Universal Suicide Risk Screening for Youths in the Emergency Department: A Systematic Review

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Objectives: To address escalating youth suicide rates, universal suicide risk screening has been recommended in pediatric care settings. The emergency department (ED) is a particularly important setting for screening. However, EDs often fail to identify and treat mental health symptoms among youths, and data on implementation of suicide risk screening in EDs are limited. A systematic review was conducted to describe the current literature on universal suicide risk screening in EDs, identify important gaps in available studies, and develop recommendations for strategies to improve youth screening efforts.

Methods: A systematic literature search of PubMed, MEDLINE, CINAHL, PsycINFO, and Web of Science was conducted. Studies focused on universal suicide risk screening of youths served in U.S. EDs that presented screening results were coded, analyzed, and evaluated for reporting quality. Eleven studies were included.

Results: All screening efforts occurred in teaching or children's hospitals, and research staff administered suicide screens in eight studies. Thus scant information was available on universal screening in pediatric community ED settings. Large variation was noted across studies in participation rates (17%−86%) and in positive screen rates (4.1%−50.8%), although positive screen rates were influenced by type of presenting concern (psychiatric versus nonpsychiatric). Only three studies concurrently examined barriers to screening, providing little direction for effective implementation. STROBE guidelines were used to rate reporting quality, which ranged from 51.9% to 87.1%, with three studies having ratings over 80%.

Conclusions: Research is needed to better inform practice guidelines and clinical pathways and to establish sustainable screening programs for youths presenting for care in EDs.

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Suicide is the second leading cause of death among children and adolescents. Since 2007, suicide deaths have increased over 75% among youths ages 15–19 and have nearly tripled among children ages 10–14 (1). Given the effects of the COVID-19 pandemic, it is likely that rates will continue to rise. Although data for children are not yet available, recent Centers for Disease Control and Prevention data indicated that U.S. adults have experienced markedly increased mental health difficulties associated with COVID-19, with one in four young adults (ages 18–24) endorsing that they have seriously considered suicide in the 30 days prior to survey completion (2).

Unfortunately, despite decades of research, our ability to detect suicide risk and interpret level of risk severity remains suboptimal (3). Furthermore, systems accessed by youths, such as health care and education, often fail to assess and identify mental health problems, including suicidal thoughts and behaviors (4–7). To address this issue, a number of recommendations have been published for the assessment and treatment of suicide risk across settings, and many encourage universal screening of youths independent of their symptom presentation, as well as training for providers to effectively manage identified risks (8–11).

HIGHLIGHTS

- Although universal suicide risk screening for youths has been recommended in emergency department (ED) settings, a systematic review of the literature revealed that few studies have examined screening in the ED.
- Of the 11 studies reviewed, all occurred in teaching or children's hospitals, and research staff administered suicide screens in most studies—thus little information was available on universal screening in community settings.
- Large variation was noted across studies in participation rates and positive screen rates.
- Few studies concurrently examined barriers to screening, providing little direction for effective implementation.

Although these recommendations represent a crucial step toward addressing rising suicide rates, insufficient data are available on the implementation of universal screening across medical care settings (12), including in emergency departments (EDs). This is unsurprising, because recommendations for screening in the ED are relatively new (10, 13), and in contrast with expert guidelines (10), current mandates recommend only targeted screening of patients presenting to the ED with behavioral health concerns (14). Nevertheless, the lack of data is concerning and requires remediation. EDs are an essential setting for suicide risk screening, because they are often the primary access point of care for many of the most vulnerable youths (15), and pediatric ED visits related to mental health concerns, and deliberate self-harm in particular, have increased dramatically over time (16). Furthermore, although a significant number of youths who die by suicide visit the ED in the months preceding their death (17), the sparse data available suggest that EDs often fail to identify and treat psychiatric symptoms (18). Additionally, efforts to improve the identification and management of suicide risk through universal screening and follow-up in EDs have been found feasible and successful in adult samples (e.g., Parkland Health and Hospital Systems [19] and ED-SAFE [20]).

Although data on screening youths in EDs for mental health problems are sparse, several clinical pathways have recently been published (10, 21). For instance, the American Academy of Child and Adolescent Psychiatry Pathways in Clinical Care (PaCC) work group developed a three-tiered clinical pathway to improve detection and management of suicide risk in pediatric ED and inpatient settings. A key element of this pathway is the use of a brief, structured, suicide safety assessment as an intermediate step between a positive initial screen and a longer full suicide safety assessment (10). However, there is a need to collect high-quality data on the efficacy of this pathway in real-world settings, and the importance of leadership and collaboration at multiple levels to support its implementation has been emphasized (9, 10). Concern also exists about lack of consistency in the suicide risk screening process used across institutions (10) and limitations in suicide risk measurement, such as inconsistent use of validated instruments (22). Therefore, a thorough understanding of the available data on ED-based suicide screening efforts for youths is of paramount importance.

To describe what is currently known, identify important deficiencies, and develop recommendations for future directions to improve detection and treatment of suicidality among youths, we conducted a systematic review to evaluate the current evidence on universal suicide risk screening for youths accessing EDs. We analyzed studies that conducted universal suicide risk screening in ED settings and described procedures used to administer the screen to children and adolescents and to follow-up on the screen results, as well as any identified barriers to screening.

METHODS

This systematic review was conducted by using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (23) (PROSPERO registration number, CRD42020183980).

Search Strategy

Articles were identified by searching PubMed, MEDLINE, CINAHL, PsycINFO, and Web of Science. The search was conducted on January 24, 2020, with the following search terms: (child OR youth OR adolescent OR pediatric) AND ((emergency) AND (room OR department)) AND ((suicid*) AND (screening OR assessment)). We then cross-checked reference lists of reviewed articles. At the time of data extraction, there were no systematic reviews on the topic listed in the Cochrane Library or registered on PROSPERO.

Study Selection

The electronic search was conducted by one author (DEMS), who collated all citations with Covidence, a systematic review software (24). Then, two authors (PEC, DEMS) independently screened titles and abstracts for eligibility. For the remaining articles, these authors conducted full-text reviews. When there was disagreement, the article was discussed with the senior author (SMH) to reach consensus.

Decisions about eligibility were made according to the following exclusionary criteria: the article was not in English; the article did not represent primary publication of original research (e.g., book chapters); the research did not take place in the United States; the research did not sample or provide separate results for participants under age 25, or the minimum age sampled was not under age 18 years old; the research did not take place in an ED or did not provide separate results for participants recruited in an ED; the research did not include a focus on suicide risk screening; the research did not involve universal suicide risk screening; and the screening results were not presented.

Universal screening was defined as the screening of patients presenting to the ED, irrespective of behavioral or emotional complaints or history. This definition does not account for sampling approach. We included studies that integrated suicide risk screening into the standard of care, capturing all eligible youths, and studies that used convenience sampling. We also included studies that screened only patients without behavioral or emotional complaints, as well as studies that did not report the ED presenting concern. These decisions were made to capture more studies, because literature in this area is limited and because procedures and barriers encountered in these studies are generalizable to the screening of all patients. We did not include studies addressing targeted screening of psychiatric patients, because such studies would not be informative for universal screening efforts. Eligibility was restricted to research conducted in the United States, because there are substantial

BOX 1. Data extracted from the 11 studies reviewed

Study characteristics

- Objectives
- Study design: cross-sectional, prospective, retrospective, or randomized clinical trial
- Study type: research or quality improvement

Hospital characteristics

- Hospital location: U.S. state
- Emergency department (ED) setting: community ED, teaching or university hospital, or children's hospital

Screen administration

- Method of administration: paper-pencil, electronic, or interview
- Screen administrator: ED staff or research staff
- Screen completer: youth, caregiver, or both
- Time of administration: in the waiting room or at triage, in a private room or exam room, or at any time during the visit
- Privacy status: caregiver present during screen or caregiver asked to leave for screen administration

Screening instrument(s)

- Name of screening tool used
- Domains covered by screening tool: suicide only or suicide and other mental health domains
- Presence of secondary measures in screening battery
- Purpose of secondary measures

Sample characteristics

- Race-ethnicity
- Sex
- Insurance type
- Exclusion criteria

Screening results

- Participation rate: proportion of eligible youths screened
- Positive screen rate for total sample (both youths with psychiatric chief complaints and youths with nonpsychiatric chief complaints)
- Positive screen rate for subgroup of youths with psychiatric chief complaints
- Positive screen rate for subgroup of youths with nonpsychiatric chief complaints
- Characteristics of youths who screened positive for suicide risk: age, race-ethnicity, sex, and insurance type

Follow-up procedures for positive screens

- Presence of follow-up procedures described in the study
- Description of follow-up procedures used

Barriers to screening

- Presence of examination of barriers either concurrently or post hoc
- Type of barriers listed: patient, provider, or organization
- Description of barriers described

differences in service systems across countries that could affect generalizability of findings. To avoid misrepresentation of data in summary statistics, studies that conducted preliminary or secondary analyses of data presented in an included larger study were excluded. No study publication date restrictions were imposed.

Data Extraction

Data were extracted by three authors (PEC, DEMS, SMH) with a prepiloted form and included study characteristics, hospital characteristics, data on screen administration and instrument(s), sample characteristics, screening participation rate, positive screen rate for the total sample and subsamples of youths presenting with psychiatric or nonpsychiatric concerns, sociodemographic characteristics of youths who screened positive, the presence and details of follow-up strategies included for youths who screened positive, and information on barriers to screening identified (see Box 1). Twenty-seven percent of the included articles were coded a second time, and results were compared. Agreement was 90.9%. The senior author (SMH) then conducted an evaluation of reporting quality by using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (25). Because most studies were not interventional trials, we did not conduct a bias assessment. Data were analyzed descriptively.

RESULTS

Of 855 articles identified through database searches, 623 were excluded as not relevant through title and abstract screening. Full-text reviews resulted in the exclusion of seven not in English, 40 that were not primary publications of original research, 81 not conducted in the United States, 19 that did not include youths in their sample or did not provide separate results for youth subsamples, five not conducted in EDs, 37 not focused on suicide risk screening, 20 that were not universal screening efforts, and seven not reporting universal screening results. An additional five articles were then excluded, because they presented preliminary or secondary analyses of data presented in an included larger study (a PRISMA flow diagram is included in an online supplement to this review).

The 11 studies that met eligibility criteria are displayed in Tables 1 and 2 (26–36). All were published in 2006 or later. Reporting quality, rated using STROBE guidelines, ranged from 51.9% to 87.1%; three studies were rated as well reported (i.e., ratings over 80%) (26–28). The research was primarily undertaken in EDs in the Northeastern (27, 29–31) and Midwestern (26, 27, 32–36) United States. Few included EDs in the South (27, 28), and none included EDs in the West. Of the seven studies that reported hospital type, all were conducted in teaching, university, or children's

TABLE 1. Study and sample characteristics of 11 studies examining suicide risk screening of youths in emergency departments (EDs)

Study	Study		Sample		
Study	Objective	Type[a]	Size[b]	Age range	Exclusions[c]
DeVylder et al., 2019 (28)[d]	Universal screening, psychometric evaluation	QI	Total, 15,003; selective (psychiatric only), 4,666; universal (psychiatric plus nonpsychiatric), 10,337	8–18	None
Fein et al., 2010 (29)	Universal screening	QI	Total, 857; psychiatric, 0; nonpsychiatric, 857	14–18	Medical severity, IDDs, non-English speakers, all psychiatric chief complaints, hearing or vision impairment, resource limitations (no computers in one area of ED)
Folse et al., 2006 (32)[e]	Universal screening, acceptability of screening, psychometric evaluation	Research	Total, 39; psychiatric, 3; nonpsychiatric, 36	12–24	Medical severity, non-English speakers, caregiver issues (no legal guardian present), resource limitations (no private space available to administer screen)
Folse and Hahn, 2009 (33)[e]	Universal screening, acceptability of screening, psychometric evaluation	Research	Total, 59; psychiatric, 5; nonpsychiatric, 54	13–24	Medical severity, non-English speakers, resource limitations (no private space available to administer screen)
Grupp-Phelan et al., 2012 (34)	Universal screening, acceptability of screening, evaluation of screening follow-up program	Research	Total, 204; psychiatric, 0; nonpsychiatric, 204	12–17	IDDs, non-English speakers, caregiver issues (no legal guardian present), seeking treatment in the ED for psychiatric concerns, resource limitations (no phone to participate in follow-up program)
Herres et al., 2018 (30)	Universal screening	QI	Total, 3,523; psychiatric, NR; nonpsychiatric, NR	14–24	Medical severity, IDDs
Horowitz et al., 2012 (27)	Universal screening, psychometric evaluation	Research	Total, 524; psychiatric, 180; nonpsychiatric, 344	10–21	Medical severity, IDDs, non-English speakers, caregiver issues (no legal guardian present)
King et al., 2009 (36)	Universal screening, psychometric evaluation	Research	Total, 295; psychiatric, NR; nonpsychiatric, NR	13–17	Medical severity, IDDs, non-English speakers, caregiver issues (no legal guardian present)
King et al., 2012 (35)	Universal screening, evaluation of screening follow-up program	Research	Total, 245; psychiatric, NR; nonpsychiatric, NR	13–17	Medical severity, IDDs
King et al., 2015 (26)	Universal screening, psychometric evaluation, characterization of youths in EDs	Research	Total, 624; psychiatric, NR; nonpsychiatric, NR	14–19	Medical severity, IDDs
Ranney et al., 2016 (31)	Universal screening, characterization of youths in EDs	Research	Total, 353; psychiatric, 14; nonpsychiatric, 338	13–17	Medical severity, non-English speakers, caregiver issues (youth in state or police custody), some psychiatric issues (suicidality or psychosis), presentation with child abuse or sexual assault

[a] QI, quality improvement.
[b] NR, not reported.
[c] IDDs, intellectual or developmental disabilities.
[d] The study compared universal screening with selective screening. Statistics from selective screening were included in summary statistics of the psychiatric subsample's positive screen rate. Statistics from universal screening were not included in the summary statistics for psychiatric and nonpsychiatric subsamples, because the percentage of youths presenting with a psychiatric chief complaint during the universal screening period was not reported.
[e] The two studies examined universal screening across ages. Data included in this review were abstracted from only the adolescent subgroups.

hospitals (27–30, 34–36). Most studies were cross-sectional (27, 29–33, 36). In addition to universal screening, objectives included instrument development and psychometric evaluation (26–28, 32, 33, 36), examination of the acceptability of screening on the patient or provider level (32–34), development or examination of follow-up strategies for positive suicide screens (34, 35), and characterization of the psychiatric profile for youths accessing the ED (26, 31). Of the 11 studies, three represented quality improvement (QI) efforts (28–30), and eight were categorized as research (26, 27, 31–36).

Study Sample Characteristics

Participating youths ranged in age from 8 to 24. Minimum ages ranged from 8 to 14, with seven studies starting recruitment at age 13 or older (26, 29–31, 33, 35, 36). The mean age

TABLE 2. Procedures and results of 11 studies examining suicide risk screening of youths in emergency departments (EDs)

Study	Screen used[a]	Participation rate	Positive screen rate[b]	Follow-up to positive screen	Barriers identified		STROBE rating[c]
					Timing	Level	
DeVylder et al., 2019 (28)	ASQ	Selective screening, 59%–81%; universal screening, 80%–86%	Total, 14.9%; selective (psychiatric), 29.9%; universal (psychiatric plus nonpsychiatric), 7.8%	Yes	Post hoc	Provider and organization	81.30%
Fein et al., 2010 (29)	BHS-ED	27.50%; calculated from the reported adoption rate (proportion of eligible youths approached by staff=33.4%) and the consenting rate (proportion of youths approached by staff who agreed to participate=64.6%)	Total, NA; psychiatric, NA; nonpsychiatric, NR. By history: endorsed ideation, 11.1%; had a plan, 5.0%; made an attempt, 5.5%; engaged in self-harm, 10.0%. Past 2 weeks: endorsed ideation, 3.6%; made a plan, 1.1%; made an attempt, .7%; engaged in self-harm, 1.1%	Yes	Post hoc	Patient, provider, and organization	69.00%
Folse et al., 2006 (32)	RSQ	NR	Total, 28.2%; psychiatric, NR; nonpsychiatric, NR	Yes	Concurrently	Patient, provider, and organization (only patient included in concurrent evaluation)	51.90%
Folse and Hahn, 2009 (33)	RSQ	NR	Total, 50.8%; psychiatric, 100%; nonpsychiatric, 46.3%	Yes	Concurrently	Patient, provider, and organization (only provider included in concurrent evaluation)	71.40%
Grupp-Phelan et al., 2012 (34)[d]	CSS	30.00%	Total, NA; psychiatric, NA; nonpsychiatric, 12.0%	Yes	Concurrently	Patient	67.70%
Herres et al., 2018 (30)	BHS-ED	17.00%	Total, 5.7%; psychiatric, NR; nonpsychiatric, NR	Yes	Not examined	—	75.00%
Horowitz et al., 2012 (27)	ASQ and SIQ	65.30%	Total, 18.7%; psychiatric, 46.7%; nonpsychiatric, 4.1%	No	Not examined	—	83.30%
King et al., 2009 (36)	SIQ	61.00%	Total, 16.3%; psychiatric, 13.2%; nonpsychiatric, 3.1%	Yes	Post hoc	Organization	62.10%
King et al., 2012 (35)	SIQ	70.00%	Total, 4.1%, psychiatric, NR; nonpsychiatric, NR	Yes	Post hoc	Patient	65.50%
King et al., 2015 (26)	SI/SA items not associated with full screener	78.60%	Total, 15.9%; psychiatric, NR; nonpsychiatric, NR	Yes	Not examined	—	87.10%
Ranney et al., 2016 (31)	SI/SA items not associated with full screener	70.30%	Total, NR; psychiatric, NR; nonpsychiatric, NR. Of total sample, 11.3% reported suicidal ideation and 3.1% made a suicide attempt	No	Not examined	—	79.30%

[a] ASQ, Ask Suicide–Screening Questions; BHS-ED, Behavioral Health Screening–Emergency Department; CCS, Columbia Suicide Screen; RSQ, Risk of Suicide Questionnaire; SIQ, Suicidal Ideation Questionnaire; SI/SA, suicidal ideation/suicide attempt.
[b] NR, not reported; NA, not applicable.
[c] STROBE, Strengthening the Reporting of Observational Studies in Epidemiology guidelines (25).
[d] A positive screen was defined as screening positive both on the CSS and on at least one additional measure of depression or substance use.

of youths screened, reported in nine studies, ranged from 14.5 to 19.3 (mean±SD age=16±2). In six of the nine studies reporting race-ethnicity, the samples were primarily White (i.e., over 50%) (27, 31–33, 35, 36), whereas three studies had primarily Black samples (28–30). Representation across other races and ethnicities was low. The sex distribution across studies was fairly even, with a slight underrepresentation of males. The proportion of males across studies ranged from 28.2% to 49.7% (mean=42%±7%) (27–33, 35, 36). Insurance type was rarely reported (27, 31, 35). Youths on public assistance represented the minority in two of these three studies (27, 35).

Eligibility criteria included the following exclusions: medical severity (26, 27, 29–33, 35, 36); presence of intellectual or developmental disabilities (IDDs), such as cognitive impairment (26, 27, 29, 30, 34–36); and language barriers (i.e., non-English speakers) (27, 29, 31–34, 36). Additional exclusions included issues related to the caregiver (e.g., legal guardian not present or youth in state or police custody) (27, 31, 32, 34, 36), lack of needed resources (e.g., no computer to complete electronic screen [29], no telephone to participate in follow-up program [34], or no private space to conduct the screen [32, 33]), some or all psychiatric presentations (29, 31, 34), hearing or vision impairments (29), and presentation with concerns of child abuse or sexual assault (31). One study did not list any exclusions (28).

Screen Administration

All studies relied on youth report alone to screen for suicide risk. An array of administration methods was used, and screening was positioned within the visit at varying times. Of the eight studies that reported on administration methods, four were interviews (27, 28, 32, 33), three were electronically administered (29–31), and one was completed in a paper-pencil format (36). In four studies, the youths completed the screen at any time during the visit (26, 29, 30, 32); in two, it was completed in an exam or private room (27, 34); and in two others, it was completed at triage (28) or in the waiting room (33). Screens were most frequently administered by research staff (26, 27, 31–36), rather than ED staff (28–30). It was not consistently reported whether caregivers were asked to leave to protect the privacy of youths screened (not reported in seven studies). Of the four studies that reported on parent presence, two asked caregivers to leave during the screen in all cases (27, 36), and two asked the caregivers to leave in some cases (29, 33).

Five different suicide risk measures were used (Table 2). The Suicidal Ideation Questionnaire (SIQ) was used in three studies—as the primary suicide risk measure in two studies (35, 36) and as the criterion standard to validate a screening tool in one study (27). The following measures were each used in two studies: the Risk of Suicide Questionnaire (RSQ) (32, 33), the Ask Suicide–Screening Questions (ASQ) (27, 28), and the Behavioral Health Screening–Emergency Department (BHS-ED) (29, 30). The Columbia Suicide Screen (CSS) was used in one study (34). Two studies screened using suicide-related questions that were not associated with a validated screening tool (26, 31). All but one measure screened only for suicide; the BHS-ED also assesses for depression, posttraumatic stress, substance use, and family and community violence. Notably, seven studies included additional measures in their screening batteries. Secondary measures were used to validate a new suicide risk screening measure (27), supplement scales that have not yet been validated (29), assess for risk factors associated with suicide that may be useful in classifying at-risk youths (26, 35, 36), and characterize youth symptom profiles (31, 34).

Screen Results

Participation rate, reported in eight studies (26, 27, 29–31, 34–36) and defined as the proportion of eligible youths screened for suicide risk, was highly variable (range 17%−86%, mean=52%±24%, median=63%). Of the six studies categorized as research, in which the screens were administered by research staff, the participation rate was relatively high (range 30.0%−78.6%) (26, 27, 31, 34–36). Two QI studies, in which ED staff were responsible for administering screens, reported participation rates that were lower (range 17.0%−27.5%) (29, 30). One QI study, in which again ED staff administered the suicide screens, reported participation rate ranges between a selective screening sample (i.e., including only youths presenting with psychiatric concerns) and a universal screening sample (28). Participation rate ranges in this study were markedly higher than in other QI studies—59%−81% in the selective screening sample and 80%−86% in the universal screening sample.

Total positive screen rate, recorded from the eight studies that included youths with both psychiatric and nonpsychiatric presenting problems, ranged from 4.1% to 50.8% (mean=19%±15%, median=16%) (26–28, 30, 32, 33, 35, 36). One study did not specify a positive screen rate, but rather screening results indicated that 11.3% of the total sample endorsed suicidal ideation and 3.1% endorsed a previous suicide attempt (31). Positive screen rate for youths presenting with a psychiatric concern was reported in four studies and ranged from 13.2% to 100% (mean=47%±38%, median=38%) (27, 28, 33, 36). Positive screen rate for youths with nonpsychiatric chief complaints was reported in four studies and ranged from 3.1% to 46.3% (mean=16%±20%, median=8%) (27, 33, 34, 36). One study did not specify a positive screen rate but rather indicated that the sample of youths with nonpsychiatric presenting concerns had a lifetime prevalence of 11.1% for suicidal ideation, 5.0% for having made a suicide plan, 5.5% for having had a previous attempt, and 10.0% for having engaged in self-harm (29). When asked about symptomology over the past 2 weeks, 3.6% endorsed suicidal ideation, 1.1% had made a plan, 0.7% had made a suicide attempt, and 1.1% had engaged in self-harm.

Only three studies reported on the characteristics of youths who screened at risk (28, 34, 36). The mean age of youths who screened positive was between 13.9 and 15.1. Females were more likely to screen positive for suicide risk, accounting for between 63.8% and 79.2% of positive screens. Two studies found that across the full sample, Black youths were more likely to score at risk (28, 34), whereas one study found that White youths more frequently scored at risk, across the full sample (36). Only one study examined the distribution of insurance types by screening results; 83.3% of youths who screened positive in this study were on public assistance (34). The screen positive rate also varied by study type. Of studies that reported total screen positive rates, QI studies had lower rates (range 5.7%−14.9%, mean=

10%±7%, median=10%) (28, 30) than did research studies (range 4.1%−50.8%, mean=22%±16%, median=18%) (26, 27, 32, 33, 35, 36).

Psychometric Evaluation

Six studies evaluated psychometrics. Folse et al. (32) and Folse and Hahn (33) examined the internal consistency and criterion-related validity of the RSQ; internal consistency (α) estimates were 0.63 (32) and 0.46 (33) for adolescent subgroups across studies. Horowitz et al. (27) found that when SIQ scores were used as the basis for comparison, sensitivity and specificity estimates of the ASQ were strong (96.9% and 87.6%, respectively). Negative predictive value (NPV) and positive predictive value (PPV) were 96.9% and 71.3%, respectively, for patients with primary psychiatric concerns and 99.7% and 39.4%, respectively, for patients with primary medical concerns (27). DeVylder and colleagues (28), using the likelihood of returning to the ED for suicide-related problems as the basis for analysis, found the sensitivity and specificity of the ASQ to be adequate in their full sample; sensitivity was lower in their universal screening sample (60%), and specificity was lower in their selective screening sample (70%). NPV of the ASQ was above 99% in their selective and universal samples, and PPV was 5.4% in the selective screening sample and 3.9% in the universal screening sample (28). King et al. (36) found that the internal consistency of the SIQ was high (α=0.97), and concurrent validity was established. King and colleagues (26) studied the sensitivity and specificity of three suicide-related questions against future suicide behavior and attempts and against attempts only. Sensitivity was adequate, but specificity was low when both metrics were used (future suicide behavior and attempts, sensitivity=0.73, specificity=0.48; attempts only, sensitivity=0.67, specificity=0.48).

Follow-Up to Positive Screen

Nine studies reported having some type of follow-up for participating youths who screened at risk (26, 28–30, 32–36); however, there was little consistency in procedures across studies, and limited details were provided in the reporting of strategies. Three studies followed at-risk youths with an interview (26, 34) or chart review (28) to assess the presence of suicidality after the initial visit. Four studies reported that the screen results were posted for ED staff or that the ED staff were notified of the results so that the results could be reviewed during the visit (28–30, 36). Four studies reported that positive suicide screens resulted in consultation from a psychiatrist or social worker (28–30, 32), but only one measured how consistently consultation was implemented after a positive screen (29). Two studies examined a referral program (34, 35), three had a risk management protocol in place (26, 32, 35), and two measured the rate of psychiatric diagnosis by ED physicians (29, 33). In one study, a comprehensive assessment battery followed positive suicide screens (26).

Barriers to Screening

Seven studies reported on barriers to screening (28, 29, 32–36), but only three identified barriers through a concurrent, systematic evaluation (32–34). In the discussion, four described barriers that likely had an impact on the study (28, 29, 35, 36). When barriers were concurrently evaluated, two studies asked for patient perceptions only (32, 34), and one inquired only about provider perceptions (33). Examining all studies that identified barriers to screening, both concurrently and post hoc, five described barriers at the patient level (29, 32–35), four at the provider level (28, 29, 32, 33), and five at the organization level (28, 29, 32, 33, 36). The most frequent barriers identified included patient acceptability (29, 32–35), workflow-related barriers (28, 29, 32, 33), and issues with the screening tool (28, 35, 36). Lack of training and procedures in place for screening (28, 29) and for follow-up strategies (29, 32, 33) were also reported as barriers. One study reported concerns about provider discomfort in inquiring about suicide-related symptoms (33), and one reported concerns about reimbursement for screening (29) and hospital liability issues (33).

DISCUSSION

Despite the public health significance of youth suicidality and the recognition of EDs as an important suicide risk screening site, there are few descriptions of universal screening for youths in EDs. The few studies that met criteria for review were published after 2006, which aligns with the steepening of youth suicide rates in the United States (1) and the introduction of recommendations for suicide risk screening in the ED (13). Most were research studies, limiting their usefulness as guides to screening in usual care settings, because procedures conducted through a research protocol are not typically integrated into usual care systems, and sampling methods do not mimic true universal screening (i.e., screening all eligible youths in the ED). Further, youths who consented to participate in research may not be representative of all youths seeking ED services. The studies were geographically concentrated in the Midwest and Northeast and were primarily conducted in academic institutions, thus providing little guidance for the challenges of universal screening in community settings or different U.S. regions.

Most studies began screening with youths ages 13 and older, above the PaCC work group's recommended starting age of 10 years (10). Screening youths ages 13 and older is problematic, because the suicide rate among younger children is not insignificant (37); one study found that almost 30% of children ages 10–12 screened at risk of suicide in a universal screening effort (38). Further, screening young children is important for earlier intervention and to prevent the worsening of symptoms (37). Representation of minority racial and ethnic groups was also low, and seven of the 11 studies excluded non-English speakers, creating further challenges in generalizability of results across all youths.

Also, little information was available on screening economically disadvantaged youths and their families, which is an issue because unique barriers may exist, such as literacy and technology biases. Of note, the relationship between poverty and youth suicide is significant (39, 40). Screening efforts almost always excluded youths with intellectual or developmental challenges, thus providing little information about how screens perform among these children and adolescents. More information about the effectiveness of screening among youths with IDDs is essential, because emerging research has identified individuals with intellectual disability and with autism spectrum disorder to be at heightened risk of suicidality (41–43).

Because efficiency is critical in the ED, it is likely that self-administered and easy-to-score or automatically scored screens may be optimal. Importantly, research staff were responsible for conducting screens in most of the studies, which provided little information about the sustainability of screening following study completion. The inconsistency across studies in when screens were administered during the visit is also notable, because it indicates that researchers and clinicians have yet to find and disseminate a standardized procedure for screening in EDs that minimizes workflow disruption. Several clinical pathways have been developed to address this gap and increase feasibility of pediatric suicide risk screening (10, 21), but these require further testing to move from evidence-informed to evidence-based guidelines. Variation in the screening tool used across studies, along with results from psychometric evaluations, also suggests that we have yet to identify an optimal method of assessment. Further, this variation makes comparison across studies difficult, because positive screen rates and psychometrics are likely to differ across tools that were designed specifically for suicide risk assessment (e.g., ASQ), tools that function as general mental health screeners (e.g., BHS-ED), and items that are not associated with a full instrument. Procedures used to validate suicide risk screening tools have also been variable (e.g., validating measures against existing tools versus prospective data) (44), which further complicates comparison of psychometric properties across studies. Notably, research efforts are under way to develop and validate new computerized adaptive testing measures—for example, the Computerized Adaptive Screen for Suicidal Youth (45) and the Kiddie-Computerized Adaptive Tests–Suicidality Scale (46)—which may prove useful in both improving risk detection and psychometric strength and increasing efficiency and feasibility of screening (8).

All studies relied only on youth report in the assessment of suicide risk. This is unsurprising, because agreement between the reports of youths and caregivers regarding suicidality is low, and youths may be resistant to disclose their symptoms to their caregivers (47). However, failing to inquire about parent perspectives is problematic, because it is considered best practice to speak with at least one collateral when assessing for youth suicide risk (10). This is especially true for younger children and for youths with communication or emotion-processing difficulties associated with IDDs (48). Many youths are also motivated to obscure symptoms of suicidality (49), making the sole reliance on youth report a significant limitation of the literature. Because caregivers typically accompany youths to the ED, it is likely feasible to assess suicide risk through both youth and parent report, which should be addressed in future studies. Notably, while relying solely on youth report, the studies inconsistently indicated whether the privacy of the youths was protected and whether caregivers were asked to leave the room during screen administration. This is concerning, because youth responses may vary when caregivers are present during completion of the screen.

Screen positive rates were highly variable among studies, suggesting the need to improve our phenotyping of youths presenting to the ED to better understand risk presentations and identify potential risk factors for suicidality among youths presenting with and without psychiatric chief complaints. Because few studies reported on the characteristics of youths who screened at risk, little information was available on possible changes in risk factors over time, although some research suggests that there have been changes to the profile of youths who screen positive for suicide risk (37). Further, although risk factors have been previously documented (11, 47, 50), many studies examined specific, time-invariant factors, such as sociodemographic characteristics, or distal factors, such as trauma history, which are weak predictors of suicidal thoughts and behaviors (3) and less suitable as treatment targets. More attention to proximal, modifiable risk factors is needed, such as sleep problems, social withdrawal, and substance use, because these may be more amenable to treatment.

The positive screen rate found for the subsamples of youths presenting to the ED with nonpsychiatric chief complaints (mean=16%, median=8%) supports the recommendation for universal screening over targeted screening (i.e., screening only youths with behavioral health concerns). Although the median positive screen rate is relatively low, it is very possible that risk identified through universal screening would otherwise go undetected. Additionally, with targeted screening, such as screening only youths with behavioral health concerns, ED staff would have to determine which patients need to be screened. Given that many ED staff report having limited training in psychiatric assessment (51) and that risk detection is difficult (3), efficient and sustainable universal screening may be preferable to reliance on clinical judgment regarding mental health needs (9, 44).

There was little consistency in procedures used to address positive screens across studies. The PaCC work group has prescribed a tiered process for assessment, referrals, and follow-up for suicide risk (10). It also encourages use of validated instruments for the brief suicide safety assessment, which should follow a positive initial screen. To better evaluate screening efforts in the ED, it is important that future research also describe and evaluate the procedures used for

further assessment, referral, and follow-up on positive suicide screens. Further, of the eight studies that reported follow-up procedures, few were treatment focused. Only three studies included evaluations of the implementation of psychiatric care, two of which were examinations of referral programs (34, 35) and one that measured the rate at which a positive screen resulted in consultation from a psychiatrist or social worker in the ED (29). This is an issue, because the utility of clinical assessment lies primarily in its ability to link at-risk youths with care. Follow-up procedures should be systematic and include a structured approach to both engage high-risk patients in safety planning and ensure that these 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 through contact following discharge is also essential. Resources for creating such care plans within health care settings exist (e.g., the Zero Suicide toolkit) and should be considered (52). Unfortunately, similar inconsistencies were identified in the evaluation of barriers to screening. Only three studies identified barriers concurrently (32–34), and these were limited to the examination of either provider perspective only or patient perspective only.

This review had limitations. We excluded studies not written in English and studies conducted outside the United States. Although this limited analyses to data most relevant to the distinct service systems in the United States, research completed outside the country may have identified effective methods to improve screening. We retained studies that did not report the presenting concern, and we analyzed both research and QI efforts, as well as studies that had varying additional objectives beyond conducting universal suicide risk screening (e.g., psychometric evaluation and evaluation of a follow-up program). These decisions were made to capture as many studies as possible, under the assumption that the knowledge gained from implementing universal screening would be appropriate for this systematic review. However, we are aware that differences in study procedures and sample characteristics have implications for our interpretation of the data, such as variability in participation rates and positive screen rates. The additional objectives of these studies also may have influenced what was evaluated in the study and what was presented in the published report. Further, our focus was on universal screening only. All studies involving targeted screening efforts were excluded, such as those focusing only on youths presenting with behavioral health concerns. Because barriers would likely be different when targeted versus universal screening was conducted, and different procedures for implementation would likely be necessary, we thought it was important to study universal suicide risk screening in the ED alone.

CONCLUSIONS

Given the difficulty of predicting future suicide, the quality of available instruments, and the practical and financial barriers to implementation, recommendations have been made against universal screening (53). Numerous clinical counterarguments have been made in response to these recommendations, including the fact that screening represents only an initial step in the evaluation of suicide risk and not all youths who screen positive will subsequently require time and resource-intensive support and that there is utility in further assessment and clinical care for distressed youths who are identified as being at risk by a screen but may not go on to attempt suicide (e.g., connection to mental health resources) (54). Beyond these arguments, it is difficult to initiate or revise guidelines without systematic evaluation of screening efforts. On the basis of this review, information generated by the scarce screening literature may not be representative or generalizable to EDs across the country and particularly those housed within community hospitals. Similarly, these studies provided little information on implementation, which may be one of the most challenging factors for universal screening in EDs, because ED staff are typically managing many competing priorities in an extremely fast-paced environment. Therefore, more research is needed on barriers to screening in EDs so that feasible and sustainable youth screening programs can be developed and validated.

It is clear through research on adult samples that universal screening and follow-up efforts in ED settings have been feasible and effective in significantly reducing suicide attempts (19, 20). Further, 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 (10). To achieve comprehensiveness, our research efforts must also reflect these features. Until both screener weaknesses and implementation barriers are addressed, we will not be able to examine the success of universal screening initiatives in pediatric settings for addressing the escalating rate of youth suicide in the United States.

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