Brief Interventions for Suicidal Youths in Medical Settings: A Meta-Analysis

Brian H. Pitts, MD,[a,c,d] Reina Doyle, MPH,[b,c,d] Lauren Wood, PhD,[b,c] Reuven Dar, PhD,[e] Stephanie De Jesus Ayala, MS,[c,d] Tripti Sharma, MA,[c,d] Marie St. Pierre, MLIS, AHIP,[c] Bruno Anthony, PhD[b,c,d]

abstract

CONTEXT: Most youths who die by suicide have interfaced with a medical system in the year preceding their death, placing outpatient medical settings on the front lines for identification, assessment, and intervention.

OBJECTIVE: Review and consolidate the available literature on suicide risk screening and brief intervention with youths in outpatient medical settings and examine common outcomes.

DATA SOURCES: The literature search looked at PubMed, OVID, CINAHL, ERIC, and PsychInfo databases.

STUDY SELECTION: Interventions delivered in outpatient medical settings assessing and mitigating suicide risk for youths (ages 10–24). Designs included randomized controlled trials, prospective and retrospective cohort studies, and case studies.

DATA EXTRACTION: Authors extracted data on rates of referral to behavioral health services, initiation/adjustment of medication, follow-up in setting of assessment, suicidal ideation at follow-up, and suicide attempts and/or crisis services visited within 1 year of initial assessment.

RESULTS: There was no significant difference in subsequent suicide attempts between intervention and control groups. Analysis on subsequent crisis service could not be performed due to lack of qualifying data. Key secondary findings were decreased immediate psychiatric hospitalizations and increased mental health service use, along with mild improvement in subsequent depressive symptoms.

LIMITATIONS: The review was limited by the small number of studies meeting inclusion criteria, as well as a heterogeneity of study designs and risk of bias across studies.

CONCLUSIONS: Brief suicide interventions for youth in outpatient medical settings can increase identification of risk, increase access to behavioral health services, and for crisis interventions, can limit psychiatric hospitalizations.

[a]*Department of Pediatrics, University of Colorado School of Medicine, Aurora, Colorado;* [b]*Department of Psychiatry, University of Colorado School of Medicine, Aurora, Colorado;* [c]*Children's Hospital Colorado, Aurora, Colorado;* [d]*Partners for Children's Mental Health, Aurora, Colorado; and* [e]*School of Psychological Sciences,Tel Aviv University, Tel Aviv, Israel*

Drs Anthony and Wood and Ms Sharma contributed to reviewing articles for inclusion, extracting data, and drafting and reviewing the manuscript; Dr Dar contributed to meta-analyses and drafting related parts of the manuscript; Ms De Jesus Ayala contributed to extracting data and drafting and reviewing the manuscript; Ms Doyle contributed to extracting data, synthesizing data, reviewing study risk of bias, and drafting and reviewing the manuscript; Dr Pitts coordinated all review efforts and was lead in designing the protocol and contributed to reviewing articles for inclusion, extracting data, synthesizing data, reviewing study risk of bias, and drafting and reviewing the manuscript; Ms St. Pierre conducted an article search through databases and drafted sections related to article search strategies; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

DOI: https://doi.org/10.1542/peds.2023-061881

Accepted for publication Nov 3, 2023

To cite: Pitts BH, Doyle R, Wood L, et al. Brief Interventions for Suicidal Youths in Medical Settings: A Meta-Analysis. *Pediatrics*. 2024;153(3):e2023061881

Suicide is a leading cause of death in youth across the United States. A recent survey revealed that 18.8% of students nationwide had seriously considered attempting suicide, 15.7% of students had made a plan about how they would attempt suicide, and 8.9% of students had attempted suicide more than once.[1]

Approximately 80% of youths who die by suicide interfaced with the medical system in the year preceding their death,[2] but only 20% had contact with a mental health professional.[3] Therefore, outpatient medical settings are well-positioned to identify, assess, and intervene with at-risk youth. Due in part to the increase in suicide rates, the American Academy of Pediatrics, the American Academy of Child and Adolescent Psychiatry, and the Children's Hospital Association declared a national emergency in child and adolescent mental health.[4]

Assessing interventions for suicide prevention, screening, and brief intervention in medical settings is challenging. Suicide is a relatively rare occurrence, and studies require large sample sizes to reveal the impact. In addition, the duration of prevention studies is often too brief to collect sufficient data on the low-frequency end points of death by suicide or suicide attempts. Consequently, the authors of many studies have focused on proximal outcomes. Moreover, testing interventions for people at risk for suicide presents unique ethical dilemmas, particularly in randomized controlled trials (RCTs). Alternative designs, such as case-control and risk-based allocation studies, have been employed to avoid such issues.[5]

In this article, we cover the literature on interventions in outpatient medical settings that include either suicide screening or suicide risk assessment followed by a brief intervention with youths aged 10 to 24. We examine the outcomes of these interventions with the goal of providing recommendations for future research and clinical practice guidelines.

METHODS

This systematic review is based on the updated Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines.[6] The protocol is registered in the International Prospective Register of Systematic Reviews under protocol ID CRD42021277451.

Inclusion Criteria

The following designs were included: RCTs, prospective and retrospective cohort studies, and case studies reported in English. We excluded cross-sectional studies. We included studies in which most participants fell within the age range of 10 to 24 years. Eligible interventions included suicide risk assessment and at least 1 intervention step to reduce suicide risk by the clinical or research team occurring within 2 weeks of the point of care. Settings included outpatient care, such as general pediatrics, family practice, and school-based health centers. Many patients access urgent or emergency care for routine medical needs; thus, interventions in these settings were included. We excluded interventions delivered during hospital admission, in nonmedical secondary school settings, or studies that were set solely in the community.

Outcomes of Interest

The primary outcomes of interest included the number and rate of subsequent suicide attempts and of emergency department (ED)/crisis center visits for suicidal ideation (SI) within 1 year after the initial intervention. The secondary outcomes of interest included rates of referral to behavioral health services, behavioral health service use within 1 year after initial intervention, follow-up of suicide risk identification, and persistent SI within 18 months of identification and intervention.

Information Sources

The literature search, completed in November 2020, covered the PubMed, OVID, Cumulative Index of Nursing and Allied Health Literature, Education Resources Information Center, and PsychInfo databases, not limited to any range of years. Citations and PDFs of the articles were organized in EndNote and deduplicated. Article authors were contacted for missing or incomplete data.

Search Strategies

The search strategy for PubMed was as follows (it was minimally modified in the other databases to account for their specific search functions): ((primary care" OR "primary health care" OR "primary care nursing" OR "Primary Health Care"[Mesh] OR "Primary Care Nursing"[Mesh] OR "Physicians, Primary Care"[Mesh])) OR ("physician assistant" OR "nurse practitioner" OR "school nurse" OR "Physician Assistants"[Mesh] OR "Nurse Practitioners"[Mesh] OR "Pediatric Nurse Practitioners"[Mesh] OR "social worker" OR "Social Workers"[Mesh] OR "school nurse" OR "school health services "OR "School Nursing"[Mesh] OR "School Health Services"[Mesh] OR "School Mental Health Services"[Mesh] OR "emergency department" OR "emergency room" OR "emergency service" OR "emergency nursing" OR "urgent care OR "retail care" OR "emergency department" OR "emergency room" OR "emergency service" OR "emergency nursing" OR "urgent care" OR "retail care" OR "Emergency Service, Hospital"[Mesh] OR "Emergency Nursing"[Mesh] OR "retail clinic") AND ("prevention and control" [Subheading] OR "Primary Prevention"[Mesh] OR prevention OR screening OR assessment OR intervention)) AND (suicide OR "attempted suicide" OR suicidality OR "suicidal ideation" OR "suicidal ideation[Mesh] OR "suicide, attempted"[Mesh]) Filters: Child: 6–12 years, Adolescent: 13–18 years, Young Adult: 19–24 years.

Article Selection

Each article was assigned 2 reviewers who examined the title and abstract to determine if it should be excluded on the basis of setting, population, or absence of an intervention. The reviewers then reconciled their determination and categorized each article for exclusion or closer review.

Each article included for further review was assigned a team of 2 reviewers who read the article and recorded information on the authors, title, year, setting, population, study design, description of intervention, primary outcomes, conclusion, limitations or gaps, and notes. On the basis of this information, each reviewer suggested that an article be included or excluded. Information recorded during this step was not shared until the completion of all reviews by that team. The reviewer pairs then met to calibrate their information and impressions. If a consensus was not reached by the pair, the article was brought to the larger author group for further review.

Data Collection Process

Data extraction forms were created and organized in a Microsoft Word template. All reviewers trained on and piloted the extraction forms before assignment to reduce errors and refine the form. Each article was assigned 2 reviewers for data extraction. After the data were extracted, reviewer pairs met to calibrate the data and discuss discrepancies. Discrepancies that could not be resolved were brought to the full author group for further discussion.

Data Items

Data extracted from the point of intervention included the identification rates of patients at risk for suicide. Outcome data included the rates of referral to behavioral health, rates of initiation or adjustment of psychotropic medication, rates of behavioral health service use after identification, follow-up rates in the setting of initial risk assessment, SI at follow-up, change in SI at follow-up, suicide attempt within 1 year after risk assessment, and ED or crisis services visited for SI within 18 months after risk assessment.

Risk of Bias in Individual Studies

The risk of bias for RCT studies was assessed by 2 reviewers by using the Cochrane Collaboration tool for assessing risk of bias for RCTs (RoB 2). After assessment, the 5 domains were categorized as "low risk," "some concerns," or "high risk" for each outcome. Nonrandomized studies were evaluated by using the Risk of Bias in Nonrandomized Studies of Interventions Cochrane Collaboration tool and categorized as having a "low," "moderate," "serious," or "critical" risk of bias along the 7 domains. An overall risk of bias for each outcome was then determined using the RoB 2 and Risk of Bias in Nonrandomized Studies of Interventions tool criteria. Disagreements in any of the above were resolved through consultation with the author group.

Summary Measures

We determined that it was feasible to conduct meta-analyses on 5 outcomes, and they are presented using forest plots and a brief narrative summary for each outcome of interest. Given the low number of qualifying studies, all studies were included, regardless of the risk of bias. The outcomes that did not qualify for a meta-analysis because the missing data were summarized by using a narrative synthesis.

Statistical Model

Computations were conducted by using Comprehensive Meta-Analysis Version 4.[7] We employed pre–post analysis whenever the relevant data were available, and only post scores when the authors did not report baseline or change scores.[8] When several follow-up periods were reported (eg, both 2 and 6 months), we used the longest period.

The random effects model was employed for all the analyses because the diversity in population and interventions in the studies included in the analysis precludes the assumption of a common effect, which underlies the fixed effect model.[7,9–11] As a measure of effect size, we used the odds ratio (OR) when study authors reported proportions (eg, of immediate psychiatric hospitalization), and Hedges' g when study authors reported continuous scores (eg, of depression scales). τ-squared was used to estimate the variance of the true effect sizes in each analysis, and the Q-statistic was used to test the null hypothesis that all studies in each analysis shared a common effect size. We should note, however, that this test is underpowered when the number of studies in each analysis is small.[12]

RESULTS

Articles

A total of 575 articles were screened and 14 were included (Fig 1): 6 RCTs, 1 quasi-experimental, 4 retrospective, and 3 single-arm studies (Table 1). One RCT was analyzed as a prospective cohort trial for the outcome of interest.[13] Results from the 3 single-arm studies are displayed in Table 2.

Participants

There was a total of 73 458 participants. Sample sizes ranged from 24 to 56 352. Ages ranged from 10 to 20 years. Five studies included participants who presented with suicide attempts or ideation,[8,14–17] 4 studies included participants who screened positive for SI,[18–21] and 5 studies did not have suicide-related inclusion criteria.[13,22–25]

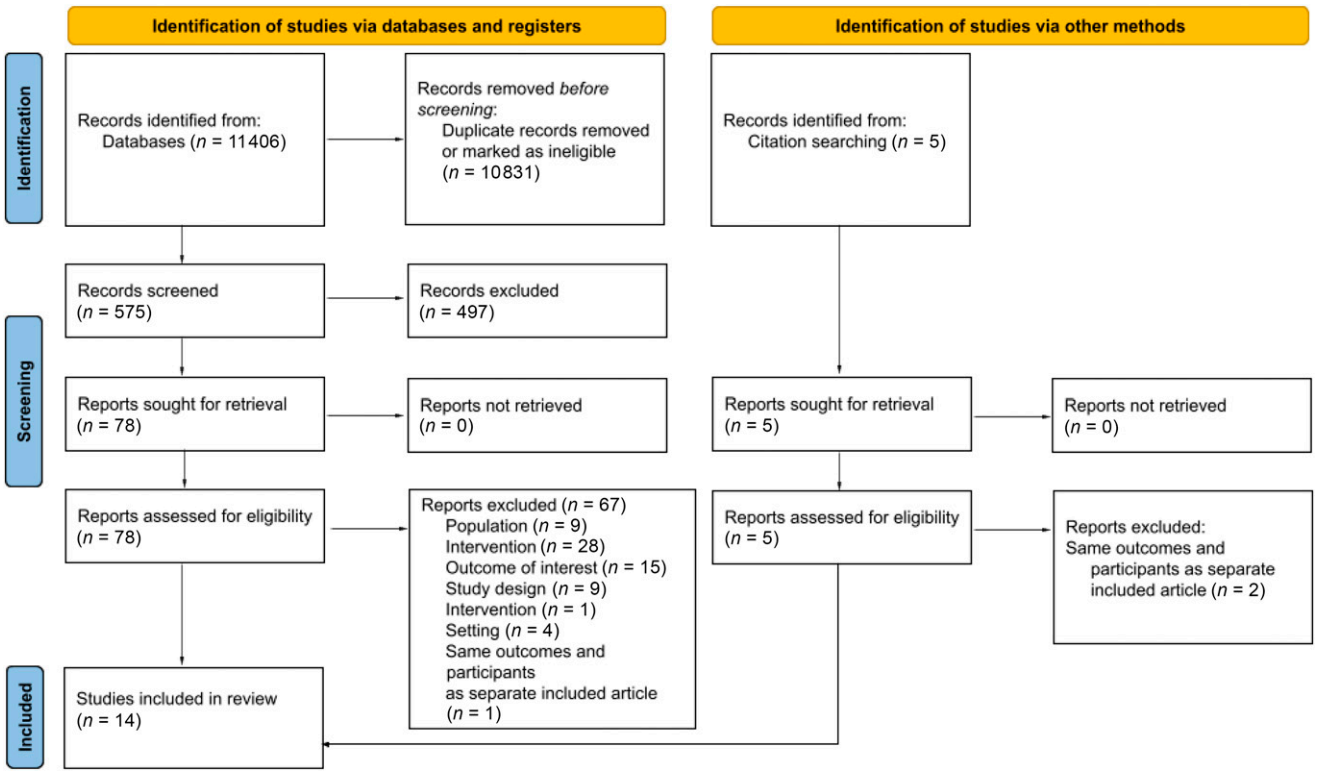

FIGURE 1
Preferred Reporting Items for Systematic Reviews and Meta-Analysis flow diagram.

Settings

Four studies took place in outpatient clinics,[13,19,22,25] 8 took place in EDs,[8,15,16,18,20,21] 1 took place in urgent care,[23] and 1 took place in both an ED and community setting.[24] All study settings were in urban geographic areas.

Interventions

Six studies were classified as screening, assessment, and referral (SAR) interventions if they only included suicide screening, patient assessment, or referral to behavioral health. Eight were classified as crisis intervention session (CIS) interventions if the intervention included additional components, such as family-based interventions,[8,16,17,20] motivational interviewing,[20,21] follow-up,[16,18,21] staff or provider training,[8] enhanced behavioral health interventions (behavioral health service beyond usual care),[8,15] and consultation.[24]

Risk of Bias

Outcomes in RCTs had varying characteristics contributing to the risk of bias.[20] Three studies had outcomes with an overall low risk of bias, 3 had some concerns about the risk of bias, and 1 had an overall high risk of bias because of how the outcome of interest was measured (Fig 2, Supplemental Table 3).

The overall risk of bias for outcomes in nonrandomized controlled (NRC) studies was typically determined to be serious, most commonly as a result of the outcome measurement methods (Fig 3, Supplemental Tables 3–7). One study also had serious bias due to deviations from the intended interventions. The outcomes for 1 NRC study were deemed to be at an overall moderate risk of bias and only 1 had outcomes deemed to be at an overall low risk of bias. Three single-arm studies could not be assessed by using the ROBINS or RoB 2 tools.

Primary Outcome: Subsequent Suicide Attempts

This meta-analysis is based on 3 studies.[8,15,20] The effect size index is the odds ratio, which was 0.850 with a 95% confidence interval (CI) of 0.398 to 1.815. The Z-value was −0.42 with $P = .674$, indicating that the null hypothesis cannot be rejected (Fig 4). The Q-statistic was 1.518 with 2 degrees of freedom, and because this value was smaller than the expected value under the null hypothesis (ie, 2), the variance of the true effects was estimated as 0. Two studies had some concerns for risk of bias because of missing outcome data,[8,20] potential outcome assessor bias,[8] and the post hoc inclusion of this analysis.[20] It is unclear if these potential biases favored intervention or control.

TABLE 1 Study Characteristics

Author, y	Sample Size	Age Range	Sex	Race/Ethnicity	Clinical Setting	Intervention	Intervention Category	Study Design
Asarnow et al, 2011	181	10–18	Female: 66%	White, NH: 35% African American: 14% Hispanic: 42% Other: 10%	ED	Youth and family crisis therapy session, follow-up phone contact	CIS	RCT
Chisolm et al, 2009	3960	11–20	Female: 53.8% Male: 46.2%	White 36.6% Black 55.9% Hispanic 3.8% Other 3.6%	Primary Care	Screening, provider feedback report	SAR	RCT for entire study; prospective cohort for outcome of interest
Etter et al, 2018	2134	12–20	Female: 51.1% Male: 48.9%	Black: 60.3% Hispanic: 14.3% Other: 17.5% White: 7.9%	Primary Care	Screening, automated provider worksheet, enhanced EHR	SAR	Single-arm
Gardner et al, 2010	1547	11–20	Female: 58% Male: 42%	Black: 57% Other: 9% White: 34%	Primary Care	Screening, feedback, risk triage, referral to behavioral health	SAR	Single-arm
Grupp-Phelan et al, 2019	159	12–17	Female: 79.2%	White: 50.3%	ED	MI-based family therapy session, behavioral health referral, case management	CIS	RCT with parallel design
Grupp-Phelan et al, 2012	24	12–17	Female: 79.2% Male: 20.8%	White: 29.2% African American: 50.0% Other: 20.8%	ED	Screening, brief evaluation, assessment, discussion, and referral for behavioral health appointment	CIS	RCT
King et al, 2015	46	14–19	Female: 80%	African American: 57% Caucasian: 39% American Indian or Alaska Native: 4% Native Hawaiian/Pacific Islander: 2% Hispanic: 2% Other: 2%[a]	ED	Personalized feedback, MI-based session, phone check-in	CIS	RCT with parallel design
Parker et al, 2003	682	<19	Female: 51% Male: 49%	Not listed	ED/Community	Physician training, behavioral health referral	CIS	Retrospective
Patel et al, 2018	4868	12–19	Female: 55.6% Male: 44.4%	White: 68.5% Black:12.8% Hispanic: 8.9% Multiracial: 4.2% Asian: 1.8% Unknown: 1% Other: 1.9%	Urgent Care	SAR to behavioral health	SAR	Single-arm
Rotheram- Borus et al, 2000	140	12–18	Female: 100%	Latino: 89.2% (experimental) Latino: 85.3% (control)	ED	Staff or provider training, family-based crisis intervention, referral for behavioral health follow-up	CIS	Quasi-experimental

TABLE 1 Continued

Author, y	Sample Size	Age Range	Sex	Race/Ethnicity	Clinical Setting	Intervention	Intervention Category	Study Design
Wharff et al, 2012	250	13–18	Female: 76%	White: 65%	ED	Family-based, cognitive behavioral crisis intervention session	CIS	Retrospective
			Male: 24%	Black: 17%				
				Hispanic/Latino: 10%				
				Biracial: 2%				
				Asian: 3%				
				Another race: 4%				
Wharff et al, 2019	139	13–18	Female: 72%	Black: 6%	ED	Family-based, cognitive behavioral crisis intervention session	CIS	RCT with parallel design
			Male: 28%	White: 66%				
				Latino: 9%				
				Asian: 3%				
				Mixed: 18%				
Wintersteen et al, 2010	2976	12–17.9	Female: 58%, 52%, 48%	Black: 77%, 77%, 99%	Adolescent medicine and primary care	Staff or provider training, SAR to behavioral health	SAR	Retrospective
				White: 16%, 19%, 0%				
				Hispanic: 2%, 1%, 0%				
				Other: 5%, 3%, 0%				
Wintersteen et al, 2013	56 352	12–17.9	Female: 51.5%	African American: 71.6%	ED	Screening, provider and staff training, evaluation	SAR	Retrospective
			Male: 48.5%	Caucasian: 22.8%				
				Other: 5.6%				

EHR, electronic health record; MI, motivational interviewing; NH, non-Hispanic.
[a] Some identified as biracial.

TABLE 2 Single-Arm Study Findings		
Outcome	**Study**	**Findings**
Primary outcomes		
Suicidal ideation at follow-up	Gardner et al, 2010	3.4% of patients seen for suicidality after receiving intervention
Secondary outcomes		
Suicide risk identification	Etter et al, 2018	6% (131) of screened patients
Suicide risk identification	Patel et al, 2018	2.4% (119) of screened patients
Immediate psychiatric hospitalization	Etter et al, 2018	7.5% of patients screening positive
Immediate psychiatric hospitalization	Patel et al, 2018	15% of patients with a positive risk assessment on C-SSRS
Behavioral health referrals	Gardner et al, 2010	74% of patients screening positive
Behavioral health referrals	Patel et al, 2018	82% of patients with positive screens
Behavioral/mental health care service use	Gardner et al, 2010	65% of patients referred internally received a service

C-SSRS, Columbia-Suicide Severity Rating Scale.

Primary Outcome: Subsequent ED, Crisis Center Visits, and Hospitalizations

Only 1 study had comparative results for this outcome.[16] The authors of this study assessed rebound ED visits within 1 month, finding that intervention patients had a non-statistically significant increased rate of returning for crisis intervention (13% vs 4%; Fisher's exact test; $P = .07$).[16] The same study found a non-statistically significant increased number of intervention patients required subsequent psychiatric hospitalization within 1 month of intervention (7% vs 3%; Fisher's exact test; $P = .27$).[16] In another study, 3.6% of patients in the intervention were hospitalized because of SI in the 3 months after intervention, but there was no comparison with the control group.[17]

Secondary Outcomes

Screening and Identification Rates

The authors of only 1 study compared the rates of suicide risk screening (82.1% vs 36.5%; OR 2.49; 95% CI 2.02–2.97; $P < .05$) and identification of patients at risk of suicide (3.6% vs 0.8%; OR 4.33; 95% CI 3.73–4.94; $P < .05$) between intervention and control groups, with both outcomes favoring the intervention group.[25]

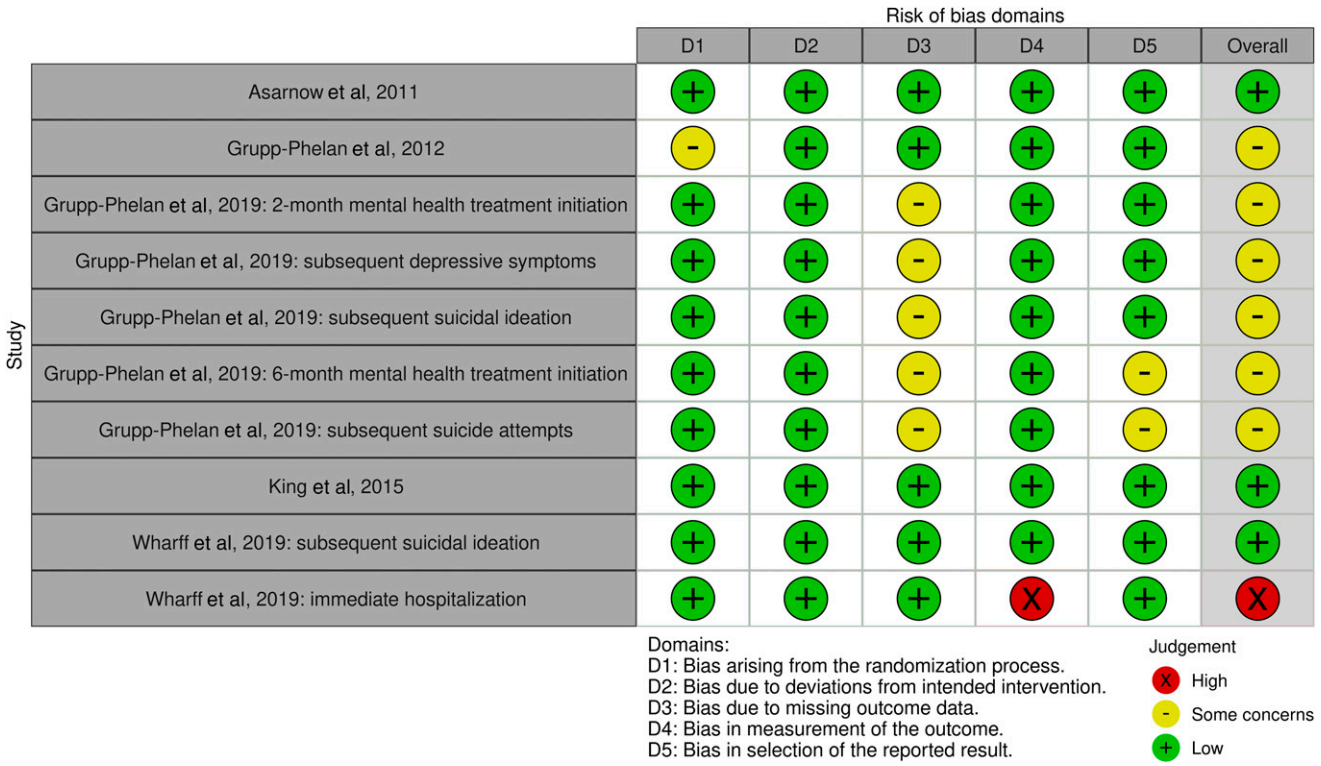

FIGURE 2
Risk of bias in RCTs.[20,22,25,27,28] This figure was created by using robvis (visualization tool).[49]

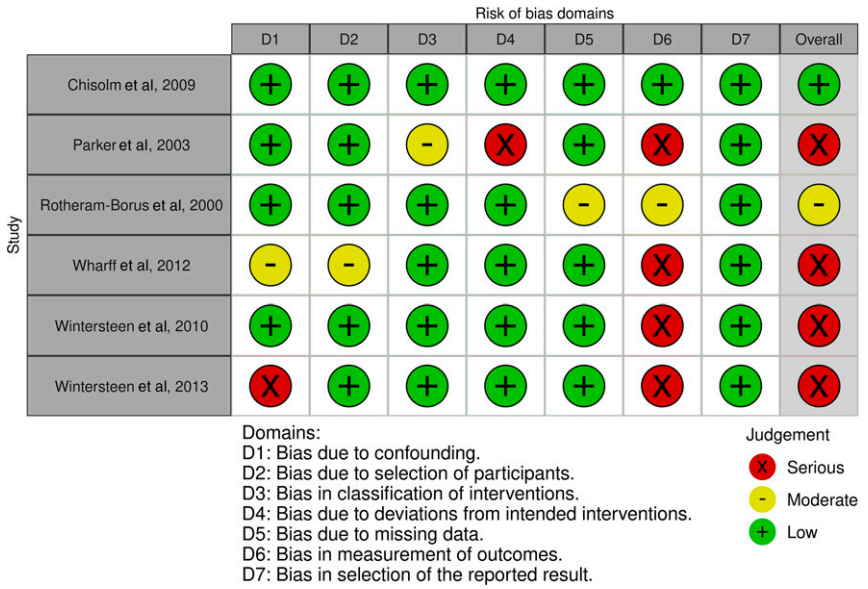

FIGURE 3
Risk of bias in NRC studies.[10,19,21,26,30,31] This figure was created by using robvis (visualization tool).[49]

Immediate Hospitalizations

This meta-analysis is based on 5 studies from 3 articles.[16,17,24] The mean effect size was 0.336 with a 95% CI of 0.149 to 0.755. The Z-value is −2.639 with $P = .008$, indicating a statistically significant reduction in immediate psychiatric hospitalizations in the intervention versus the control conditions (Fig 5). The Q-value was 35.544 with 4 degrees of freedom, $P < .001$. τ-squared, the variance of true effect sizes, was 0.733 in log units. All studies had a serious or high risk of bias for this outcome because of outcome assessors also delivering the interventions,[16,17,24] and 1 had a high risk of bias for deviation from the intended intervention.[24]

One study with an SAR intervention was not included in the meta-analysis because of missing critical data.[14] The study authors reported a significant decrease in emergency room referrals from the intervention clinic (87% decrease, OR = 0.13, 95% CI 0.03–0.36, $P < .001$).[14] However, the authors reported no statistical difference in psychiatric hospitalization rates from the intervention clinic, likely because of being underpowered (10.7 admissions per year, 4 admissions per year after intervention).

Referrals to Behavioral Health

Interventions were positively associated with referrals to behavioral health in 2 studies.[17,25] One revealed a significant increase in behavioral health referrals for SI made by primary care providers after introducing a suicide risk screening program (3.6% vs 0.8% of patients screened for suicide risk; OR 4.33; 95% CI 3.73–4.94; $P < .05$).[25] The other study revealed a shift from inpatient admission to referral to intensive outpatient (21% vs 5.3%; χ^2 value not reported; $P < .001$) and regular outpatient therapy (43% vs 37%; χ^2 value not reported; nonsignificant) in intervention patients.[17] Both studies had an overall serious risk of bias for this outcome.

Behavioral Health Service Use

Both CIS and SAR interventions revealed an association between intervention and patient behavioral health service use and engagement.[8,13,15,18,20] The mean effect size

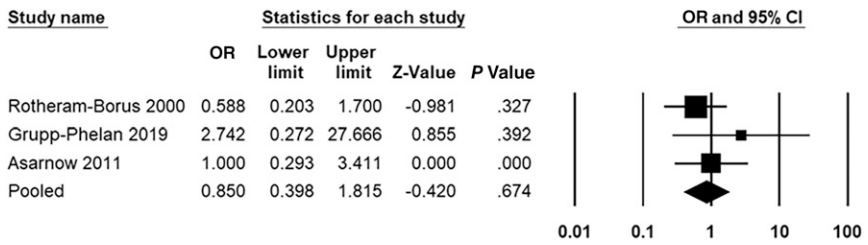

FIGURE 4
Forest plot of subsequent suicide attempts.[10,22,27] Odds ratios <1 indicate that the interventions resulted in fewer suicide attempts at follow-up. Rates imputed from Rotheram-Borus[10] assume equal rates of attrition between groups, per the author's advice. See Supplemental Table 4 for details on study-specific outcome data.

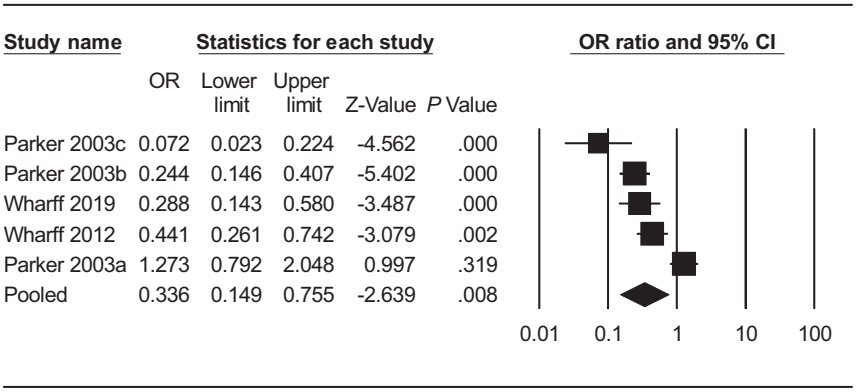

FIGURE 5

Forest plot of immediate psychiatric hospitalizations.[25,26] Odds ratios <1 indicate that the interventions resulted in fewer hospitalizations at follow-up as compared with controls. Twelve-month *N*s were imputed from reported monthly participant rates for Parker[30] for inclusion in this meta-analysis. Parker et al, 2003 measured immediate hospitalizations at Hotel Dieu Hospital in after introduction of an intervention program in 1998 (Parker 2003a), in 2000 after termination of the program in 1999 (Parker 2003b), and at the Hospital for Sick Children in 1999 (Parker 2003c). See Supplemental Table 5 for details on study-specific outcome data.

was 3.843 with a 95% CI of 2.12 to 6.967. The Z-value is 4.44 with $P < .001$, indicating an overall statistically significant effect of the interventions (Fig 6). The Q-value was 13.041 with 4 degrees of freedom, $P = .011$, and τ-squared was 0.284 in log units. These studies all had a low or moderate risk of bias for this outcome. This moderate risk of bias was largely mediated by missing outcome data[8,20] with unclear implications for the directionality of bias.

Subsequent Depression Symptoms

This meta-analysis is based on 5 studies.[8,15,18,20,21] The mean effect size was 0.405 with a 95% CI of 0.143 to 0.666. The Z-value was 3.035 with $P = .002$, indicating an overall statistically significant effect of the interventions (Fig 7). The Q-value was 7.133 with 4 degrees of freedom, $P = .129$, and τ-squared, the variance of true effect sizes, was 0.039 in d units. Two of these studies had a moderate risk of bias for missing outcome data,[8,20] and 1 had a moderate risk of bias due to participants being unblinded about their intervention status.[18]

Subsequent SI

This meta-analysis is based on 4 studies.[15,16,20,21] The mean effect size for SI measures was 0.053 with a 95% CI of −0.160 to 0.255. The Z-value was −0.485 with $P = .628$, which implies that there is no statistically significant effect of the interventions on SI scores (Fig 8). The Q-value was 1.656 with 3 degrees of freedom, and because this value is smaller than the expected value under the null hypothesis (ie, 3), the variance of the true effects was estimated as 0. There was, however, a significant time effect revealing decreased SI for both intervention and control groups across 3 studies over time.[16,20,21] One study had a moderate risk of bias with an unclear impact on results due to missing participant data.[20] A fifth study that revealed no significant change in SI ($\beta = -0.316$; *P* value not reported) was not included in this meta-analysis because it

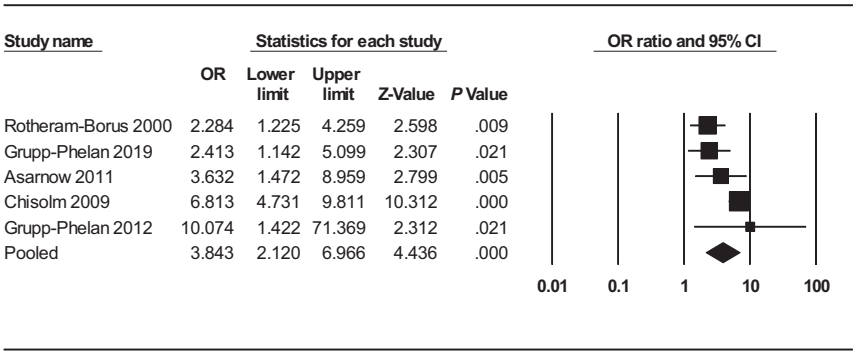

FIGURE 6

Forest plot of behavioral and mental health care service use.[10,19,20,22,27] Odds ratios >1 indicate that the interventions resulted in higher rates of using behavioral and mental health care services compared with controls. See Supplemental Table 6 for details on study-specific outcome data.

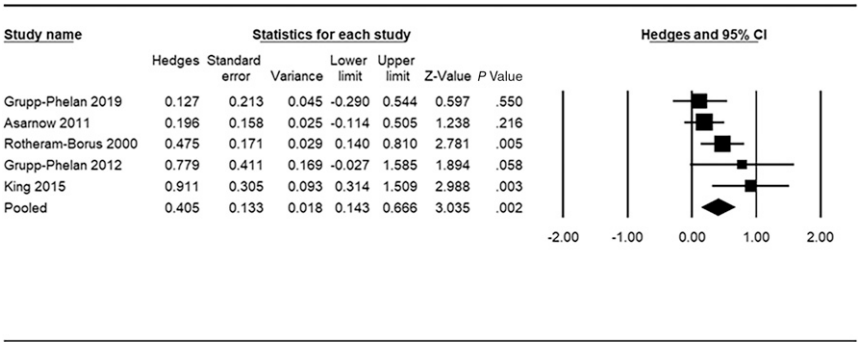

FIGURE 7

Forest plot of the effects of interventions on subsequent depression symptoms.[10,20,22,27,28] Hedges' g >0 indicates that interventions reduced scores on measures of depression at follow-up (controlling for baseline scores) compared with controls. All studies had a low or moderate risk of bias for these outcomes. See Supplemental Table 7 for details on study-specific outcome data.

did not include SI symptom scores, and they were not available from the author.[8] This study had a moderate risk of bias due to missing data and concerns that outcome assessors (therapists) were not blind to participant intervention status.

DISCUSSION

Overall, the results revealed a lack of intervention effect on subsequent suicide attempts and subsequent SI. The results did, however, suggest an impact on secondary outcomes of reducing immediate psychiatric hospitalizations and improving patient access to mental health care, with a milder effect on patients' subsequent depressive symptoms. These findings provide evidence that brief suicide interventions in medical settings can improve the delivery of mental health care to suicidal youth. However, they also make clear that these interventions alone are insufficient at decreasing future suicide attempts and SI in youths.

Subsequent Suicide Attempts and Crisis Interventions

A previous meta-analysis of 14 brief interventions that combined adult and adolescent studies (4 overlapped with the current study) revealed a trend toward fewer subsequent suicide attempts.[26] However, of the 7 studies examining this outcome, only 2 (included in this review) involved adolescents, and the results were the weakest for those. Because a reduction in suicide attempts could be considered the most critical outcome of prevention efforts, our finding of a lack of such effects is disappointing. This may reflect the challenge facing suicide prevention studies related to low base rates of suicide and small sample sizes.

A large percentage of patients seen in the ED for suicide or self-harm return to the ED for psychiatric reasons within 1 year.[27] The authors of the small number of studies reviewed in the current paper did not sufficiently evaluate the effect of intervention on this outcome.

Subsequent Symptomatology

Five studies assessed subsequent depressive symptoms. Overall, intervention groups had significantly lower depression scores at follow-up compared with control groups. The impact of interventions on subsequent SI was not significant based on 4 studies. However, there was significantly decreased SI over time for intervention and control groups in 3 of the 4 studies included in this review. A previous systematic review of suicide prevention interventions identified 13

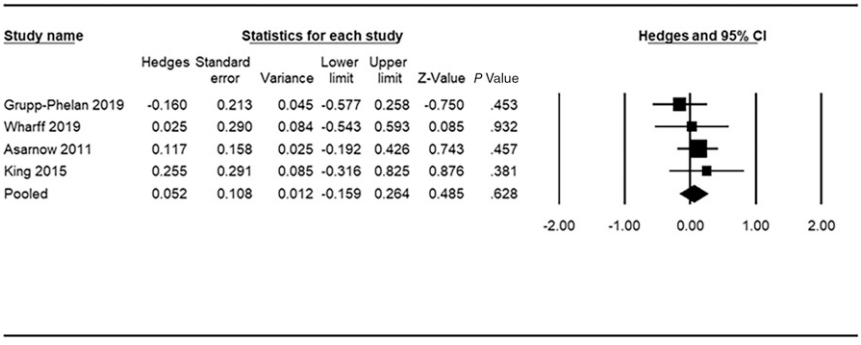

FIGURE 8

Forest plot of the effects of interventions on subsequent suicidal ideation.[2,22,25,27] Hedges' g >0 means that interventions reduced scores on measures of suicidal ideation at follow-up (controlling for baseline scores) as compared with controls. See Supplemental Table 7 for details on study-specific outcome data.

studies in health care settings (ED, clinics, inpatient) that measured SI at follow-up.[28] Of those, the authors of only 4 reported significant effects of the intervention condition, although many of the interventions were more intensive than those included in the current review.[28]

Immediate Psychiatric Hospitalization

Our results suggested a drastic reduction in immediate psychiatric hospitalizations in the intervention conditions. Although the degree of this effect was mediated by a serious risk of bias among outcome assessors in all qualifying studies, the directionality of the effect was likely real. Coupling suicide risk assessment and safety and disposition planning is a core feature of modern brief suicide prevention strategies.[29,30]

Over the past 15 years, pediatric hospitalizations for mental health disorders have increased by >50%, with total expenditures of $11.6 billion.[31] Studies have revealed that significant percentages of youth are readmitted for inpatient psychiatric care within 1 year of discharge.[32–36] Such repeat hospitalizations can disrupt social support and school performance and result in greater stigmatization for youth and families. Thus, brief interventions such as the Family-Based Crisis Intervention or the Rapid Response Model may provide an alternative to psychiatric hospitalization, providing social benefits to the patient and cost benefits to the system.[16,17,24]

Access to Mental Health Care

CIS interventions had a strong association with increased access to outpatient behavioral health care with little indication that this finding was subject to a significant risk of bias. These findings are consistent with the Doupnick meta-analyses, which revealed that the pooled effect of the interventions was to increase linkage to follow-up care in both adults and adolescents.[26] They are particularly important because attendance at mental health follow-up after an ED visit or hospitalization for suicide risk is associated with as much as a 75% lower risk of subsequent suicide death.[37] However, overall rates of mental health follow-up after the acute treatment of suicide attempts are low, particularly for youths who were not engaged in care before the ED visit.[38,39]

Limitations

This review has several limitations. First, our literature search was limited to published articles and reports in English. Second, only 14 studies met the inclusion criteria, and only the subset with relevant outcomes was included in each meta-analysis. Additionally, the studies were heterogeneous, with a mix of RCTs, non-RCTs with 2 or more arms, and single-arm trials. Because of this, definitive effect sizes for specific settings or intervention models could not be estimated. Risk of bias was also a limitation; we could only conduct a risk of bias assessment on 11 studies, 8 of which had at least 1 outcome with a moderate risk of bias. Finally, we were not able to examine whether brief suicide interventions reduced suicide deaths because most studies did not include death as an outcome.

Implications for Future Research and Practice

This review and meta-analysis synthesized the literature on suicide screening and brief interventions with youths in outpatient medical settings. In agreement with other reviews, such interventions may be effective at improving patients' linkage to follow-up mental health care, as well as reducing immediate hospitalization and symptoms of depression.

The small number of studies likely results from several factors, including challenges in approaching acutely suicidal patients and families, clinical site environmental factors, and youth and parental concerns regarding the study. The authors of future studies should focus on established ways to enhance recruitment.[40] Reliable state-level and health system-level estimates of suicides, suicide attempts, and rehospitalizations would help determine the true impact of suicide prevention programs.

Access to timely care after the identification and assessment of suicide risk continues to be a challenge. Although this review revealed that brief interventions in medical settings can be successful, further investigation into engaging families and high-risk adolescents in treatment is warranted, particularly with family-focused interventions.[41,42] In addition, because positive results have been reported in interventions using technology with adults, further studies exploring technology to enhance engagement[43] and increase access[44,45] are encouraged.

The success of these efforts underlines the importance of integrating interventions into general medical care. The Joint Commission's 2016 mandate to identify patients at risk for suicide[4] has increased the number of health care settings screening for suicide risk. However, successful integration depends on several factors. First, health care settings need robust systems to identify patients with suicide risk. Clinical pathways for universal suicide risk screening for youths in EDs and similar medical settings have been developed, with attention to both assessment tools and implementation factors.[45] Nonetheless, their success varies. Second, suicide prevention interventions need experienced clinicians who have the skills and knowledge to deliver them.[41] Yet, many settings have limited access to this workforce and may rely on other professionals to deliver components of the interventions. Settings with limited access to mental health professionals may consider using telehealth to improve access to mental health. Also, to ensure appropriate resources, health care systems need to identify mechanisms

to reimburse the time and resources required to deliver evidence-based suicide prevention interventions.

Finally, the utility of such clinical intervention lies primarily in its ability to link at-risk youths with appropriate care. Procedures that facilitate referral should be systematic and include a structured approach to engage high-risk patients in safety planning and ensure that patients have access to evidence-based services. Because most suicidal patients who leave the ED never attend a follow-up appointment, facilitating the transition of care after discharge is essential. Telehealth and other modes of contact should be considered to facilitate care coordination, which is a key component of many of the included interventions.[46]

Only 4 studies included interventions in primary care settings. All were classified as SAR interventions and did not include CIS components. There has been significant development in youth suicide screening and intervention in primary care settings,[29,47] but the impact remains understudied.[48]

CONCLUSIONS

Brief suicide prevention interventions in outpatient medical settings can increase access to behavioral health services while limiting unnecessary psychiatric hospitalizations. Improving patient symptoms and functioning in the long-term likely relies on many postintervention variables, including adherence to and quality of mental health care and community support systems.

ACKNOWLEDGMENT

The author group would like to acknowledge Erin Bishop, MPH, for her initial coordination of this project.

ABBREVIATIONS

CI: confidence interval
CIS: crisis intervention session
ED: emergency department
NRC: nonrandomized controlled
OR: odds ratio
RCT: randomized controlled trial
RoB 2: Cochrane Collaboration tool for assessing risk of bias for randomized trials, version 2
ROBINS-I: Cochrane Collaboration tool for assessing risk of bias in nonrandomized studies of interventions
SAR: screening, assessment, and referral
SI: suicidal ideation

Address correspondence to Brian Pitts, MD, Department of Pediatrics, University of Colorado School of Medicine, 13123 E 16th Ave, B025, Aurora, CO 80014. E-mail: brian.pitts@cuanschutz.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FUNDING: No external funding.

CONFLICT OF INTEREST DISCLOSURES: The authors have indicated they have no potential conflicts of interest to disclose.

REFERENCES

1. Ivey-Stephenson AZ, Demissie Z, Crosby AE, et al. Suicidal ideation and behaviors among high school students - Youth Risk Behavior Survey, United States, 2019. *MMWR Suppl.* 2020;69(1):47–55
2. Ahmedani BK, Simon GE, Stewart C, et al. Health care contacts in the year before suicide death. *J Gen Intern Med.* 2014;29(6):870–877
3. Astrup H, Myhre MØ, Kildahl AT, Walby FA. Suicide after contact with child and adolescent mental health services-a National Registry study. *Front Psychiatry.* 2022;13:886070
4. American Academy of Pediatrics, American Academy of Child and Adolescent Psychiatry and Children's Hospital Association. AAP-AACAP-CHA declaration of a national emergency in child and adolescent mental health. Available at: https://www.aap.org/en/advocacy/child-and-adolescent-healthy-mental-development/aap-aacap-cha-declaration-of-a-national-emergency-in-child-and-adolescent-mental-health/. Accessed January 4, 2023
5. Institute of Medicine (US) Committee on Pathophysiology and Prevention of Adolescent and Adult Suicide. In: Goldsmith SK, Pellmar TC, Kleinman AM, Bunney WE, eds. *Reducing Suicide: A National Imperative.* National Academies Press; 2002
6. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ.* 2021;372(71):n71
7. Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. Comprehensive Meta-Analysis Version 4 Software. Available at: www.meta-analysis.com
8. Rotheram-Borus MJ, Piacentini J, Cantwell C, et al. The 18-month impact of an emergency room intervention for adolescent female suicide attempters. *J Consult Clin Psychol.* 2000;68(6):1081–1093
9. Borenstein M. *Common Mistakes in Meta-Analysis and How to Avoid Them.* Biostat, Inc; 2019
10. Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. A basic introduction to fixed-effect and random-effects models for meta-analysis. *Res Synth Methods.* 2010;1(2):97–111

11. Hedges LV, Vevea JL. Fixed- and random-effects models in meta-analysis. *Psychological Methods.* 1998;3(4):486–504

12. Higgins JPT, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *BMJ.* 2003;327(7414):557–560

13. Chisolm DJ, Klima J, Gardner W, Kelleher KJ. Adolescent behavioral risk screening and use of health services. *Adm Policy Ment Health.* 2009;36(6):374–380

14. Wintersteen MB, Diamond GS. Youth suicide prevention in primary care: a model program and its impact on psychiatric emergency referrals. *Clin Pract Pediatr Psychol.* 2013;1(3):295–305

15. Asarnow J, Baraff L, Berk M, et al. Effects of an emergency department mental health intervention for linking pediatric suicidal patients to follow-up mental health treatment: a randomized controlled trial. *Psychiatr Serv.* 2011;62(11):1303–1309

16. Wharff EA, Ginnis KB, Ross AM, et al. Family-based crisis intervention with suicidal adolescents: a randomized clinical trial. *Pediatr Emerg Care.* 2019;35(3):170–175

17. Wharff EA, Ginnis KM, Ross AM. Family-based crisis intervention with suicidal adolescents in the emergency room: a pilot study. *Soc Work.* 2012;57(2):133–143

18. Grupp-Phelan J, McGuire L, Husky MM, Olfson M. A randomized controlled trial to engage in care of adolescent emergency department patients with mental health problems that increase suicide risk. *Pediatr Emerg Care.* 2012;28(12):1263–1268

19. Gardner W, Klima J, Chisolm D, et al. Screening, triage, and referral of patients who report suicidal thought during a primary care visit. *Pediatrics.* 2010;125(5):945–952

20. Grupp-Phelan J, Stevens J, Boyd S, et al. Effect of a motivational interviewing-based intervention on initiation of mental health treatment and mental health after an emergency department visit among suicidal adolescents: a randomized clinical trial. *JAMA Netw Open.* 2019;2(12):e1917941

21. King CA, Gipson PY, Horwitz AG, Opperman KJ. Teen options for change: an intervention for young emergency patients who screen positive for suicide risk. *Psychiatr Serv.* 2015;66(1):97–100

22. Etter DJ, McCord A, Ouyang F, et al. Suicide screening in primary care: use of an electronic screener to assess suicidality and improve provider follow-up for adolescents. *J Adolesc Health.* 2018;62(2):191–197

23. Patel A, Watts C, Shiddell S, et al. Universal adolescent suicide screening in a pediatric urgent care center. *Arch Suicide Res.* 2018;22(1):118–127

24. Parker KCH, Roberts N, Williams C, et al. Urgent adolescent psychiatric consultation: from the accident and emergency department to inpatient adolescent psychiatry. *J Adolesc.* 2003;26(3):283–293

25. Wintersteen MB. Standardized screening for suicidal adolescents in primary care. *Pediatrics.* 2010;125(5):938–944

26. Doupnik SK, Rudd B, Schmutte T, et al. Association of suicide prevention interventions with subsequent suicide attempts, linkage to follow-up care, and depression symptoms for acute care settings: a systematic review and meta-analysis. *JAMA Psychiatry.* 2020;77(10):1021–1030

27. Cushing AM, Liberman DB, Pham PK, et al. Mental health revisits at US pediatric emergency departments. *JAMA Pediatr.* 2023;177(2):168–176

28. Calear AL, Christensen H, Freeman A, et al. A systematic review of psychosocial suicide prevention interventions for youth. *Eur Child Adolesc Psychiatry.* 2016;25(5):467–482

29. American Academy of Pediatrics and American Foundation for Suicide Prevention. Suicide: blueprint for youth suicide prevention. Available at: https://www.aap.org/en/patient-care/blueprint-for-youth-suicide-prevention/. Accessed January 4, 2023

30. National Institutes of Mental Health. Ask suicide-screening questions (ASQ) toolkit. Available at: https://www.nimh.nih.gov/research/research-conducted-at-nimh/asq-toolkit-materials. Accessed January 4, 2023

31. Torio CM, Encinosa W, Berdahl T, et al. Annual report on health care for children and youth in the United States: national estimates of cost, utilization and expenditures for children with mental health conditions. *Acad Pediatr.* 2015;15(1):19–35

32. Gearing RE, Mian I, Sholonsky A, et al. Developing a risk-model of time to first-relapse for children and adolescents with a psychotic disorder. *J Nerv Ment Dis.* 2009;197(1):6–14

33. Bobier C, Warwick M. Factors associated with readmission to adolescent psychiatric care. *Aust N Z J Psychiatry.* 2005;39(7):600–606

34. Barker D, Jairam R, Rocca A, Goddard L, Matthey S. Why do adolescents return to an acute psychiatric unit? *Australas Psychiatry.* 2010;18(6):551–555

35. McCarthy L, Pullen LM, Savage J, Cayce J. Risk factors leading to increased rehospitalization rates among adolescents admitted to an acute care child and adolescent psychiatric hospital. *J Child Adolesc Psychiatr Nurs.* 2017;30(2):105–111

36. Owusu E, Oluwasina F, Nkire N, et al. Readmission of patients to acute psychiatric hospitals: influential factors and interventions to reduce psychiatric readmission rates. *Healthcare (Basel).* 2022;10(9):1808

37. Knesper DJ. *Continuity of Care for Suicide Prevention and Research: Suicide Attempts and Suicide Deaths Subsequent to Discharge from the Emergency Department or Psychiatry Inpatient Unit.* American Association of Suicidology Suicide Prevention Resource Center; 2010

38. Bridge JA, Marcus SC, Olfson M. Outpatient care of young people after emergency treatment of deliberate self-harm. *J Am Acad Child Adolesc Psychiatry.* 2012;51(2):213–222.e1

39. Doupnik SK, Passarella M, Terwiesch C, Marcus SC. Mental health service use before and after a suicidal crisis among children and adolescents in a United States national Medicaid sample. *Acad Pediatr.* 2021;21(7):1171–1178

40. Tracey M, Finkelstein Y, Schachter R, et al. Recruitment of adolescents with suicidal ideation in the emergency department: lessons from a randomized controlled pilot trial of a youth suicide prevention intervention. *BMC Med Res Methodol.* 2020;20(1):231

41. Ginnis K, White E, Roll A, Wharff E. Family-based crisis intervention in the emergency department: a new model of care. *J Child Fam Stud.* 2015;24:172–179

42. Hughes JL, Asarnow JR. Enhanced mental health interventions in the emergency department: suicide and suicide attempt prevention in the ED. *Clin Pediatr Emerg Med*. 2013;14(1):28–34

43. Watling DP, Preece MHW, Hawgood J, et al. Developing a postdischarge suicide prevention intervention for children and young people: a qualitative study of integrating the lived-experience of young people, their carers, and mental health clinicians. *Child Adolesc Psychiatry Ment Health*. 2022;16(1):24

44. Fairchild RM, Ferng-Kuo SF, Rahmouni H, Hardesty D. Telehealth increases access to care for children dealing with suicidality, depression, and anxiety in rural emergency departments. *Telemed J E Health*. 2020;26(11):1353–1362

45. Hughes J, Asarnow J. Implementing and adapting the SAFETY treatment for suicidal youth: the incubator model, telehealth, and the COVID-19 pandemic. *Cognit Behav Pract*. 2022;29(1):198–213

46. Rengasamy M, Sparks G. Reduction of postdischarge suicidal behavior among adolescents through a telephone-based intervention. *Psychiatr Serv*. 2019;70(7):545–552

47. Horowitz LM, Roaten K, Pao M, Bridge JA. Suicide prevention in medical settings: the case for universal screening. *Gen Hosp Psychiatry*. 2020;63:7–8

48. Horowitz LM, Bridge JA, Tipton MV, et al. Implementing suicide risk screening in a pediatric primary care setting: from research to practice. *Acad Pediatr*. 2022;22(2):217–226

49. McGuinness LA, Higgins JPT. Risk-of-bias VISualization (robvis): an R package and Shiny web app for visualizing risk-of-bias assessments. *Res Synth Methods*. 2021;12(1):55–61