicide attempts,

or suicidal ideation as main outcomes. We excluded clinical trials targeting patients with chronic psychotic illnesses because these subjects would already have been identified as being at risk of suicide. We also excluded RCTs that did not supply sufficient detail to allow us to directly compare outcomes between intervention and control groups. For cohort studies in particular, we excluded studies that did not have a similar clinical presentation for intervention and control groups (e.g., the general population was not an adequate control group) or did not have an independent control group (e.g., the same sample could not act as its own control at a different time).

To identify articles relevant to the screening and treatment of suicide risk, the EPC staff searched the MEDLINE database from 1966 to June 30, 2002 using search terms consistent with the inclusion criteria. We supplemented these sources by searching the Cochrane Collaboration Library; using the same search terms in PsycINFO; and hand searching the bibliographies of systematic reviews, relevant original articles, the second edition of the *Guide to Clinical Preventive* Services[39] The numbers of articles that met our criteria by search terms are documented in Table 3 (see page 16). The EPC staff with both Task Force liaison and full USPSTF agreement concluded that there were a sufficient number of prospective trials to preclude the need to review trials with retrospective study design.

We found 1 well-conducted, recent systematic review by Hawton et al. concerning treatment of deliberate self-harm, which was relevant to key question 3 (reducing suicide attempts or completions).[11] We found another recent, well-done systematic review relevant to intermediate outcomes (key question 4).[41] We checked studies from our searches against the studies in these reviews, and we examined in detail only those studies that had not been included in the systematic reviews. In our data synthesis step, we included the findings of the systematic

reviews along with the additional studies that we reviewed in detail. Only 3 RCTs exclusively involved patients 17 years of age or younger.[42-44]

Literature Reviewed

All of the titles and abstracts were reviewed independently by 2 of the authors. If either reviewer determined that the study met the inclusion criteria based on the abstract, the full paper was retrieved for further evaluation. The studies were subject to an additional review by 2 of the authors to finalize inclusion, with disagreements resolved by a systematic resolution of discrepancies; we considered the study's relevance to the systematic search inclusion criteria and research methods, as well as whether inclusion would be consistent with the decisions made when other discrepancies were resolved.

Data Abstraction and Development of Evidence Tables

We developed 2 standardized data abstraction forms, 1 for studies that addressed screening for suicide risk and the other for those addressing treatment. The forms were pretested by the 3 authors and modifications were made based on the findings of the pretest. For the studies that met our inclusion criteria, a primary reviewer abstracted relevant information onto the appropriate abstraction form. Another member of the EPC staff entered the information from the abstraction forms into the evidence tables. The primary reviewer for each study checked the accuracy of the evidence table entries and the 2 other authors checked the clarity of the information.

To characterize the quality of the included studies, we rated the internal and external validity for each article using criteria developed by the USPSTF Methods Work Group.[40] In addition to these criteria, we further assessed validity as follows: Internal validity considered the

proportion of eligible patients who consented to participate as a key factor. External validity focused on the study population's relevance to our population of interest; primary care patients with unidentified suicide risk. For all treatment studies, we assessed several quality factors such as whether inclusion criteria were used and whether attrition between groups was similar; for randomized controlled trials in particular, we further evaluated the adequacy of randomization and allocation concealment, and whether an intention to treat analysis was conducted. For each study, the primary reviewer rated internal and external validity per the above criteria initially. Subsequently, each of these ratings were reviewed by the EPC staff to reach consensus agreement. Finally, the first author reviewed all quality ratings to ensure consistency in the ratings.

Apart from grading individual study quality, we also assessed the aggregate internal and external validity and coherence (agreement of the results of the individual studies) for each of the key questions in the analytic framework.

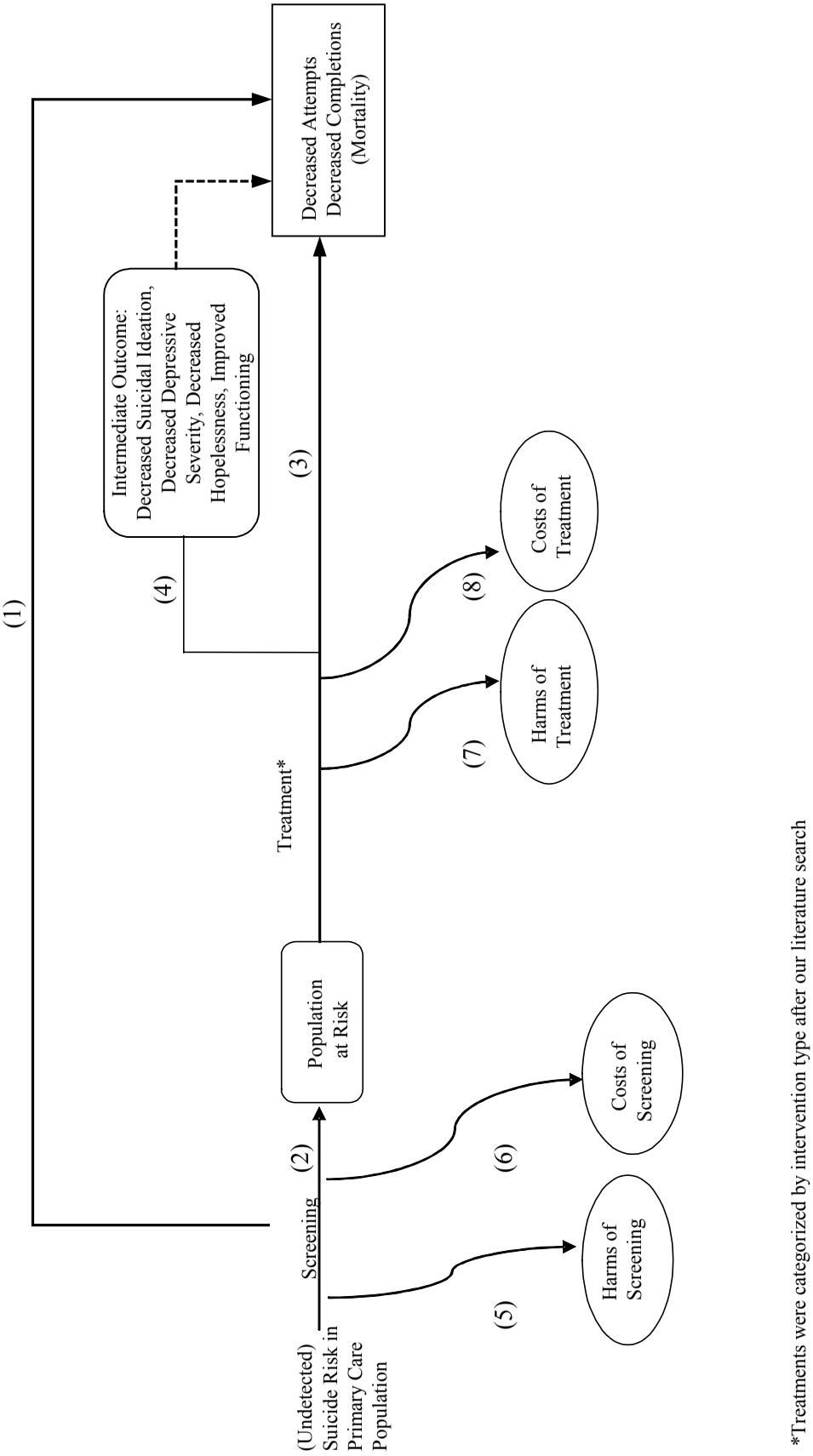
Peer Review Process

We conducted an extensive external review of the draft SER. Outside reviewers were representatives of key primary care professional associations that have formal liaison ties to the USPSTF, a representative of the Canadian Task Force on Preventive Health Care, representatives of other professional societies, clinical experts in the area of depression and suicide, staff at the Agency for Healthcare Research and Quality, and representatives of other federal agencies. Appendix A lists the names and affiliations of all peer reviewers.

Production of This Systematic Evidence Review

The authors worked closely with 2 members of the USPSTF to produce this systematic evidence review (SER) (see Acknowledgments in Appendix A) and presented reports to the full USPSTF in January and May 2002. After feedback from the Task Force and appropriate revisions, we distributed the draft of this review for broad-based external peer review as described above. Following peer review, we made revisions as appropriate, and then presented the final SER to the Task Force in September 2002 for its use in arriving at its final recommendations. We will use the information from this SER to develop a manuscript for publication.

Figure 1. Screening for Suicide Risk: Analytic Framework



*Treatments were categorized by intervention type after our literature search

Table 1. Key Questions for Screening for Suicide Risk

Number	Question
1	Does screening for suicide risk in primary care settings result in decreased attempts and/or decreased mortality?
2	Can a screening test reliably detect suicide risk in primary care populations?
3	Main outcome: For those identified as being at risk, does treatment result in decreased suicide attempts and/or decreased mortality from suicide?
4	Intermediate outcome: For those identified as being at risk, does treatment result in decreased suicidal ideation, decreased depressive severity, decreased hopelessness, or improved level of functioning?
5	What are the harms of screening?
6	What are the costs of screening?
7	What are the harms of treatment?
8	What are the costs of treatment?

Table 2. Inclusion and Exclusion Criteria

Element	Inclusion	Exclusion
Databases	MEDLINE, PsycINFO	Other databases
Languages	English only	Other languages
Populations	Humans only	Animal studies
Study design	Randomized controlled trial, cross-sectional, cohort, systematic reviews and meta-analysis	Case-control, letters, editorials, and nonsystematic reviews
Study population	Screening: primary care Treatment: primary or specialty care	Screening: community settings and psychiatric settings Treatment: community settings

Table 3. Literature Search Results: Screening

Step	Screening	Number of Articles in: MEDLINE	PsycINFO
1	Explode suicide/ or explode suicide, attempted	24,512	17,269
2	Explode mass screening/	51,454	15,074
3	1 and 2	83	456
4	Total unduplicated records from both databases	250	
	Met inclusion criteria	1*	
	Randomized Controlled Trials of Suicide Treatments	**MEDLINE**	**PsycINFO**
1	Explode (suicide/ or explode suicide, attempted) and (explode randomized controlled trial/explode single-blind or double-blind method/explode random allocation)	72	0
2	Explode suicide/ or explode suicide, attempted	26,541	17,269
3	Limit 2 to randomized controlled trial	123	0
4	1 or 3	215	
5	Randomized controlled trial		727
6	1 and 2 and 5		7
7	Limiting to human and English language, total unduplicated records from both databases	222	
	Met inclusion criteria	33	
	Cohort Studies of Treatment	**MEDLINE**	**PsycINFO**
1	Explode suicide/ or explode suicide, attempted	26,780	17,269
2	Limit 1 to (human and English language)	19,492	
3	Explode therapeutics/ or treatment.mp	2,561,983	
4	2 and 3	2,249	
5	Explode cohort studies	438,625	
6	4 and 5	522	109
7	Total unduplicated records from both databases	507	
	Met inclusion criteria	4	
	Primary Care Reviews and Meta-Analyses	**MEDLINE**	**PsycINFO**
1	Primary care reviews or meta-analyses	54	47
2	Total unduplicated records from both databases	54	
	Met inclusion criteria	2	

* 1 additional article abstracted; see text

III. Results

We present here the results of our systematic review for the US Preventive Services Task Force (USPSTF) of issues relating to screening for suicide risk; the chapter is organized in terms of the key questions introduced in our analytic framework (Figure 1). Tables 4-8, which provide a brief summary of key information from articles relevant to selected key questions, can be found at the end of the chapter. Evidence tables, which provide a more detailed abstraction of information for articles pertaining to selected key questions, are found in Appendix B.

Key Question No. 1: Relationship Between Screening and its Effect on Suicide Attempts and/or Mortality

We found no randomized controlled trials (RCTs) or cohort studies evaluating this overarching question.

Key Question No. 2: Reliability of Screening Tools

Our review of articles identified through searching MEDLINE and PsycINFO identified 250 possible articles involving the use of screening tests to assess suicide or attempted suicide. We complemented this search by reviewing 2 comprehensive reviews supported by the National Institute of Mental Health (NIMH): *Suicide Assessment Measures for Intervention Research with Adults and Older Adults*,[45] and *Assessment of Suicidal Behaviors and Risk Among Children and Adolescents*.[46] Our evaluation identified only 1 article that met our inclusion criteria pertinent to assessing an instrument's operating characteristics for identifying suicide risk in primary care.[23] No articles met our inclusion criteria for child and adolescent populations in a

primary care setting, although we identified 1 potentially relevant article from a pediatric emergency room setting.[47] Data from these 2 articles appear in Evidence Table 1 (Appendix B).

Screening for the General Primary Care Population

The Symptom Driven Diagnostic System for Primary Care (SDDS-PC),[48] a 62-item self-report instrument designed to help identify psychiatric illness in primary care settings, contains 3 items assessing suicide risk.[23] In this sample of patients between 18 and 70 years of age, 2.4% (67/2,749) of patients reported "feeling suicidal" within the past month. At 1 of the 3 sites (n = 1,001 participants), data on suicidal thoughts, plans, and past attempts were systematically collected using a nurse-administered, face-to-face structured interview conducted immediately before the medical visit. The individual operating characteristics of 3 items ("thoughts of death," "wishing you were dead," and "feeling suicidal," within the past month) were determined compared to a structured interview for identifying a plan to commit suicide (the gold standard). "Thoughts of death" had 100% sensitivity, 81% specificity, and 5.9% positive predictive value for detecting patients with a plan to commit suicide. Endorsing "wishing you were dead" had 92% sensitivity, 93% specificity, and 14% positive predictive value; "feeling suicidal" had 83% sensitivity, 98% specificity, and 30% positive predictive value for identifying patients with a plan to kill themselves. Of those "feeling suicidal," 85% had a psychiatric disorder as determined by structured clinical interviews,[49] modified to Diagnostic and Statistical Manual of Mental Disorder - Fourth Edition (DSM-IV) criteria.[50] After adjusting for potentially confounding effects of psychiatric comorbidity and demographics, only major depression (odds ratio [OR] = 33.1; 95% confidence interval [CI], 10.9 - 99.6) and drug abuse or dependence (OR = 16.7; 95% CI, 3.9 - 71.4) were independently associated with suicidal ideation. Of note, only 46% of those eligible for this study agreed to participate.

Two additional assessment measures have been used in primary care settings; they appear to be particularly reasonable considerations for testing in future research.[22,51] Neither instrument met our inclusion criteria because no research has assessed their test characteristics in a primary care setting. The Scale for Suicide Ideation (SSI), a widely used 21-item, interviewer-administered rating scale that measures the current intensity of patients' attitudes, behaviors, and plans to commit suicide on the day of the interview, is 1 of only 2 suicide risk tools with documented predictive validity for adults seeking outpatient psychiatric treatment.[51] The test takes approximately 10 minutes to administer. Patients who scored in the higher risk category (total score > 2) were approximately 7 times more likely to commit suicide than those who scored in the lower risk category.[51] It has been used as a measure of suicide risk in a variety of medical settings (including the primary care setting), but its sensitivity and specificity have not been assessed in the primary care setting. A related measure with documented predictive validity in adult psychiatric outpatients, the Scale for Suicidal Ideation-Worst (SSI-W), indicated that patients scoring in the higher risk category were 14 times more likely to commit suicide than patients in the lower risk category.[5]

Cooper-Patrick et al. used stepwise logistic regression to create retrospectively a 4-item, interviewer-administered screen, the Suicidal Ideation Screening Questionnaire, using data from the NIMH Epidemiologic Catchment Area study.[22] The authors derived this tool from a subgroup of patients who had received care in the general medical sector within the past 6 months. Assessing sleep disturbance, mood disturbance, guilt, and hopelessness correctly identified 84% of patients who endorsed suicidal ideation within the prior 12 months. However, the items do not assess any suicide-related behaviors, the screen is not useful for risk prediction because it does not allow determination of the chronology of events (i.e., whether the four items

precede suicidality, follow it, or occur concurrently), and the screen's test characteristics have not been prospectively studied in a primary care setting.

Screening for the General Primary Care Population: Children and Young Adolescents

Despite a plethora of instruments to assess suicide risk specifically among children and adolescents,[46] we did not find any appropriately evaluated screening tools to assess for risk of suicide among adolescents in general primary care clinic populations.

One recent report by Horowitz et al. described the development of a 4-item screening instrument to identify adolescents at risk of suicide in emergency room settings, a frequent de facto primary care setting.[47] The items were "Are you here because you tried to hurt yourself?" "In the past week, have you been having thoughts about killing yourself?" "Have you ever tried to hurt yourself in the past, other than this time?" and "Has something very stressful happened to you in the past few weeks?" These 4 items were evaluated against the Suicide Ideation Questionnaire (SIQ) and a shortened version for youth in less than the tenth grade (SIQ-JR) as the criterion standard.[52] The majority of youth (75%) in this study were between 11 and 16 years of age. This instrument was found to have a sensitivity of 98%, specificity of 37%, positive predictive value of 55%, and negative predictive value of 97%. Of note, subjects in this study were not an unselected primary care population but rather presented with a psychiatric chief complaint, a fact that makes these results less generalizable to routine screening in unselected primary care or emergency room populations. How well this screening instrument performs in general clinic settings has not been tested, and items may need to be modified for use in primary care.

Screening in a High-Risk Primary Care Population

No instruments have been assessed that screen for suicide risk in high-risk primary care populations. These would include persons with a history of self-harm, those with depressive illness, or those with substance abuse. It is this high-risk group that has received the greatest amount of intervention study (see Key Questions 4 and 5 below).

Challenges of Finding a Clinically Useful Screening Measure

Given the rarity of suicide attempts in the primary care population, finding an accurate screening strategy for suicide risk for the general population in a primary care setting is a daunting challenge. This is illustrated, for example, by the following hypothetical situation. Consider a screening instrument (for example, endorsing "feeling suicidal") that identifies patients at high risk and has reasonable test characteristics (e.g., sensitivity of 80% and specificity of 70%, figures similar to screens for depression.[53,54] Apply this tool to a population of 10,000 in which 10 patients will attempt suicide (10-fold more than the 10 in 100,000 persons who will complete suicide). In such a hypothetical population, use of this suicide screening tool to identify those who will make a suicide attempt will produce 8 true positives, 2 false negatives, and 2,997 false positives, a positive predictive value of 0.3%. The high proportion of false positives can generate a substantial burden. Notable disadvantages to such a test would include the patient and provider time needed to follow-up such a positive screen with a confirmatory procedure in primary care practices already pressed for time, the absence of a clear evidence-based decision to guide the follow-up for such a positive screen in primary care, and the financial costs of unnecessary referrals to a mental health provider.

Summary

Only 1 screening instrument to identify those at risk of suicide in primary care settings has been tested, with 1 item ("feeling suicidal")from the SDDS-PC instrument[48] corresponding closely with plans to attempt suicide.[23] This instrument was tested on patients from 18 to 70 years of age. Although this result is promising, further study is required before any recommendations can be made regarding the use of screening instruments to identify suicide risk in primary care settings. In children or young adolescents, no testing of instruments in primary care settings has yet taken place.

Key Question No. 3: Effect of Treatment on Suicide Attempts and Mortality

We report first on findings from RCTs and then on our findings from cohort studies. Within each study design section, we provide the evidence stratified by age whenever possible (see below). For studies included in prior systematic reviews, we address the relevant data only in the text and text tables, not in the evidence tables. For studies not addressed in prior systematic reviews, we present the relevant data in the text and the text tables, and we provide the abstracted information in greater detail in Evidence Table 2 (Appendix B). Evidence Table 2 is organized by study design with RCTs followed by cohort studies in chronological order.

Randomized Controlled Trials

Thirty-three randomized controlled trials (RCTs) met our inclusion criteria; all involved high-risk groups. Thirty-one of these trials required recent deliberate self-harm (DSH). Two trials (one of which produced 2 articles)[55,56] did not require DSH but enrolled patients with borderline personality disorder, a group at increased risk of DSH and of whom at least 75% in each study had a history of DSH.[55-57] One study recruited some of its patients from a primary

care setting, although the intervention was performed in a psychiatric outpatient setting.[57] One study had the intervention performed within a primary care setting.[58]

Trials focusing on the 2 populations of greatest clinical concern (i.e., adolescents/young adults and elderly adults) were limited. We review the three studies that exclusively involved adolescents 17 years of age and younger[42] as a group.[43,44] Of these, 2[42,43] had been included in the Hawton et al. review,[11] and 1 was published subsequently.[44] The remaining 30 included either adults only or adults and older adolescents but did not differentiate further by age in the analyses; we review them together.

We found no published intervention study for the geriatric population. However, the Prevention of Suicide in Primary Care Elderly - Collaborative Trial (PROSPECT) is currently being conducted.[59] This trial aims to determine whether placement of a depression health specialist in primary care practices will have a favorable impact on rates of depression, hopelessness, and suicidal ideation in elderly primary care patients with major or persistent minor depression. Both identification of suicidal ideation and management of suicide risk occur in the primary care setting.[60] Initial outcomes for the 4- and 8-month follow-up periods are expected by early 2003.

We organize our review of the 33 RCTs as follows. First, we summarize the results of the 21 studies of DSH systematically reviewed by Hawton et al. that involved older adolescents and adults[11] (Table 4, see page 41). Of these, 5 dealt with problem-solving therapies compared to standard aftercare, 5 with intensive care plus outreach compared to standard aftercare, 1 each with emergency care or dialectical behavioral therapy compared to standard aftercare, 1 each with 4 different nonpharmaceutical therapies, and 5 with pharmaceutical interventions (4 antipressants, 1 antipsychotic).

We then provide greater detail on the 9 additional RCTs of DSH involving older adolescents and adults that we identified in our literature search[55-58,61-66] (Table 5, see page 42). Lastly, we review the 3 studies exclusively involving adolescents 17 years of age and younger (Table 6, see page 43).

Older Adolescents and Adults: Prior Review of Randomized Clinical Trials for Deliberate Self-Harm

Twenty-one studies of adults receiving treatments for deliberate self-harm are described below (Table 4);[13,67-86] of these, 12 included older adolescents.[13,67-74,76,81,83] Although some trends suggested incremental benefit from certain interventions, compared to usual care, interventions for which more than 1 study was performed produced no statistically significant effects by meta-analysis. The most promising intervention was problem-solving therapy, a short-term cognitively-oriented psychotherapy, which was tested in patients 15 years of age and older. For these studies, the summary odds ratio (OR) showed a trend toward decreasing DSH for 5 studies of problem-solving therapy versus standard aftercare (OR 0.70; 95% CI, 0.45-1.11).[67-71]

Intensive care plus outreach versus standard aftercare (6 studies)[13,72-76] produced a summary OR of 0.83 (0.47-1.48).

One large trial of emergency care consisting of providing the patient with a card with physician contact information and an offer of crisis intervention as needed was compared to standard care.[77] Results showed a trend toward a decreased likelihood of repeating DSH in favor of the intervention (0.43, 95% CI 0.15-1.27).

Two interventions, dialectical behavior therapy and flupenthixol (an antipsychotic), reported statistically significant reduced repetition of DSH relative to standard care or placebo, respectively, but, involved a maximum of 20 patients in each group. Dialectical behavior

therapy (DBT), a comprehensive treatment program developed to treat chronic and severely dysfunctional individuals with borderline personality disorders by improving emotional and behavioral management skills, significantly reduced repetition of DSH for patients ages 18 to 45 years with borderline personality disorder and recent DSH relative to standard care (OR = 0.24; 95% CI, 0.06-0.93).[78] Administration of the antipsychotic flupenthixol significantly reduced the proportion of repeated DSH for those ages 18 to 68 years with a history of at least 2 prior suicide attempts as compared with placebo (OR = 0.09; 95% CI, 0.02-0.50).[82]

Older Adolescents and Adults: Additional Randomized Controlled Trials of Deliberate Self-Harm

Nine additional studies involving repetition of DSH in adult populations were identified in our literature search (Table 5).[55-58,61-66] One study showed significant benefit from interpersonal psychotherapy (IPT), a time-limited psychotherapy that focuses on resolving current interpersonal problems to improve symptoms, relative to standard care. In this study, Guthrie et al. recruited patients ages 18 to 65 years from an emergency room setting who presented with deliberate self-poisoning but did not require medical or psychiatric hospitalization.[61] Patients were randomized to either 4 50-minute sessions of IPT delivered by nurse therapists in the patient's home or to usual care. Fifty-one percent (n = 119) of those eligible participated, with those refusing being at a greater suicide risk of suicide as indicated by their being more likely to have a history of self-harm, to have left a suicide note, and to express the wish to die. In an intention-to-treat analysis, those in the IPT group were less likely to have a repeat episode of DSH in the subsequent 6-month period (8.6% v. 27.9%, $P = 0.0009$).

Bateman et al. compared psychoanalytically oriented partial hospitalization to standard aftercare for patients ages 16 to 65 years with borderline personality disorder who were followed

in psychiatric outpatient clinics.[55,56] Treatment occurred for a maximum of 18 months. Although inclusion criteria did not require DSH, ninety-five percent of those randomized to partial hospitalization and at least three-quarters of those randomized to usual care had a history of prior suicide attempts, indicating that both groups were at high risk of DSH.

Analysis was not intention-to-treat. Twenty-two patients were initially randomized to each group. Three patients in the partial hospitalization group were lost to follow-up, but 3 patients were allowed to switch from the usual care group to partial hospitalization, producing 22 patients in the partial hospitalization group and 19 in the usual care group. After 18 months of treatment, the percent of those with suicide attempts within the prior 6 months was significantly lower in the treatment group than the control group (53% for intervention group, no rate given for control group but figure suggests approximately 40%, $P < 0.001$ by Mann-Whitney test). At 18-month follow-up after initial treatment regimen, a significantly smaller proportion of the partial hospitalization group made a suicide attempt (4/22, or 18%) than did the usual care group (12/19, or 63%; no OR given, $P < 0.004$ by Fisher's exact test). If only the original 19 randomized to partial hospitalization were included in the analysis, the difference remained significant ($P < 0.001$ by Mann-Whitney test).

The remaining 7 studies identified no benefit from interventions beyond either standard care[57,58,62,64,65] or placebo.[63,66]

Evans M. et al. enrolled patients after discharge from medical hospitals who had been admitted following DSH and referred for psychiatric consultation.[64] Patients were randomized to receive either an emergency information card providing the number for 24-hour crisis telephone consultation with an on-call psychiatrist for 6 months (n = 417) or usual care (n = 410). Outcome information was determined by subsequent visits to one of the three participating

hospitals, at which time they were included in a computerized case registry. This system detected overdose relatively well but was less reliable in detecting self-laceration. In an intention-to-treat analysis at 6-month follow-up, the groups did not differ significantly in the likelihood of repeating an attempt (OR = 1.20; 95% CI, 0.82-1.75), nor did they differ in the number of repeated episodes. In a subgroup analysis of patients dichotomized by prior history of DSH, those with a previous history of DSH in the intervention group had higher odds of repeating (OR = 1.85; 95% CI, 1.14-3.03). Those with no prior history experienced a nonsignificant protective effect (OR = 0.64; 95% CI, 0.34-1.22).

Motto and Bostrom tested a low-intensity outpatient intervention (brief contact by letter) to usual care in a group of patients who had been admitted to an inpatient psychiatric facility either depressed or suicidal and who had declined therapy after hospital discharge.[65] The intervention group received a brief contact letter once per month for 4 months, followed by once every 2 months for 8 months, and then once every 3 months for 4 years. The control group received no letter. The outcome of interest was suicide, as measured by health statistics, clinical sources, family members, death certificates, and coroners' records; analysis was intention-to-treat. At 5-year follow-up, intervention and control groups did not significantly differ in the proportion of patients who completed suicide (3.9% v. 4.6%). Contact during the first 2 years of the study was found by Kaplan-Meier survival analysis to decrease significantly the risk of suicide attempts over that time period, but no benefit accrued by the 5-year follow-up.

Rudd et al. compared an outpatient day hospitalization program to usual outpatient care for a group of military patients recruited from inpatient and outpatient military settings.[62] Eligible patients were either referred following a suicide attempt, had a mood disorder with current suicidal ideation, or had episodic alcohol abuse with current suicidal ideation.

Intervention occurred for 2 weeks and follow-up occurred at 1 year. The attrition rates were high (75% in experimental group and 79% in control group), and 20% of the intervention group was hospitalized. Analysis was not intention-to-treat. The authors compared multiple measures of suicidal ideation and behavior and found no differences between the 2 groups; both groups improved over time.

Montgomery et al. compared antidepressants to placebo for psychiatric outpatients with a history of at least 2 prior suicide attempts but no evidence of major depression.[63] Patients were seen by psychiatrists twice a week for 6 months and randomized to either fluoxetine treatment at 60 mg twice a week (120 mg/week total, n = 54) or placebo (n = 53). Analysis was not intention-to-treat. The percentage of patients with repeat attempts at 6 months did not differ significantly (33.3% v. 34%). This dosing is substantially below the standard dosing of 20 mg per day for patients with depressive illness.

Battaglia et al. tested the benefit of low-dose intramuscular fluphenazine (an antipsychotic) compared to placebo (ultra-low dose intramuscular fluphenazine) in a group of patients evaluated in a psychiatric emergency room who had made a suicide attempt within the prior 30 days and who had a history of at least 2 prior suicide attempts.[66] Patients receiving or expected to receive any other psychotropic medications were excluded from the study. The outcome measured was the change in the rate of serious DSH per month over the prior 6 months. The 2 groups did not differ significantly (-0.16 v. –0.06, $P = 0.1459$ by Mann-Whitney test). Analysis was not intention-to-treat.

Koons et al. compared dialectical behavioral therapy (DBT) to usual care in a six-month RCT involving women veterans with borderline personality disorder.[57] Patients were recruited from one Women Veterans primary care clinic, multiple Veterans Counseling Centers, and other

Veteran Medical Centers within the same state. A total of twenty-eight women were randomized; 10 within each arm completed the study and were analyzed. The rate of lifetime history of DSH among all enrolled was reported to be 75%, with no significant difference between the two groups studied. Six months after beginning treatment, there was no significant difference between the two groups in the proportion with DSH in the previous 3-months; 1/10 women in the DBT arm had an episode of DSH in the previous 3-months (relative to a baseline rate of 50%) compared to 2/10 in the control arm (relative to a baseline rate of 30%). Of note, the usual care group, with unfettered access to weekly individual therapy and supportive and psychoeducational groups, received an intensity and quality of care that is likely greater than most usual care groups.

In the only study to test an intervention for suicide risk in the primary care setting, Bennewith et al. compared a 3-part, 1 time intervention to usual care.[58] Providing the intervention involved general practitioners with (1) a letter informing them of a patient's DSH episode, (2) a letter the physicians at their discretion could forward to the patient inviting him or her to make an appointment, and (3) guidelines on the assessment and management of DSH in general practice, to usual care. Eligible patients were those with a new episode of DSH (identified from a case register in a weekly report from a local hospital's accident and emergency department) who were already patients within the participating practices. In an intention-to-treat analysis at 12-month follow-up, the groups did not differ significantly in the proportion of patients who attempted suicide (21.9% *v* 19.5%). Of note, adherence to this low-intensity intervention was poor; only 58% of the intervention group physicians sent a letter to the patient within a 12-month period.

Children or Adolescents 17 Years of Age or Younger Exclusively: Randomized Controlled Trials of Deliberate Self Harm

We identified 3 RCTs conducted exclusively in patients 17 years of age or younger (Table 6),[42-44] 2 of which[42,43] were previously reviewed by Hawton.[11] Harrington et al. compared a home-based family intervention plus usual care versus usual care alone for treatment of adolescents age 16 years or younger referred to psychiatric hospitals in the United Kingdom for deliberate self-poisoning.[43] The home-based family intervention involved 1 assessment session plus 4 home visits; follow-up lasted for 6 months. The intervention did not influence the repetition of DSH (OR, 1.02; 95% CI, 0.41-2.51). Analysis was not intention-to-treat.

Cotgrove et al. studied the benefit of using an emergency card in a population of 105 children between the ages of 12.2 and 16.7 years for a period of 12 months.[42] Patients were recruited from inpatient hospitals following a DSH episode. In an intention-to-treat analysis, those randomized to the emergency card group (the card acted as a "passport" to readmission to a pediatric hospital ward) showed a tendency toward decreased DSH (OR, 0.50; 95% CI, 0.12-2.04), an estimate that is similar to that from the Morgan et al. adult study of emergency cards (Table 4).[77] Both effects were in the opposite direction from the largest adult study of the use of emergency cards involving 817 adults by Evans M. et al., which reported a point estimate of 1.20 (95% CI 0.82-1.75) (Table 5).[64]

Wood et al. assessed group therapy versus standard care in a population of 12-to-16-year-old outpatients referred for mental health services as a result of DSH.[44] The experimental intervention consisted of an initial assessment phase of 6 group sessions followed by weekly group sessions until the patient felt ready to leave. Individual sessions were available if needed. In an intention-to-treat analysis 7 months after randomization, those in group therapy (n = 32) were significantly less likely than those in usual care (n = 31) to be "repeaters" (defined as

having 2 or more episodes of DSH post-randomization) (6% v. 32%; OR, 0.16; 95% CI, 0.03-0.71). Adolescents randomized to group therapy tended to have fewer episodes of DSH than those allocated to routine care (mean 0.6 v. 1.8, statistical analysis not reported), but this finding did not reach statistical significance. Despite reliance on self-report as the main measure of DSH, the strength of these findings within the context of a small sample size is promising.

Cohort Studies

Of the 4 cohort studies that met our inclusion criteria, 2 were in adults and older adolescents,[87,88] and 2 were in child or adolescent populations exclusively[89,90] (Table 7, see page 44). None of these studies produced statistically significant differences involving repeated suicidal behavior.

Older Adolescents and Adults: Cohort Studies

Coryell et al. evaluated suicide risk in a long-term cohort of patients with major affective disorders diagnosed at 1 of 5 academic sites in the United States;[87] the mean age was approximately 40 years, and subjects were 17 years or older. From this cohort, a nested case-control study was performed in which the first case group consisted of 15 patients who committed suicide and the second case group of 41 patients who made a serious suicide attempt. The controls were nonsuicidal patients who were also from the cohort. All cases were receiving some type of therapy at the time of the suicide or suicide attempt. The controls were matched to the cases on sex, polarity (i.e., whether depressed or manic) at the time of suicide or suicide attempt, lifetime diagnoses of substance abuse or alcoholism, history of a prior serious suicide attempt, and receipt of a similar composite antidepressant score (measured by similarity in strengths and types of antidepressants) to the case. Cases were compared to controls on use of

lithium in the week before the suicide or suicide attempt, using the case's exposure time to designate the exposure time in the controls. The investigators found no relationship between use of lithium before the suicide or suicide attempt. The cases appeared to have more severe disease based on the duration of cohort enrollment, percentage with a history of prior suicide attempts, and use and type of antidepressants at the time of assessment.

Raj et al. compared the use of 10 sessions of cognitive-behavioral counseling over a 2-3 month period to routine medical treatment for patients admitted to the intensive care unit (ICU) of a general hospital following their first or second suicide attempt.[88] The patients were between 16 and 50 years of age and needed to have coexisting depression or anxiety. Upon admission to the ICU, the 40 enrolled patients were sequentially assigned to either the counseling intervention or to routine medical care with the option to attend therapy sessions. None of the intervention group repeated a suicide attempt at 2 to 3 months of follow-up; 1 patient in the control group made a repeat suicide attempt. The significance of this small absolute difference is unclear.

Children and Adolescents 18 years of Age or Younger Exclusively: Cohort Studies

Pfeffer et al. followed a cohort of 69 children and adolescent psychiatric inpatients receiving routine aftercare (53 of whom reported suicidal ideation or an attempt within the 6 months prior to hospitalization) and a group of 64 community subjects (who were not psychiatric patients and were matched on demographic characteristics) for 6 to 8 years.[89] At initial assessment the cohort was between 4.7 and 14.7 years of age (mean 10.5 +/- 1.8 years). Information about type, onset, and duration of psychiatric treatment was obtained from multiple sources, including subjects, parents, and records of medical facilities and schools. In the follow-up period, 20 suicide attempts and no deaths occurred; no direct comparison of two groups by suicide attempts was reported. The investigators found no association between annual rates of

combined psychiatric services and the occurrence of a suicide attempt post-hospitalization or between type of services received and time to first suicide attempt post-hospitalization. They did find a positive association between use of antidepressant medication and time to occurrence of a suicide attempt in the follow-up period, which the authors speculate is related to the fact that more severely ill patients are preferentially prescribed medication.

Rotheram-Borus et al. evaluated an emergency room intervention targeting both urban Latino females, ages 12 to 18 years, who presented with a suicide attempt, and their mothers.[90] The 3-component intervention involved emergency room staff training, adolescent-mother pairs viewing a video, and a family therapy session before leaving the emergency room. During the 18-month follow-up period, 6 repeat suicide attempts occurred in the intervention group and 11 in the standard treatment group, a difference that did not reach statistical significance. The intervention was associated with less depression among adolescents and increased use of follow-up outpatient therapy.

Summary

Among these studies, we saw no statistically significant effects for interventions for which more than 1 study of the intervention had been performed. Some trends, however, suggest incremental benefit from some interventions (in particular, problem-solving therapy for patients 15 years of age and older). Of the interventions for which only 1 study was done, the most promising are DBT for borderline personality disorder in adults, interpersonal psychotherapy (IPT) for DSH in adults (ages 18 to 45 years), and group therapy for DSH in younger adolescents (ages 12 to 16 years). These results, however, need further confirmation.

The evidence basis has 3 primary limitations. First, the studies tend to be underpowered, so that there is risk of falsely concluding that a particular intervention does not produce a

statistically significant benefit when in fact such a benefit exists. This limitation is understandably a consistent problem given the rarity of the event.

Second, standard care, the most common comparison group used in the studies, is poorly described. It likely varies across the multiple studies, making it unclear to what the experimental intervention is really being compared. The components of standard care are poorly understood; indeed, standard care itself in many cases may be an effective intervention.

Third, inconsistent age ranges, and lack of stratification based on age, limits our ability to make meaningful conclusions specific to particular age groups. This limitation may reflect the fact that one of the highest risk age ranges, persons 15 to 24 years, includes both older adolescents and young adults. Stratification within this age group in subsequent studies could better address this question.

Key Question No. 4: Effect of Treatment on Suicidal Ideation, Depressive Severity, Hopelessness, and Level of Functioning

We identified 1 systematic review[41] (Table 8, see page 45) and 8 additional articles that studied intermediate outcomes in patients at high risk for suicide [43,44,57,61,88,90-92] (Table 9, see page 46). Four of the latter[43,44,90,92] were performed in adolescents 18 years of age or younger. As with Key Question 3, we address the prior review studies only in text and text tables, whereas the additional articles are examined in text and text tables and are also abstracted in detail in Evidence Table 2 (Appendix B).

Older Adolescents and Adults: Prior Review of Randomized Controlled Trials Involving Intermediate Outcomes

Townsend et al. conducted a systematic review of 6 RCTs[67-71,93] involving brief problem-solving therapy in patients with DSH in which the outcomes included depressive severity,

hopelessness, and improvement in problems (Table 8).[41] The analyses did not stratify the study populations by age. The 4 studies that evaluated depressive outcomes[67-69,71] used 2 different scales for depression, requiring Townsend et al. to calculate a Standardized Mean Difference (SMD; the mean difference divided by the pooled sample standard deviation, producing results related to multiples of the standard deviation) to evaluate depressive symptoms. The summary SMD indicated a significantly lower depression score of about one-third of a standard deviation for patients offered problem-solving therapy compared to those receiving usual care (-0.36, 95% CI –0.61, -0.11). Three trials measured hopelessness, an item strongly correlated with suicidal ideation.[69,70,93] Because these 3 trials used the same scale, the Beck Hopelessness Scale,[94] Townsend et al. calculate a Weighted Mean Difference. The groups receiving problem-solving therapy averaged approximately 3 points less on hopelessness scores at follow-up than those receiving standard care (-2.97 points; 95% CI, -4.81, -1.13). Two trials measured whether problems had improved (a dichotomous measure rated by assessors blinded to treatment).[67,68] Improvement in problems was more likely in those receiving problem-solving therapy compared to usual care (OR, 2.31; 95% CI, 1.29 - 4.13) (Table 8).

Older Adolescents and Adults: Additional Randomized Controlled Trials Involving Intermediate Outcomes

As shown in Table 9, Guthrie et al. measured suicidal ideation in their RCT by comparing 4 sessions of interpersonal psychotherapy delivered in the patient's home by nurse therapists to usual care.[61] Patients were 18 to 65 years old. In an analysis that was not intention-to-treat, suicidal ideation (as measured by the Scale for Suicidal Ideation[51]) at 6-month follow-up showed a significantly lower degree of suicidal ideation (mean score 7.9 v. 12.8, 95% CI: -8.2 to

-1.6, $P = 0.0005$). The authors had *a priori* identified a difference of 5 points as being clinically significant.

Koons et al measured suicidal ideation and depressive severity in their 6-month RCT of women veterans with borderline personality disorder.[57] In their analysis of those subjects completing treatment, DBT was superior to usual care in decreasing suicidal ideation as measured by the Scale for Suicidal Ideation[51] (10 point mean decrease vs. 4 point mean decrease, $P < 0.05$ by two-way repeated measures analysis of variance [ANOVA]). The results for DBT's effect on depressive severity were inconsistent. As measured by the self-report Beck Depression Inventory,[95] DBT produced a significantly greater decrease in depressive symptoms than usual care (two-way ANOVA, $P < 0.05$). However, as measured by the interviewer-administered Hamilton Depressive Rating Scale,[96] there was no significantly greater decrease for DBT group vs. usual care by two-way ANOVA.

Montgomery et al. performed a 4-week cohort study comparing the antidepressants mianserin, amitriptyline, and maprotiline.[91] This study was part of the work in defining the depressive measure used (the Montgomery-Asberg Depression Rating Scale, or MADRS) as being more sensitive to change for antidepressant clinical trials than the HAM-D. The authors found that suicidal ideation, as measured by the MADRS, was decreased by a significantly greater degree at study's end by mianserin compared to maprotiline ($P < 0.01$), and that there was a trend favoring mianserin over amitriptyline ($P < 0.10$). There was no difference among the 3 study drugs for the analogous "suicidal thoughts" on the HAM-D, and the overall quality of the study was poor.

Raj et al.'s previously described cohort study comparing 10 sessions of cognitive-behavioral counseling to routine medical treatment for patients admitted to an ICU following

their first or second suicide attempt also measured the effect of the intervention on suicide ideation.[88] Assessing the difference in Scale for Suicidal Ideation (SSI) scores between baseline and 2 to 3 months post-discharge for the 2 groups, they found that those who received counseling had a substantially greater reduction in suicidal ideation than the usual care group (15.0 $\pm$ 7.79 vs. 2.75 $\pm$ 6.09, $P \leq 0.05$).

Children 18 Years and Younger Exclusively: Randomized Controlled Trials Involving Intermediate Outcomes

In the Harrington et al. RCT reviewed above, the authors also compared the benefits of a home-based family intervention plus usual care to usual care alone for the degree of suicidal thoughts in adolescents 16 years of age and younger with DSH.[43] The authors found no effect on suicidal ideation measures for those completing treatment at 2- and 6-month follow-up. Subgroup analyses of adolescents without major depression at enrollment suggested that the intervention effectively decreased suicidal ideation at 2 and 6 months compared to the usual care group. Mean scores on the Suicidal Ideation Questionnaire at 2 months were 8.6 versus 32.8 ($P < 0.01$) and at 6 months 4.9 v. 21.6 ($P < 0.01$), respectively.

Wood et al. assessed the benefits of group therapy versus usual care for suicidal ideation in an RCT involving adolescents 12 to 16 years of age who were referred for mental health services as a result of DSH.[44] In an intention-to-treat analysis seven months post-randomization, the groups did not differ significantly in severity of suicidal ideation as measured by self-report on the 30-item Suicidal Ideation Questionnaire[52] (mean difference from baseline was 47.3 v. 39.7; mean difference between interventions was 7.5 [95% CI, -18.8 to 33.9]).

Brent et al. compared cognitive behavior therapy (CBT), systemic behavior family therapy (SBFT), and individual nondirective supportive therapy (NST) for the treatment of

adolescents between 13 and 18 years of age with major depressive disorders.[92] Eligibility criteria did not require suicidal ideation or a history of self-harm. Primary outcome measures included suicidality and remission of major depressive disorder; analysis was intention-to-treat. The authors found that after 12 to 16 weeks of care, only 17% of adolescents randomized to the CBT group met the criteria for major depressive disorder, as did 32% receiving SBFT and 42% in the NST group (comparison among 3 groups revealed $x^2 = 5.22$; df = 2; $P = 0.07$; comparison between CBT and NST $x^2 = 5.23$, df = 1; $P = 0.02$). Suicidality decreased significantly for all 3 groups over the course of the study, with similar reductions seen across the 3 groups. These results suggest that more effective treatments for depression did not clearly lead to greater decreases in suicidality.

In the previously described cohort study by Rotheram-Borus et al. comparing an emergency room intervention of staff training, patient and family education, and 1 family therapy session to usual care in Latino females ages 12 to 18 years, the investigators also measured suicidal ideation and depressive symptoms.[90] At 18-month follow-up, the authors found no differences between groups in suicidal ideation. However, the authors did find benefit for the intervention group for depressive symptoms; the proportion of patients with Beck Depression Inventory scores[95] in the clinical range at 18 months was significantly lower for the intervention group (4.9% vs. 10.1%, $P < 0.01$).

Summary

Results from studies involving primarily older adolescents and adults are promising. In comparison to standard care, problem-solving therapy (meta-analyses showing benefit with improved mood, less hopelessness, and improvement in problems), interpersonal therapy (1 study demonstrating decreased suicidal ideation), DBT (with 1 trial demonstrating decreased

suicidal ideation), and cognitive behavioral counseling (1 cohort study showing greater decrease in suicidal ideation) can improve intermediate outcomes in patients at high risk for suicidal ideation. Similar decreases in suicidal ideation for adolescent groups have not been shown. However, for adolescents 18 years of age and younger who have attempted suicide, 1 cohort study suggests that a brief emergency crisis intervention involving mother and daughter may decrease the number of patients with clinical relevant depressive symptoms at 18-month follow-up. No studies have been performed in patients recruited from primary care settings.

Key Question No. 5: Harms of Screening

We found no relevant literature to address this topic.

Key Question No. 6: Costs of Screening

We found no relevant literature to address this topic.

Key Question No. 7: Harms of Treatment

We found no studies that directly assessed the issue of harms of therapy. Two studies did give relevant information for groups stratified by whether a prior DSH episode had occurred, but they yielded contradictory results.

In the Evans M. et al. study comparing an emergency card with 24-hour crisis consultation availability to standard aftercare, a subgroup analysis demonstrated that patients with a previous history of DSH in the intervention group had higher odds of repeating (OR, 1.85; 95% CI, 1.14-3.03), whereas those with no prior history experienced a nonsignificant protective effect (OR, 0.64; 95% CI, 0.34-1.22).[64] This result raises the question whether, in some especially high-risk groups, interventions may on occasion worsen outcome. In contrast,

Bennewith et al. found the opposite results on subgroup analyses. For patients with a history of DSH, the intervention decreased the likelihood of repeat DSH (OR, 0.57; 95% CI, 0.33-0.98); for those with no DSH history, the intervention appeared to increase the likelihood of repetition (OR, 1.32; 95% CI, 1.02 - 1.70).[58] Differences in the study populations and the variability of adherence to the intervention in the Bennewith et al. study may explain some of the contradictory results.

Key Question No. 8: Costs of Treatment

We found no studies that directly addressed this question

Table 4. Randomized Controlled Trials of Interventions to Decrease Deliberate Self-Harm in Adults and Older Adolescents*

Trial (sorted by treatment)	Age Range† (years)	Number (%) of Participants With Deliberate Self Harm During Follow-up‡		
		Experimental	Control	Odds Ratio (95% CI)
Problem-solving Therapy *v* Standard Aftercare				
Gibbons et al., 1978[67]	≥17	27/200 (13.5)	29/200 (14.5)	0.92 (0.52-1.62)
Hawton et al., 1987[68]	> 16	3/41 (7.3) [1]	6/39 (15.4) [0]	0.43 (0.10-1.87)
Salkovskis et al., 1990[69]	16-65	3/12 (25.0)	4/8 (50.0)	0.33 (0.05-2.24)
McLeavey et al., 1994[70]	15-45	2/19 (10.5)	5/20 (25.0)	0.35 (0.06-2.09)
Evans K et al., 1999[71]	16-50	10/18 (55.6)	10/14 (71.4)	OR not calculated
Overall				0.70 (0.45-1.11)
Intensive Care Plus Outreach *v* Standard Care				
Chowdhury et al., 1973[72]	>16	17/71 (23.9)	19/84 (22.6)	1.08 (0.51-2.27)
Welu, 1977[73]	≥16	3/62 (4.8)	9/57 (15.8)	0.27 (0.07-1.06)
Hawton et al., 1981[74]	≥15	5/48 (10.4) [0]	7/48 (14.6) [0]	0.68 (0.20-2.32)
Allard et al., 1992[75]	NR†	22/63 (34.9) [3]	19/63 (30.2) [1]	1.24 (0.59-2.62)
Van Heeringen et al., 1995[76]	≥ 15	21/196 (10.7) [6]	34/195 (17.4) [7]	0.57 (0.32-1.02)
Van der Sande et al., 1997[13]	≥ 16	24/140 (17.1)	20/134 (14.9)	1.18 (0.62-2.25)
Overall				0.83 (0.61-1.14)
Emergency Care *v* Standard Aftercare				
Morgan et al., 1993[77]	Mean age, 30	5/101 (5.0) [0]	12/111 (10.8) [0]	0.43 (0.15-1.27)
Dialectical Behavior Therapy *v* Standard Aftercare				
Linehan et al., 1991[78]	18-45	5/19 (26.3)	12/20 (60.0)	0.24 (0.06-0.93)
Inpatient Behavior Therapy *v* Inpatient Insight Oriented Therapy				
Liberman and Eckman, 1981[79]	18-47	2/12 (16.7)	3/12 (25.0)	0.60 (0.08-4.45)
Same Therapist (Continuity of Care) *v* Different Therapist (Change of Care)				
Torhorst et al., 1987[80]	NR	12/68 (17.6)	4/73 (5.5)	3.70 (1.13-12.09)
General Hospital Admission *v* Discharge				
Waterhouse and Platt, 1990[81]	≥ 16	3/38 (7.9)	4/39 (10.3)	0.75 (0.16-3.60)
Flupenthixol (Antipsychotic) *v* Placebo				
Montgomery et al., 1979[82]	18-68	3/14 (21.4)	12/16 (75.0)	0.09 (0.02-0.50)
Antidepressants *v* Placebo				
Hirsch et al., 1982[83]	16-65	16/76 (21.1) [0]	5/38 (13.2) [0]	1.76 (0.59-5.24)
Montgomery et al., 1983[84]	Mean age, 35.7	8/17 (47.1)	12/21 (57.1)	0.67 (0.18-2.41)
Verkes et al., 1998[85]	≥ 18	15/46 (32.6)	21/45 (46.7)	0.70 (no CI, p=0.12)
Overall				0.83 (0.47-1.48)
Long-term Therapy *v* Short-term Therapy				
Torhorst et al., 1988[86]	NR	9/40 (22.5)	9/40 (22.5)	1.0 (0.35-2.86)

* Adapted from Hawton et al., 2001[11]

† NR, not reported.

‡ Numbers in square brackets [ ] are reported suicides.

Table 5. Additional Randomized Controlled Trials of Interventions to Reduce Deliberate Self-Harm in Adults and Older Adolescents*

Trial (sorted by treatment)	Age Range (years)	Number (%) of Participants With Deliberate Self Harm During Follow-up		
		Experimental	Control	Odds Ratio (95% CI)
Interpersonal Psychotherapy *v* Standard Aftercare				
Guthrie et al., 2001[61]	18-65	5/58 (8.6)	17/61 (27.9)	no OR given; % difference =19.3%, (8.6%-30.0%, p=0.0009)
Psychoanalytically-oriented Partial Hospitalization *v* Standard Aftercare				
‡ Bateman et al., 1999,[55] 2001[56]	16-65	4/22 (18.2)	2/19 (63.2)	No OR given; Fisher's exact test, $P < 0.004$ (If include only 19 in Grp 1, then Grp 1 at 18 mos *v* Control at 18 mos: Mann Whitney $P < 0.001$)
Emergency Care *v* Standard Aftercare				
Evans M et al., 1999[64]	"adults"	70/417 (16.8)	59/410 (14.4)	1.20 (0.82-1.75)
Brief Contact By Letter *v* Standard Aftercare				
Motto and Bostrom, 2001[65]	Mean age, 34.4	15/389 (3.9)	21/454 (4.6)	NS
Outpatient Day Hospitalization *v* Usual Care				
Rudd et al., 1996[62]	Mean age, 22 (SD=2.3 yrs)	Multiple measures of suicidal ideation and behavior (including Modified Scale for Suicidal Ideation, and the Suicide Probability Scale) analyzed. No difference between experimental and control groups		
Antidepressants *v* Placebo				
Montgomery et al., 1994[63]	NR	18/54 (33.3)	18/53 (34.0)	NS
Fluphenazine (Antipsychotic) *v* Placebo				
Battaglia et al., 1999[66]	18-65	Change in rate of serious self-harm behaviors per mo. over 6 mo. = -0.16	Change in Rate of serious self-harm behaviors per mo. over 6 mo. = -0.06	Mann-Whitney test, $P = 0.1459$
Dialectic Behavioral Therapy *v* Usual Care				
‡ Koons et al., 2001[57]	21-46	1/10 (10)	2/10 (20)	NS
Follow-up Letter and General Guidelines *v* Standard Care				
† Bennewith et al, 2002[58]	16-95	211/964 (21.9)	189/968 (19.5)	1.17 (0.94-1.47)

*Not in Hawton Review[11]
†Primary care treatment setting; all other studies conducted in specialty care settings
‡Inclusion criteria required diagnosis of borderline personality disorder; all others required DSH
NR= not reported

Table 6. Randomized Controlled Trials to Decrease Deliberate Self-Harm in Young Adolescents Exclusively

Trial (sorted by treatment)	Age Range (years)	Number (%) of Participants With Deliberate Self Harm During Follow-up		
		Experimental	Control	Odds Ratio (95% CI)
Home-based Family Therapy *v* Standard Aftercare				
*Harrington et al., 1998[43]	≤16	4 (14.9)	11/75 (14.7)	1.02 (0.41-2.51)
Emergency Care *v* Standard Aftercare				
*Cotgrove et al., 1995[42]	12.2-16.7	3/47 (6.4)	7/58 (12.1)	0.50 (0.12-2.04)
Group Therapy *v* Standard Care				
Wood et al., 2001[44]	12-16	2/32 (6)	10/31(32)	0.16 (0.03-0.71)

* Adapted from Hawton et al., 2001[11]

Table 7. Cohort Studies to Decrease Suicidal Behavior in At-risk Patients*

Trial (sorted by treatment)	Study Type	Age Range (years)	Outcome	Experimental	Control	Odds Ratio (95% CI) or Reported Statistic
Lithium Use in Week Preceding Suicide or Suicide Attempt vs. no Lithium Use						
Coryell et al, 2001[87]	Nested case-control	17	Completed suicides/ Attempted suicides	40.0% / 22.0%	53.3% / 19.5%	McNemar Chi Square: 0.667, p=0.41 McNemar Chi Square: 0.067, p=0.80
Cognitive Behavioral Counselling *v* Usual Care						
Raj et al., 2001[88]	Cohort	16-50	No. of repeated suicide attempts	0/20 (0%)	1/20 (5%)	N/A
Use of Psychiatric Services by Psychiatric Inpatients Post-discharge *v* Community Sample						
Pfeffer et al., 1994[89]	Cohort	4.7-14.7	Occurence of suicide attempt post-hospitali-zation	N/A	N/A	No association between annual rates of combined psychiatric services and occurrence of suicide attempt No association between types of services received and time to first suicide attempt
Psychosocial Emergency Room Intervention *v* Usual Care						
Rotheram-Borus et al., 2000[90]	Cohort	12-18	No. of repeated suicide attempts	6/65 (9.2%)	11/75 (14.7%)	NS

*No.= number. N/A=not applicable. NS=not statistically significant

Table 8. Prior Review of Randomized Controlled Trials Comparing Problem-solving Therapy *v* Standard Aftercare for Intermediate Outcomes

Study*	Age Range (years)	Depression: Standardized Mean Difference (95% CI)	Hopelessness: Weighted Mean Difference (95% CI)	Improvement in Problems (yes/no): OR (95%CI)
Gibbons et al., 1978[67]	17	-0.18 (-0.52, 0.15)	NR	2.74 (1.40, 5.36)
Hawton et al., 1987[68]	> 16	-0.31 (-0.80, 0.18)	NR	1.38 (0.43, 4.47)
Salkovskis et al., 1990[69]	16-65	-1.24 (-2.24, -0.25)	-3.25 (-5.31, -1.19)	NR
McLeavey et al., 1994[70]	15-45	NR	0.50 (-4.51, 5.5)	NR
Evans K et al., 1999[71]	16-50	-0.86 (-1.60, -0.13)	NR	NR
Patsiokas and Clum, 1985[93]	NS	NR	-6.60 (-13.73, 0.53)	NR
Meta-analytic summary statistic		**-0.36 (-0.61, -0.11)**	**-2.97 (-4.81, -1.13)**	**2.31 (1.29, 4.13)**

* Data above are from Townsend et al., 2001[41]
NS: not stated

Table 9. Additional Studies Involving Intermediate Outcomes*

Trial (sorted by treatment)	Study Type	Age Range (years)	Outcome	Experimental	Control	Odds Ratio (95%CI) or Reported Statistic
ADULTS AND OLDER ADOLESCENTS						
Interpersonal Psychotherapy *v* Standard Aftercare						
Guthrie et al., 2001[61]	RCT	18-65	Scale for Suicidal Ideation score	7.9	12.8	Mean difference: 95% CI –8.2 to –1.6, p=0.0005)
Dialectic Behavioral Therapy *v* Usual Care						
Koons et al., 2001[57]	RCT	21-46	Scale for Suicidal Ideation	10 point decrease	4 point decrease	p <0.05 by two-way repeated measures analysis of variance
			Depressive severity	BDI: 9.4 point decrease	BDI: 5.4 point decrease	p < 0.05 by two-way repeated measures analysis of variance
				HAM-D: 12.6 point decrease	HAM-D: 8.3 point decrease	NS
Mianserin (Mi) *v* Amitryptyline (Am) *v* Maprotiline (Ma) (all antidepressants)						
Montgomery et al., 1978[91]	Cohort	NR	Suicidal thoughts	By HAM-D: Mi: N/A Am: N/A Ma: N/A	N/A	No difference among three drugs
				By MADRS: Mi: ~11 Am: ~ 5 Ma: ~ 6	N/A	Greater SI decrease only with Mi *v* Ma (p< 0.01)
Cognitive-behavioral Counseling *v* Usual Care						
Raj et al., 2001[88]	Cohort	16-50	Scale for Suicidal Ideation	15 point mean decrease	2.75 point mean decrease	P = 0.00
CHILDREN 18 YEARS AND YOUNGER EXCLUSIVELY						
Home-based Family Therapy *v* Standard Aftercare						
Harrington et al., 1998[43]	RCT	≤ 16	Suicidal Ideation Questionnaire	40.0 point mean decrease	34.2 point mean decrease	NS
Group Therapy *v* Standard Care						
Wood et al., 2001[44]	RCT	12-16	Suicidal Ideation Questionnaire	47.3 point mean decrease	39.7 point mean decrease	NS

Table 9. Additional Studies Involving Intermediate Outcomes* (continued)

Trial (sorted by treatment)	Study Type	Age Range (years)	Outcome	Experimental	Control	Odds Ratio (95%CI) or Reported Statistic
Cognitive Behavior Therapy (CBT) v Systemic Behavior Family Therapy (SBFT) v Individual Nondirective Supportive Therapy (NST)						
Brent et al., 1997[92]	RCT	13-18	% with SI score > 4 as measured by K-SADS-P/E	CBT: 8.6% SBFT: 6.5%	NST: 15.2%	No significant difference among three groups by random effects regression analysis
Psychosocial Emergency Room Intervention v Usual Care						
Rotheram-Borus et al., 2000[90]	Cohort	12-18	Suicidal Ideation Scale taken from the HASS			Beta for intervention effect in mixed linear model= -0.316, NS
			Patients with clinically significant depression by BDI	4.9%	10.1%	P < 0.01

* RCT= randomized clinical trial BDI = Beck Depression Inventory (self-report) HAM-D = Hamilton Depressive Rating Scale NS= not significant N/A = not applicable NR = not reported MADRS = Montgomery-Asberg Depression Rating Scale SI = suicidal ideation K-SADS-P/E= School Age Schedule for Affective Disorders and Schizophrenia, Present and Lifetime Versions HASS=Harkavy & Asnis Suicide Survey

IV. Discussion

Evidence for or against the value of screening for risk of suicide in primary care settings must be considered within a complex practice and epidemiologic context. Suicide is a rare outcome, even among high-risk groups; this fact alone creates methodological challenges. Randomized controlled trials (RCTs), the "gold standard" for showing efficacy in evidence reviews, ethically cannot include a true placebo arm; consequently, all interventions are being compared to treatment arms that in fact may (or may not) be effective. Finally, patterns of suicide behaviors are very complex. Although a prior suicide attempt is a strong risk factor for completed suicide, sociodemographic characteristics and behaviors clearly differ across groups who attempt suicide, practice repetitive deliberate self-harm behaviors (DSH), and successfully complete suicide. Focusing exclusively on completed suicide still reveals dramatic differences in rates and methods across the life span, between males and females, and between different race and ethnicity groups. Current research, in large part, does not address this complexity.

Within this context, we have reviewed literature published since 1966 with the goal of better defining the clinician's role in screening for suicide risk in primary care settings. Despite the public health import of suicide and the Surgeon General's call to action, evidence to guide the primary care clinician's assessment and management of suicide risk is extremely limited.

No studies exist that address the overarching question of whether screening for suicide risk in primary care patients improves outcome. Consequently, we must address this question by analyzing the studies addressing the intervening linkage questions.

Very little is known about use of screening instruments for suicide risk in primary care populations. In older adolescents and adults (ages 18 to 70 years), 1 prospective study identifies

reasonable test characteristics for persons reporting that they were "feeling suicidal" compared to responses indicating the presence of a plan. This question was part of a more extensive case identification instrument designed for primary care. This study has not been replicated, nor has the specific question identified ("feeling suicidal") been tested independently of the longer instrument. No screening instruments have been tested in primary care settings for children or young adolescents.

The evidence is fair and mixed that interventions to treat those at risk of suicide reduce suicide attempts or completions. Although some trends suggest incremental benefit from several interventions, no consistent statistically significant effects have emerged for interventions for which more than 1 study has been done. Of the interventions for which only 1 study had been done, promising interventions included dialectic behavioral therapy (DBT) for borderline personality disorder,[78] interpersonal psychotherapy (IPT) for DSH,[61] and group therapy specifically for children and adolescents with DSH.[44] These interventions, however, require further confirmation.

We should emphasize that our review did not include all of the available clinical trial literature involving suicide attempts or completions. Some literature has examined the effectiveness of medications such as lithium in the prevention of suicide among psychiatric patients with major mood disorders, as reflected in a recent meta-analysis by Tondo et al.[97] We did not include these studies in our review because they did not meet our inclusion criteria of a controlled trial with an adequate comparison group.

Several studies show improvement for intermediate outcomes, primarily for older adolescents and adults at high risk for DSH. Specifically, meta-analyses of RCTs using problem-solving therapy have shown benefit as indicated by improved mood, decreased

hopelessness, and improvement in problems.[41] In addition, 1 RCT involving IPT[61] and 1 RCT involving DBT[57] have documented decreased suicidal ideation, and 1 cohort study of cognitive behavioral therapy (CBT) decreased suicidal ideation.[88] Similar decreases in suicidal ideation for adolescent groups have not been shown.[43,44] However, for adolescents 18 years of age and younger who have attempted suicide, 1 cohort study suggested that a brief emergency crisis intervention involving mother and daughter may decrease the number of patients with clinical relevant depressive symptoms at 18-month follow-up.[90]

We found no information directly addressing the harms and costs of either screening or treatment. Such information is important to guide any conclusions about either screening or intervening for suicide risk, should evidence of beneficial treatments relevant to suicide prevention emerge.

Priorities for a Research Agenda

Our review highlights several important issues involving research on the assessment and management of suicide risk. First, the challenge of studying interventions for a rare event is underscored by the fact that, even in a population with a relatively high risk of DSH (i.e., those who have already harmed themselves), documenting incremental benefit relative to standard care has been difficult. This difficulty is attributable at least in part to the fact that most studies are underpowered to detect significant differences, whereas studies that have larger sample sizes typically provide the least intense (and, arguably, likely less effective) interventions.[58] Future research must consider the feasibility of large, multi-site studies which could have sufficient power to identify the benefit of interventions for such a substantial health problem that is a relatively rare event.

Second, the generalizability of the available evidence to a primary care population with unidentified suicide risk is poor. The great majority of research has been conducted in psychiatric populations with an already identified risk for suicide, rather than among unidentified patients in primary care, who as a group are at lower risk. The existing literature includes only 1 screening study (of adults) conducted in a primary care setting.[23] Only 1 of the intervention studies involved patients recruited from primary care practices (although most were from mental health settings),[57] and all of the studies involved patients already identified as being at high risk for harming themselves (and, consequently, are likely to already be in treatment with a mental health professional). Only 1 study conducted the intervention in a primary care setting.[58] High priorities for future research are to examine the test characteristics of screens for suicide risk for all age groups in primary care settings and to recruit patients for intervention studies from primary care settings.

Third, the available studies focus on those with relatively moderate risk for suicide and, for ethical and clinical reasons, exclude patients at the highest risk. Most identified high-risk patients are likely admitted to a psychiatric unit for safety, which may (or may not) in itself be an effective intervention. Subsequent research should consider how to stratify at-risk primary care patients and target interventions to risk severity.

Fourth, the lack of evidence for incremental benefit from a particular intervention compared to standard care is not equivalent to saying that nothing works. There is no evidence that "no care" works. Standard care in many instances may be a successful intervention, indicating it is sufficient or that it is "good enough." However, standard care is poorly described in the existing literature and likely is variable across studies, making the comparison to the experimental intervention difficult to evaluate. The exact components of standard care, which

may be an effective intervention, are poorly understood. Subsequent research could address this shortcoming by attempting to more carefully monitor and define standard care.

Fifth, making meaningful conclusions specific to any particular age group is difficult. Very few studies have exclusively enrolled adolescents, and those that do typically enroll only young adolescents. Patients in mid to late adolescence (who are at highest risk) are often enrolled in adult studies, which have not been stratified by age; as a result, drawing conclusions specific to this age group is a challenge. In addition, despite the concern about increased risk of suicide in the elderly, there is a dearth of information to guide evidence-based assessment and management strategies in primary care. Results from the PROSPECT trial will begin to fill this void.[59] Subsequent research should involve populations with more clearly defined age groups and analyses stratified by age to allow more meaningful interpretation for specific high-risk age groups.

Sixth, dramatic differences in suicide behaviors among men and women, and among different racial and ethnic groups have drawn little attention. A better understanding of this variation may have direct implications for screening and treatment strategies, and they warrant further research.

Seventh, our review is relevant only to those individuals who access clinical care, which means that a large portion of the population may be ignored. Indeed, fully one-third of adolescents do not receive a physical examination by a clinician within the previous year; information on addressing this substantial group is even less clear.[98] Community-based research can presumably address this question.

Finally, we did not find studies meeting our inclusion criteria that addressed whether more adequate treatment of depressed patients or substance-abusing patients will decrease the

risk of suicide. Of note, assessing suicidal ideation is the standard of care in the evaluation for depression, for which the U.S. Preventive Services Task Force now recommends routine screening.[7] Successful collection of pertinent clinical information during such screening requires the communication of sensitive information between the primary care clinician and patient and emphasizes the importance of the clinician-patient interaction. This routine screening will likely identify more patients with suicidal ideation, for which primary care clinicians will need evidence-based management strategies. Non-prospective studies have suggested that educating general practitioners on better identification and treatment of depression may be an effective method of suicide prevention.[99] Subsequent prospective primary care-based clinical trials are needed to develop this evidence base.

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Appendix A
Acknowledgments

Appendix A
Acknowledgments

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Appendix B
Evidence Tables

Glossary

ANOVA	Analysis of Variance
BSSI	Beck Scale for Suicidal Ideation
CBT	Cognitive Behavioral Therapy
CI	Confidence Interval
DBT	Dialectical-Behavioral Therapy
DSH	Deliberate Self-Harm
DSM-III-R	Mental Disorders-III-Revised
ER	Emergency Room
F/U	Follow-up
GP	General Practitioner
GRP(s)	Group(s)
HAM-D	Hamilton Depressive Rating Scale
Hr	Hour
Hx	History
ICU	Intensive Care Unit
INT	Intervention
IM	Intramuscular
ITT	Intention-to-Treat Analysis
K-SADS-P/E	School Age Schedule for Affective Disorders and Schizophrenia, Present and Lifetime Versions
MADS	Montgomery-Asberg Depression Rating Scale
MDD	Major Depressive Disorder
Mg	Milligram
MSSI	Modified Scale for Suicidal Ideation
N	Number
NPV	Negative Predictive Value
NR	Not Reported
NST	Nondirective Supportive Therapy
OCD	Obsessive Compulsive Disorder
OR	Odds Ratio
Outpt	Outpatient
PPV	Positive Predictive Value
Pts	Patients
RR	Relative Risk
RSQ	Risk of Suicide Questionnaire
Rx	Prescription
SA	Suicide Attempt
SBFT	Systemic Behavioral Family Therapy
SD	Standard Deviation
SI	Suicidal Ideation
SIQ	Suicide Ideation Questionnaire
SIQ-JR	Suicide Ideation Questionnaire-Junior High School Version
SPS	Suicide Probability Scale
SSI	Scale for Suicide Ideation
Tx	Treatment
VA	Veterans Administration
Wk	Week
Wkly	Weekly

Evidence Table 1. Screening for Suicide Risk

Author, Year	Setting	Inclusion/ Exclusion Criteria (for those screened)	Population Characteristics	Screening Method	Criterion Standard	Screen and Criterion Standard Administered Independently? Interpreted Blind to Screen?
Olfson et al., 1996[23]	Primary care clinic in medical setting	Attendance at primary care clinic affiliated with one of 3 medical centers. Demographic information is reported for all 3 grps. Test characteristics of suicide items collected from and reported for only 1 grp.	**N**=2,749 **% female**: 68 **Age range**: 18-70 years (two-thirds between 26 and 55) 71% Caucasian 21% Black 8% other	Self-administered 62-item psychiatric case-finding instrument with three items related to SI. Screening positive involved answering yes to any 1 of 3 items involving the past month: feeling suicidal?, wished you were dead?, and thoughts of death?	Nurse administered face-to-face structured interview conducted immediately prior to medical visit (when self-administered screen completed) in which pt responded yes to following question: In the last month, did you have a plan to kill yourself?	Yes Yes

Evidence Table 1. Screening for Suicide Risk (continued)

Test Characteristics	Adverse Effects of Test?	Conclusion(s)	Internal/External Validity	Overall Quality	Limitations
Test 1: Feeling suicidal. Positive test = Yes (n=33). Sensitivity 83%; specificity 98%. PPV=30.3 **Test 2:** Wished you were dead. Positive test = Yes (n=79). Sensitivity 92%; specificity 93%. PPV=13.9 **Test 3:** Thoughts of death. Positive test = Yes (n=202). Sensitivity 100%; specificity 81%. PPV=5.9.A6	Not reported	Self-reported "feeling suicidal" item corresponded closely with acknowledged plans to attempt suicide	Fair/Good	Good	Only 46% of eligible pts approached across the 3 centers agreed to participate. No data on physician detection of suicide in routine practice, so unclear about possible value of screening for this symptom. Limited data on suicide attempt and no data on suicide completion. Unclear what degree of risk endorsing a suicide plan within the past month details - is this a reasonable "gold standard" for moderate-to-severe risk?

Evidence Table 1. Screening for Suicide Risk (continued)

Author, Year	Setting	Inclusion/ Exclusion Criteria (for those screened)	Population Characteristics	Screening Method	Criterion Standard	Screen and Criterion Standard Administered Independently? Interpreted Blind to Screen?
Horowitz et al., 2001[47]	ER	Children and adolescents presenting to ER in tertiary care center in Boston with chief complaint related to a psychiatric issue per triage nurse	**N**=144 **% females**=54 **Age range**: "75% between 11 and 16 years." Mean ± SD age = 13.6 years (2.48) 49% Caucasian 26% Black 15% Latino 1% Asian	RSQ administered by triage nurse in ER	SIQ administered by member of pyschology team. If <10th grade got SIQ-JR. Cut-off ≥41 for SIQ; ≥31 for SIQ-JR	Yes Yes

Evidence Table 1. Screening for Suicide Risk (continued)

Test Characteristics	Adverse Effects of Test?	Conclusion(s)	Internal/External Validity	Overall Quality	Limitations
Conducted analyses on a 4-item subscale. 1) Are you here because you tried to hurt yourself? 2) In the past week, have you had any suicidal thoughts? 3) Have you ever attempted suicide in the past? 4) Has something very stressful happened in the past 3 weeks? Sensitivity 0.98; specificity 0.37; PPV -0.55; NPV - 0.97	Not reported	A four-item screening test administered in the ER setting had sensitivity of 98%, a specificity of 37%, a PPV of 55% and a NPV of 97%	Good/Fair-Poor	Good	ER patients with suspected psychiatric issues who are probably not reflective of clinic population. Focused on adolescent showing up with suicide-related issues.

Evidence Table 2. Treatment of Suicide Risk

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Montgomery et al., 1994[63] RCT	**Recruitment setting:** Psychiatric clinic **Age range**: NR **Eligibility:** Patients with a history of 2 or more suicide attempts **Exclusion criteria:** No current major depression according to DSM-III-R	**INTERVENTION**: 60 mg fluoxetine twice a week **CONTROL**: placebo twice a week **Tx setting**: Psychiatric clinic **Tx duration**: 6 months **F/U duration**: 0 months	**INTERVENTION** **Total N** = 54 **Age**: Mean = NR **Female**: NR **Prior SA**: NR **Psych comorbidity**: NR **CONTROL** **Total N** = 53 **Age**: Mean = NR **Female**: NR **Prior SA**: NR **Psych comorbidity**: NR	Number of suicide attempts in 6-month period. Because several patients may have had more than 1 suicide attempt during the study, the denominator is not the number in each group as the authors presented. **INTERVENTION**: N = 18 **CONTROL**: N = 18 No difference between intervention and control

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
NR	No	**Internal Validity**: Poor **External Validity**: Poor	Fluoxetine was not useful for suicide prevention.	Subtherapeutic dosing of fluoxetine, only 120 mg per week No demographic information or psychiatric information was available Results not clearly specified; proportion of patients with a repeat SA not clear Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Rudd et al., 1996[62] RCT	**Recruitment setting:** Potential patients referred from 2 mental health clinics, 1 emergency room, and 1 in-patient psychiatric unit. **Age range**: Mean = 22 ± 2.3 **Eligibility:** Suicide attempt, mood disorder with concurrent SI, or episodic substance use with SI. **Exclusion criteria**: Psychosis, thought disorder, personality disorder rendering outpatient group therapy inappropriate.	**INTERVENTION:** Outpt intensive structured group-treatment in day hospitalization setting 9 hrs daily for 2 weeks (10 weekdays). Patients received 2-hr wkly support groups while waiting for group to accumulate. **CONTROL:** Usual care (combination of inpt and outpt care that was not well-defined or measured). **Tx setting:** Psychiatric outpatient day-hospital **Tx duration:** 2 weeks **F/U duration:** 1 year	**INTERVENTION** **Total N** = 143 **Age**: NR **Female**:32 **Prior SA**:12.7% by cutting **Psych comorbidity**: report no statistical differences between groups **CONTROL** **Total N** = 121 **Age**: NR **Female:**15 **Prior SA**:4% by cutting **Psych comorbidity**: report no statistical differences between groups	SI as measured by MSSI **INTERVENTION:** mean 3.1 ± 9.0 **Control:** mean 0.8 ± 3.8 **Repeated measures ANOVA:** No differences between groups

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
Likelihood of suicide as measured by SPS **Intervention**: mean 55.6 ± 13.2 **Control:** mean 57.4 ± 10.4 **Repeated measures ANOVA**: No differences between groups	No	**Internal validity:** Poor **External validity**: Poor	No differences in SI or likelihood of suicide between patients enrolled in a 2 week intensive day-treatment program vs. treatment as usual.	Study focused primarily on a male military population 20% of day-treatment intervention group required hospitalization No measures of treatment received after the 2 wk intervention No attempt to measure treatment as usual (control) High attrition rate Low power

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Brent et al., 1997[92] RCT (intermediate outcome only)	**Recruitment setting:** Psychiatric clinic. One third recruited by advertising and 2/3 recruited from patients referred by self, parent, or professionals. **Age range:** 13-18 **Eligibility:** Met criteria for MDD defined as > or = to 13 on the Beck Depression Inventory, normal intelligence (not defined), and living with at least one parent or guardian. **Exclusion criteria:** Psychosis, OCD, eating disorder, bipolar illness, current substance abuse, chronic medical illness, pregnancy.	**INTERVENTION #1** **Total N** = 37 **Age**: Mean 15.7 (1.3) **Female**:75.7% **Prior SA**: 21.6% **Psych comorbidity**: 37.2% anxiety **INTERVENTION #2** **Total N** = 35 **Age**: Mean 15.4 (1.4) **Female**:77.1% **Prior SA**: 22.9% **Psych comorbidity**: 28.6% anxiety **CONTROL** **Total N** = 35 **Age**:Mean 15.7 (1.5) **Female**:74.3% **Prior SA**:25.7% **Psych comorbidity**: 28.6% anxiety	**INTERVENTION #1:** 12-18 sessions of CBT **INTERVENTION #2**:12-18 sessions of SBFT **CONTROL:** 12-18 sessions of NST **Tx setting:** Psychiatric clinic **Tx duration:** 12-16 weeks **F/U duration:** Immediately after treatment phase	Proportion with SI score >4, which is suicidality with a plan or an attempt as measured on K-SADS-P/E. **INTERVENTION #1**: 8.6% **INTERVENTION #2**: 6.5% **CONTROL:** 15.2% **Random effects regression analysis**: No statistically significant difference among 3 groups, although all showed significant decreases in SI compared to baseline (McNemar Chi square, $p < 0.001$).

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
Proportion meeting DSM-III-R critieria for MDD from the K-SADS-P/E **Intervention #1**:17.1% **Intervention #2**: 32.3% **Control**: 42.4% **Chi square**: Trend for differences among the 3 grps (*P* = .07), with a pairwise difference between Intervention#1 and Control (*P* = .02)	Yes	**Internal validity**: good **External validity**: fair-good	Adolescents age 13-18 with MDD who receive CBT show statistically greater improvements in depression at 16 weeks than adolescents receiving SBFT or NST. Although adolescents in all 3 groups show less SI at 16 weeks, there are no differences between groups.	The adolescents at highest risk for suicide may be missed in this study because recruitment setting did not include emergency rooms.

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Bateman and Fonagy, 1999,[55] 2001[56] RCT	**Recruitment setting:** Psychiatric clinic (patients already identified as needing psychiatric evaluation and referred by outside clinician) **Age range**: 16-65 years **Eligibility:** Borderline personality disorder (as determined by Structured Clinical Interview for DSM-III-R and by Diagnostic Interview for Borderline Patients score $\geq$ 7) **Exclusion criteria:** Bipolar disorder, current substance abuse, psychotic disorder, mental impairment, organic brain disorder	**INTERVENTION**: Psychoanalytically-oriented partial hospitalization **CONTROL**: Usual care, consisting of general outpatient psychiatric services without formal psychotherapy Medications were prescribed as needed **Tx setting**: Partial hospitalization on psychiatric unit or outpatient psychiatric clinic **Tx duration**: 18 mo's **F/U duration**: 18 mo's (note that INTERVENTION group continued group analytic therapy twice per week during follow-up)	**INTERVENTION** **Total N** = 19 **Age**: Mean = 30.3 $\pm$ 5.86 **Female**: 68% **Prior SA**: 94.7% **Psych comorbidity**: > 70% (primarily mood and anxiety disorders) **CONTROL** **Total N** = 19 **Age**: Mean = 33.3 $\pm$ 6.60 **Female**: 47% **Prior SA**: 70-75% **Psych comorbidity**: > 62% (primarily mood and anxiety disorders)	% with suicide attempts within prior 6 mo's measured by self-report at end of the 18 mo treatment **INTERVENTION**: 5.3% **CONTROL**: NR, but figure suggests ~40% **Mann Whitney test**: $P < 0.001$

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
% with suicide attempts within prior 6 months measured by self-report at end of the 36 months (18 months after treatment period ended) **INTERVENTION**: 18% **CONTROL**: 63% **Fisher exact test**: *P* < 0.004	No	**Internal Validity**: Fair (no intention to treat analysis; no blinded outcome [data was self-report, then attempt were made to cross-check with hospital records]) **External Validity**: Poor (focus on borderline personality disorder patients, and patients were already identified as requiring psychiatric evaluation, so may not be generalizable to unidentified primary care patients)	Psychoanalytically-oriented partial hospitalization decreased number of suicide attempts relative to usual care Psychiatric outpatient treatment for borderline personality disorder patients at moderate-high risk to harm selves.	73% of those eligible were enrolled Small sample size Intervention had many facets, making it hard to know what the key component(s) was (were). Usual care could be quite variable Intervention group continued twice weekly group analytic therapy after formal treatment period ended, potentially confounding 36 month follow-up outcome results Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Battaglia et al., 1999[66] RCT	**Recruitment setting:** Psychiatric emergency service **Age range**: 18-65 years **Eligibility:** Suicide attempt within 30 days and ≥ 2 prior suicide attempts **Exclusion criteria:** Psychotic illness; current or expected treatment with psychotropic medications; allergy to fluphenazine; history of tardive dyskinesia or neuroleptic malignant syndrome.	**INTERVENTION**: Low dose IM fluphenazine decanoate (antipsychotic): 2.5 mg/month **CONTROL**: Ultra-low dose IM fluphenazine decanoate:1.5 mg/ month **Tx setting**: Psychiatric emergency service **Tx duration**: 6 months **F/U duration**: none	**INTERVENTION** **Total N** = 30 **Age**: Mean = 29.7 ± 5.9 **Female**: 43% **Prior SA**: 100% **Psych comorbidity**: > 43% with substance abuse or dependence; > 37% with borderline personality disorder **CONTROL** **Total N** = 28 **Age**: Mean = 31.2 ± 8.2 **Female**: 44% **Prior SA**: 100% **Psych comorbidity**: > 36% with substance abuse or dependence; > 29% with borderline personality disorder	Change in rate of serious DSH behaviors/month measured as self-report at 6 months using Parasuicide History Inventory **INTERVENTION**: -0.16 ± 0.19 **CONTROL**:-0.06 ± 0.22 **Mann-Whitney test**: NS (*P* = 0.1459)

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
NR	No	**Internal Validity**: Fair (not intention to treat analysis; only 26% of those who were eligible were enrolled) **External Validity**: Poor	No significant difference between intervention and control groups at 6 months, although the trend favors low dose fluphenazine decanoate. Would need 64 patients in each group to be powered to show a significant difference. Both groups had significant decreases in suicidal behaviors relative to pre-randomization rates.	26% of those eligible were enrolled Small sample size High degree of comorbid substance abuse/dependence and borderline personality disorder also may make this population less representative of unidentified patients at suicide risk in primary care setting Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Evans et al., 1999[64] RCT	**Recruitment setting:** General inpatient medical facility **Age range**: "Adults" **Eligibility:** All adults admitted after DSH to 2 of 3 general hospitals in Bristol, England AND referred for psychiatric evaluation. **Exclusion criteria:** High risk of not using intervention appropriately or of dangerousness to self or others.	**INTERVENTION**: Card offering 24-hour crisis telephone consultation with on-call psychiatrist for 6 months **CONTROL**: Usual care **Tx setting**: Outpatient with psychiatric availability **Tx duration**: 6 months **F/U duration**: 0 months	**INTERVENTION** **Total N** = 417 **Age**: Mean = 32.9 ± 12.9 **Female**: 58% **Prior SA**: 12.5% **Psych comorbidity**: 87% **CONTROL** **Total N** = 410 **Age**: Mean = 33.8 ± 13.1 **Female**: 53% **Prior SA**: 8.0% **Psych comorbidity**: 87.1%	% with repeat DSH identified through hospital case registry **INTERVENTION**: 16.8% **CONTROL**: 14.4% **OR** = 1.20 (95% CI: 0.82, 1.75) *P* = NR

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
# of repeat DSH episodes identified through hospital case registry **INTERVENTION**: Mean = NR **CONTROL**: Mean = NR **Chi square**: "not significant"	Yes	**Internal Validity**: Fair **External Validity**: Poor	Providing a card offering emergency telephone support to patients following medical admission for DSH does not appear to influence overall repetition rates. Subgroup analyses suggested that response to intervention differed by history of DSH; for those with a previous DSH, the odds of repeating DSH were higher in the intervention group (OR 1.85, 95%CI 1.14, 3.03), while for those with no prior DSH in the intervention, the odds of repeating DSH tended to be higher in the control group (OR 0.64, 95%CI 0.34, 1.22)	Routine health service information systems used may underestimate repeat DSH Detection of DSH by self-laceration is less reliable; case registry is better with overdoses Findings were confined to DSH patients admitted overnight to the hospital and cannot be generalized to all DSH patients Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Guthrie et al., 2001[61] RCT	**Recruitment setting:** Emergency room **Age range**: 18-65 years **Eligibility:** Presented to emergency room with deliberate self-poisoning **Exclusion criteria:** Requiring inpatient psychiatric treatment; not be registered with a general practitioner; living outside hospital catchment area; serious medical illness.	**INTERVENTION**: 4 sessions of interpersonal psychotherapy, 50 minutes weekly, delivered by nurse therapists **CONTROL**: Usual care **Tx setting**: Patient's home **Tx duration**: 1 month **F/U duration**: 6 months (including the 1 month of treatment)	**INTERVENTION** **Total N** = 58 **Age**: Mean = NR by group; of total number of participating subjects, means age was 31.2 years ± 1.5 **Female**: 43% **Prior SA**: 57% **Psych comorbidity**: 48% Baseline severity of suicidal thoughts: 15.9 (9.9) as measured by BSSI **CONTROL** **Total N** = 61 **Age**: Mean = NR by group; of total number of participating subjects, mean age = 31.2 years ± 1.5 **Female**: 46% **Prior SA**: 62% **Psych comorbidity**: 61% Baseline severity of suicidal thoughts: 14.3 (10.8) as measured by BSSI	Repetition of DSH measured as self-report at 6 months (intention to treat) **INTERVENTION**: 9% **CONTROL**: 28% **Absolute rate difference** = 19.3% (95% CI: 8.6%, 30.0%) *P* = 0.009

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
Number of reported episodes of self-harm **INTERVENTION**: Mean = 0.6(95% CI 0.3-0.9) **CONTROL**: Mean = 1.8 (95% CI 0.6-3.0) **Mean difference** = NS	Yes (for primary outcome)	**Internal Validity**: Fair-good **External Validity**: Poor	4 sessions of interpersonal psychotherapy decreased both repeated self harm attempts (ITT analysis) and SI (not ITT analysis) relative to usual care 6 months after entry into the study.	51% of eligible patients were enrolled, so those enrolled were of a moderate-high severity Those who refused were at greater suicide risk, more likely to have a history of DSH, to have left a suicide note, and to express a wish to die Outcome assessment not blinded (self-report) Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Koons et al., 2001[57] RCT	**Recruitment setting:** 1 Women Veterans primary care clinic, Veterans Counseling Centers, and other Veterans medical centers. **Age range:** adults (needed to be veterans) **Eligibility:** Women veterans with DSM-III-R criteria for Bordeline Personality Disorder **Exclusion criteria:** Schizophrenia, bipolar disorder, substance dependence, and antisocial personality disorder.	**INTERVENTION:** Dialectical Behavior Therapy, medications as needed **CONTROL**: Usual care (60 minutes of weekly individual therapy with VA clinician, supportive and psychoeducational groups, medications as needed) **Tx setting**: Veterans psychiatric outpatient clinic **Tx duration**: 6 months **F/U duration**: none	**INTERVENTION** **Total N** = 10 **Age**: Mean = 34.5 $\pm$ 7.5 **Female**: 100% **Prior SA**: unclear--75% of whole group had a lifetime history of DSH, and proportions between intervention and control groups described as insignificant **Psych comorbidity**: NR **CONTROL** **Total N** = 10 **Age**: Mean = 35.4 $\pm$ 6.9 **Female**: 100% **Prior SA**: unclear--75% of whole group had history of DSH, and proportions between intervention and control groups described as insignificant **Psych comorbidity**: NR	% with DSH during previous 3 months measured by self-report **INTERVENTION**: 10% (1/10; a decrease from 50% at baseline) **CONTROL**: 20% (2/10;a decrease from 30% at baseline) No significant difference between the rates. The difference between the proportions going from any DSH to no DSH was suggestive of an effect for the intervention group (P = 0.07), while there was no suggestion of an effect for the control group (P = 1.00)

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
SI as measured by the BSSI **INTERVENTION**: Mean = decrease by 10 points **CONTROL**: Mean = decrease by 4.1 points Two-way repeated measures ANOVA indicated that DBT decreased significantly more than control (P <0.05)	No	**Internal Validity**: Fair. Not intention-to-treat analysis; multiple tests increase risk of type 1 error; randomization process not described; small sample size **External Validity**: Poor. Access to care unfettered in this VA system. Patients seen not representative of primary care.	DBT was not superior to usual care in decreasing DSH. DBT was superior to usual care in decreasing SI scores.	Small sample size. Inconsistent results with regard to decreasing depressive symptoms. Using Beck Depression Inventory (self-report), there was a significantly greater decrease in depressive symptoms than with usual care (one-way ANOVA, P = 0.026). Using the Hamilton Depression Rating Scale (administered by interviewer), there was no significantly greater decrease for DBT group vs. usual care (one-way ANOVA, P = 0.11) Usual care group received intensity and quality of treatment likely greater than most usual care groups, and most usual care therapists had treatment orientations with similarities to DBT, each of which might make differences more difficult to show.

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Motto and Bostrom, 2001[65] RCT	**Recruitment setting:** Nine psychiatric inpatient facilities in San Francisco **Age range**: NR **Eligibility:** Persons admitted for depressive or suicidal illnesses. **Exclusion criteria:** Patients who continued with therapy for at least 30 days post-discharge, with therapy provided by psychiatrists, psychologists, social workers, or pastors.	**INTERVENTION**: Contact in the form of regular communications using short letters expressing concern and support from the hospital interviewer. Patient could respond using a self-addressed envelope but was not required to respond. Letters were sent once per month for 4 months, every 2 months for 8 months, and then every 3 months for 4 years. **CONTROL**: No further active involvement post-discharge **Tx setting**: Outpt **Tx duration**: 5 years **F/U duration**: up to 15 years	**INTERVENTION** **Total N** = 389 **Age**: Mean = 34.4 **Female**: 58% **Prior SA**: NR **Psych comorbidity**: NR **CONTROL** **Total N** = 454 **Age**: Mean = 32.8 **Female**: 54% **Prior SA**: NR **Psych comorbidity**: NR	1) % with suicide as cause of death 5 years after discharge Identified through coroner's records, death certificates, clinical sources, and family members **INTERVENTION**: 3.9% **CONTROL**: 4.6% 2) % with suicide as cause of death 15 years after discharge **INTERVENTION**: 6.4% **CONTROL**: 5.7%

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
Difference in survival over time since discharge using Kaplan-Meier probabilities Intervention group had fewer suicides than control group at 2 years (P = 0.043) but difference disappeared at 5 years post-discharge.	Yes	**Internal Validity**: Fair **External Validity**: Poor	Continuing to remain in contact with individuals who are at risk of suicide and who refuse therapy is effective for reducing suicide completion for up to 2 years post-discharge but not afterwards.	Appears to be a convenience sample from the 9 facilities Not clear whether the study was powered to detect a difference in completed suicides over the 5 and 15 year follow-up period Not a well-controlled study--no control for events occurring subsequent to discharge that may have influenced suicide risk Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Wood et al., 2001[44] RCT	**Recruitment setting:** Psychiatric clinic and inpatient facility **Age range:** 12-16 years **Eligibility:** Referred after episode of DSH and reported at least 1 other episode of DSH in past year **Exclusion criteria:** Suicide risk precluded outpatient treatment, unable to attend or benefit from group therapy, psychosis, overdose on alcohol or accidental overdose on illicit drugs.	**INTERVENTION:** Initial assessment phase, attendance in 6 "acute" group sessions, followed by weekly group sessions in a "long-term" group until young person feels ready to leave. **CONTROL**: Usual care (not well defined or measured) **Tx setting:** NR **Tx duration:** Median of 8 group sessions over 6 months (range 0-19) **F/U duration:** 7 months post-randomization	**INTERVENTION** **Total N** = 32 **Age**: 14.2 (1.1) **Female**: 25 **Prior SA**: # of previous episodes of DSH = 4.1(2.3) **Psych comorbidity**: 27 with hx of MDD **CONTROL** **Total N** = 31 **Age**: 14.3(2.1) **Female**: 24 **Prior SA**: # of previous episodes of DSH = 4.2(2.6) **Psych comorbidity**: 25 with Hx of MDD	Proportion who report 2 or more episodes of DSH after randomization ("repeaters") **INTERVENTION**: 6% **CONTROL:** 32% Cox regression controlling for number of episodes of DSH prior to randomization: OR = 6.3 [95% CI 1.4-28.7]

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
SI at 6 months as measured by SIQ (not intention to treat) **INTERVENTION**: Mean decrease = 47.3 **CONTROL**: Mean decrease = 39.7 **Mean difference** = NS (7.5, 95%CI –18.8 to 33.9)	Yes	**Internal validity:** Fair **External validity:** Poor	Intervention did not decrease mean number of episodes of DSH, but did decreased proportion of patients who reported repeated (2 or more) episodes of DSH.	Reliance on self-report measures of DSH Small sample size Significant OR associated with wide CI Findings would need to be confirmed in larger studies Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Bennewith et al., 2002[58] RCT	**Recruitment setting:** Case register for DSH covering a particular catchment area; subjects must be registered with a GP **Age range:** 16-95 years **Eligibility:** Patients with a new episode of DSH identified from a case register in weekly report from local hospitals' accident and emergency departments, and those individuals from general practices which had agreed to participate in study were identified. General practices agreeing to be randomized (60% of those eligible) were the unit of randomization. **Exclusion criteria:** Substance use not felt to be DSH; homeless; patient requested no one be informed of episode; DSH secondary to psychosis; DSH managed entirely in primary care (so did not require visiting a hospital or emergency department).	**INTERVENTION:** GP received a letter informing them of a DSH episode, a letter to forward to the patient (at GP's discretion) inviting patient to make an appointment to consult, and guidelines on assessment and management of DSH for GP to use in consultations. **CONTROL**: Usual care **Tx setting**: Primary care **Tx duration**: One time receipt of above information by mail **F/U duration**: 12 months	**INTERVENTION** **Total N** = 964 **Age**: Mean = 32.3 ± 13.0 **Female**: 60.3% **Prior SA**: 13.9% **Psych comorbidity**: NR **CONTROL** **Total N** = 968 **Age**: Mean = 32.8 ± 13.5 **Female**: 57.3% **Prior SA**: 11.4% **Psych comorbidity**: NR	% with repeated DSH as indicated by case register **INTERVENTION**: 21.9% **CONTROL**: 19.5% **OR** = 1.17 (95% CI: 0.94, 1.47) *P* = 0.16

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
Mean days to first repeat episode as indicated by case register **INTERVENTION**: Mean = 104.9 **CONTROL**: Mean = 109.5 Hazard ratio = 1.15 (95% CI: 0.94, 1.42) *P* = 0.17	Yes	**Internal Validity**: Fair-good (only 58% of intervention group sent letter to patient within the 12 month period, compared to 15% of control group who initiated contact with patient) **External Validity**: Good	Identification to a GP practice of a patient's DSH episode and related recommendations, including management guidelines for a subsequent DSH consultation and provision of a letter inviting a DSH patient to consult, did not reduce the incidence of DSH.	This report is the only published study of an intervention based in primary care Assessment of outcome was blinded 60% of patients from each group attended a GP appointment within 6 weeks of index episode, most within 2 weeks For those with a history of DSH, OR for the intervention = 0.57 (95% CI 0.33-0.98), suggesting benefit for the intervention For those with no history of DSH, OR = 1.32 (95% CI 1.02, 1.70), suggesting a harmful effect from the intervention The intervention was of minimal intensity

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Montgomery et al., 1978[91] Cohort	**Recruitment setting:** NR **Age range**: NR **Eligibility:** Primary depressive illness; 30 of 80 patients were from an ongoing study comparing amitriptyline to mianserin **Exclusion criteria:** NR	**INTERVENTION 1**: Mianserin 60 mg **INTERVENTION 2**: Amitriptyline 150 mg **INTERVENTION 3**: Maprotiline 150 mg **Tx setting**: Inpatient **Tx duration**: 4 weeks **F/U duration**: 0 weeks	**INTERVENTION 1** **Total N** = 50 **Age**: Mean = 44.4 ± 2.1 **Female**: NR **HAM-D**: 24.6 ± 0.8 **MADS**: 17.2 ± 0.6 **INTERVENTION 2** **Total N** = 15 **Age**: Mean = 43.2 ± 3.4 **Female**: NR **HAM-D**: 22.1 ± 0.9 **MADS**: 16.5 ± 0.5 **INTERVENTION 3** **Total N** = 15 **Age**: Mean = 41.5 ± 3.7 **Female**: NR **HAM-D**: 23.4 ± 1.1 **MADS**: 15.9 ± 1.2	Intermediate outcome only

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
Decrease in SI was demonstrated for comparison between mianserin and amitriptyline using the MADS only (not HAM-D) **INTERVENTION 1**: Mean = ~ 11.0 **INTERVENTION 2**: Mean = ~ 5 **INTERVENTION 3**: Mean = ~ 6 **t test** (intervention 1 vs. intervention 2) = 2.8 *P* = < 0.01 **t test** (intervention 1 vs. intervention 3) = 1.8 *P* = < 0.10	No	**Internal Validity**: Poor **External Validity**: Poor	Drug effect demonstrated for comparison between mianserin to amitriptyline using the MADS only, not the HAM-D	Only SI assessed, not suicide attempts Very small sample size Very little explanation of study methods and analysis Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued))

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Pfeffer et al., 1994[89] Cohort	**Recruitment setting**: Inpatient mental health facility and community setting **Age range**:4.7-14.7 years at initial recruitment [mean 10.5 (SD 1.8)] **Eligibility**: 53 psychiatric inpatients with and 16 without SI or attempt in previous 6 months, and 64 nonpatients selected from general community matched by demographic factors **Exclusion criteria**: NR	**INTERVENTION:** Treatment post-hospitalization measured by self-report, parent report, school and clinic records **CONTROL:** Natural history of community sample **Tx setting:** Multiple **Tx duration:** Varied **F/U duration:** 7.16 $\pm$ 1.0 years	**INTERVENTION** **Total N** = 69 **Age**: NR **Female**: NR (27% overall) **Prior SA:** NR **Psych comorbidity:** All **CONTROL** **Total N** = 64 **Age:** NR **Female:** NR (27% overall) **Prior SA:** 1.6% in previous 6 months **Psych comorbidity**: 44	No association between annual rate of combined treatment services and occurrence of 1st suicide attempt. No association between specific type of service and time to first attempt. Rx drugs associated with shorter interval to first attempt (RR 17.03, 95% CI 3.33-87.1, *P* < 0.001), which likely reflects a more severely ill population. First suicidal episodes in patients most prevalent in first 2 yrs of F/U while community sample had slow gradual increase over full F/U interval.

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
Numbers of suicidal episodes (SI or attempt) **INTERVENTION:** N = 38 (55.1%) **CONTROL**: N = 22 (34.4%) No analysis reported	No	**Internal validity:** Fair **External validity:** Poor	No association between treatment and SI or attempts.	Naturalistic design limits ability to address treatment questions Sicker patients most likely received more treatment Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Rotheram-Borus et al., 2000[90] Cohort	**Recruitment setting:** Emergency room **Age range**:12-18 years **Eligibility:** Female patients who had attempted suicide, were not hospitalized for more than 1 week, and were not referred to hospitals outside of the region **Exclusion criteria**: No parent or family; low intelligence (not defined)	**INTERVENTION:** Emergency room staff received training, patients and mothers watched a 20-minute "soap opera" videotape conveying treatment expectations, and bilingual crisis therapist discussed videotape, provide 1 therapy session and contract for outpatient F/U treatment. **CONTROL:** Standard emergency room care and outpatient referral. **Tx setting:** Emergency room **Tx duration:** One emergency room encounter **F/U duration:** 18 months	INTERVENTION **Total N** = 65 **Age:** 14.9 (SD = 1.4) **Female**: All **Prior SA:** 31.8% **Psych comorbidity**: 59% (depression) CONTROL **Total N** = 75 **Age:** 14.9 (SD = 1.5) **Female**: All **Prior SA**: 29.7% **Psych comorbidity:** 60% (depression)	Number of suicide attempts measured by self-report, mother's report, and hospital records **INTERVENTION:** 6 **CONTROL:** 11 No statistically significant difference

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
Proportion of patients with Beck Depression Inventory scores in the clinical range at 18 months **INTERVENTION:** 4.9% **CONTROL:** 10.1% **Multivariate linear regression:** Beta = -.546 (*P* < .01)	No, though used multiple imputation to account for missing data	**Internal validity:** Fair **External validity:** Poor	Emergency room intervention was not associated with decreased suicide behaviors. Emergency room intervention was associated with decreased depression and increased number of outpatient F/U sessions (mean of 3.8 more sessions).	Primarily Latino females in an urban emergency room Small sample size for main outcome of suicide attempt Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Coryell et al., 2001[87] Cohort	**Recruitment setting:** 5 academic medical centers **Age range**: 17 years or older **Eligibility:** Cohort of patients treated for major affective disorders. From this cohort, a case-control study was designed with two case groups--suicide completers and suicide attempters. Controls were matched to cases on level of treatment at the same point in the case's follow-up period, sex, polarity at intake, lifetime substance abuse, and prior SA history. **Exclusion criteria:** NR	TREATMENT EVALUATED: Medication use at time of case's suicide completion or attempt **Tx setting**: Outpt **Cohort enrolled**: 1978-1981 **F/U duration**: ranged from 45.6 ± 36.5 in controls for suicide completers to 164.5 ± 75.6 for controls of suicide attempters	COMPLETED SUICIDES **Total N** = 15 **Age**: Mean = 39.1 ± 17.7 **Female**: 46.7% **Prior SA**: 26.7% **Psych comorbidity*** = 40.0% CONTROLS (COMPLETERS) **Total N** = 15 **Age: Mean** = 40.2 ± 13.0 **Female:** 40% **Prior SA:** 13.3% **Psych comorbidity* =** 53.3% ATTEMPTED SUICIDES **Total N** = 41 **Age: Mean** = 33.5 ± 12.5 **Female:** 80.5% **Prior SA**: 22.0% **Psych comorbidity*** = 0% CONTROLS (ATTEMPTERS) **Total N** = 41 **Age: Mean** = 38.2 ± 13.4 **Female:** 70.7% **Prior SA:** 14.6% **Psych comorbidity*** = 0%	Medication use at time of suicide completion COMPLETED SUICIDES: **TCA**: 40.0% **MAOI**: 13.3% **SSRI**: 6.7% **Lithium**: 40.0% CONTROLS FOR COMPLETERS **TCA**: 46.7% **MAOI**: 0% **SSRI**: 0% **Lithium**: 53.3% **Lithium (case vs control)**: **McNemar Chi square**: 0.667 *P* = 0.41 Statistical results given for lithium only

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
Medication use at time of suicide attempt **ATTEMPTED SUICIDES**: **TCA**: 63.4% **MAOI**: 22.0% **SSRI**: 4.9% **Lithium:** 22.0% **CONTROLS FOR ATTEMPTERS** **TCA:** 80.5% **MAOI:** 14.6% **SSRI:** 0% **Lithium:** 19.5% **Lithium (case vs control)**: **McNemar Chi square**: 0.067 *P* = 0.80 Statistical results given for lithium only	NR	**Internal Validity**: Fair **External Validity**: Fair-Poor Methods were not very clear. Follow-up occurred over approx 13 yrs, pts may have completed a Psychiatric Status Rating weekly.	Lithium was not protective for preventing suicide completion or attempts.	Deaths detected when attempts to recontact failed, confirmed with death certificate and medical record Questionable comparability between cases and controls Population not representative of patients with unidentified suicide risk

Evidence Table 2. Treatment of Suicide Risk (continued)

Author, Year	Selection of Population	Definition of Intervention and Study Groups	Characteristics of Enrolled Population	Primary Outcome: Definition and Results
Raj et al., 2001[88] Cohort	**Recruitment setting:** Intensive care unit of a general hospital **Age range**: 16-50 years **Eligibility:** Patients who attempted suicide for the first or second time by overdosing on drugs or pesticides, who also had anxiety or depression (mild, moderate, or severe). **Exclusion criteria:** Those who scored <20 on the Mini-Mental State Examination with psychosis, dysthymia, bipolar affective disorder, obsessive compulsive disorder, eating disorder, alcohol dependence or abuse of other psychoactive drugs, personality disorders (paranoid, schizoid, dissocial.	**INTERVENTION**: 10 sessions over a 2-3 month period where sessions included cognitive behavioral methods such as guided discovery and Socratic questions, verbal challenge, downward arrow method, activity scheduling, graded task assignment, cognitive restructuring, guided imagery, retribution and decatastrophising, distraction, behavioral and homework methods, diary maintenance, breathing exercises, suicidal contracts, problem-solving skills training, and behavioral counseling to significant others. Monthly letters sent for 2-3 months with booster sessions (1 to 5 sessions) as necessary. **CONTROL**: Routine medical treatment with an option to attend therapy sessions. Reminders sent for 2 months post-discharge about availability of therapy. **Tx setting**: NR **Tx duration**: 2-3 months **F/U duration**: 0 months	Patients were allocated to intervention and control sequentially upon admission to the ICU **BOTH GROUPS COMBINED** **Total N** = 40 (20 in INT and 20 in CONTROL) **Age range:** no mean given; 85% were between 16-30 years of age **Female**: 57.5% **Prior SA**: NR **Psych comorbidity**: 22.5%	% with repeats SAs **INTERVENTION**: 0% (n = 0) **CONTROL**: 5% (n = 1)

Evidence Table 2. Treatment of Suicide Risk (continued)

Secondary Outcome: Definition and Results	Intention-to-Treat Analysis (Yes/No)	Overall Quality: Internal/External Validity	Conclusions	Comments and Limitations
SI using difference in SSI) scores between baseline and 2-3 months post-discharge. **INTERVENTION**: Mean = 15.0 ± 7.79 **CONTROL**: Mean = 2.75 ± 6.09 **t test** = NR *P* = 0.00	No	**Internal Validity**: Poor **External Validity**: Poor	Flexible use of therapeutic methods addressing the individual's needs is effective with this population. Problem solving skills training, combined with cognitive and behavioral methods were successful at reducing suicide attempts and completions.	Non-randomized study Intervention group received personalized therapy but control group could receive therapy as well without control in the analysis Intervention group had lower educational attainment and salary, and higher rates of family history of psychiatric illness (65% vs. 5% in control group) Population not representative of patients with unidentified suicide risk