# Identifying Suicide Risk in Adolescents and Young Adults With Type 1 Diabetes: Are Depression Screeners Sufficient?

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## OBJECTIVE

**Examine the utility of suicide-risk items embedded within depression screeners for identifying the presence of suicide risk in adolescents and young adults (AYA) with type 1 diabetes.**

## RESEARCH DESIGN AND METHODS

**Sensitivity, specificity, and predictive value of self-report of suicide risk on the Patient Health Questionniaire-9 (PHQ-9) were compared with the pediatric psychologist–administered Columbia-Suicide Severity Rating Scale (C-SSRS) as the reference standard for AYA with type 1 diabetes seen in a multidisciplinary AYA Diabetes Program clinic.**

## RESULTS

**Of 133 participants, 9.8% and 11.3% reported suicide risk on the PHQ-9 and C-SSRS, respectively. Sensitivity of the PHQ-9 risk item was 53.3% (95% CI 27.4%–77.7%), specificity was 95.7% (95% CI 89.9%–98.4%), positive predictive value was 61.5% (95% CI 32.3%–84.9%), and negative predictive value was 94.2% (95% CI 87.9–97.4%).**

## CONCLUSIONS

**Depression screeners appear to under-identify AYA with type 1 diabetes who may otherwise be at risk for suicide.**


Reliable identification of adolescents and young adults (AYA) with type 1 diabetes at risk for suicide is critical given requisite access to insulin, which can be lethal when used for self-harm (1,2). There are clear clinical guidelines for depression screening in children and adolescents with type 1 diabetes (3), yet recommendations for suicide screening are lacking (4). In this study, we examined the utility of the Patient Health Questionnaire-9 (PHQ-9) suicide-risk item for identifying the presence of suicide risk in AYA with type 1 diabetes, compared with the utility of a validated and reliable suicide-specific measure.

## RESEARCH DESIGN AND METHODS

### Participants and Procedures

AYA with type 1 diabetes seen at their first multidisciplinary AYA Diabetes Program clinic visit completed a PHQ-9 questionnaire the same day as their appointment. A

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pediatric psychologist administered the Columbia-Suicide Severity Rating Scale (C-SSRS), a suicide-specific interview, during the clinic visit. This study was approved by the Seattle Children's Research Institute Institutional Review Board.

### Measures

#### *PHQ-9*

Participants completed the PHQ-9, an established self-report measure used to assess symptoms of major depressive disorder (5). Participants identified frequency of thoughts about suicide or self-harm (i.e., item 9, "thoughts that you would be better off dead, or of hurting yourself in some way") over the past 2 weeks. Item 9 is considered a nonspecific measure, encompassing both suicide and self-harm ideation (6). The PHQ-9 demonstrated good internal consistency for the present study (Cronbach $\alpha$ = 0.88).

#### *C-SSRS*

The Columbia-Suicide Severity Rating Scale (C-SSRS), a structured, suicide-specific interview, is used to assess passive or active suicidal thoughts, plan, and intent during the previous month (7). The C-SSRS includes distinct categories related to suicidal thoughts and behaviors that are relatively consistent with definitions outlined by the Centers for Disease Control and Prevention (8) and is considered the gold-standard suicide-specific screening instrument (9).

#### *Data Analysis*

A score of $\geq$1 (e.g., "several days") on item 9 was used to indicate presence of suicide risk. Any endorsement of suicide ideation, plan, or intent in the past month was used to indicate presence of suicide risk on the C-SSRS.

Sensitivity, specificity, positive and negative predictive values, and false-positive and false-negative rates with exact 95% CIs were calculated for the PHQ-9 item 9, compared with the C-SSRS as the reference standard.

## RESULTS

Analysis included 133 AYA with type 1 diabetes (mean age 19.6 years ± 1.1; 58% young women; Table 1). Thirteen participants (9.8%) reported suicide risk on the PHQ-9 and 15 (11.3%) screened positive on the C-SSRS. Of the 15 participants identified for suicide risk by C-SSRS, 8 screened positive for suicide risk on the PHQ-9. The PHQ-9 correctly identified the absence of suicide risk in 113 of 118 participants found not to be at risk for suicide by C-SSRS. Sensitivity of the PHQ-9 risk item compared with the C-SSRS was 53.3% (95% CI 27.4%–77.7%), specificity was 95.7% (95% CI 89.9%–98.4%), positive predictive value was 61.5% (95% CI 32.3%–84.9%), and negative predictive value was 94.2% (95% CI 87.9%–97.4%). The PHQ-9 under-identified suicide risk in 46.7% of participants (false-negative rate) and overidentified 4.2% of participants as at risk who did not report suicide risk on the C-SSRS.

## CONCLUSIONS

To align with clinical guidelines, numerous clinical sites have implemented routine depression screening in AYA with type 1 diabetes, many of which are also used to screen for suicide risk (1,2,4,10). Results of this study suggest sole reliance on suicide-risk items on depression screeners may not be enough to reliably identify patients at risk for suicide. In the present study, the PHQ-9 failed to detect nearly 50% of patients who reported suicide risk on the C-SSRS. These findings are consistent with those of Horowitz et al. (11) who found low sensitivity (70%) for item 9 on the PHQ-A (i.e., the PHQ-9 adapted for adolescents) in detecting suicide risk in pediatric medical inpatients.

Observed rates of suicide risk in our study (11.3%) are among the highest reported in the pediatric diabetes literature (range 2.2%–8.9%), though rates as high as 21% have been reported when history of suicide attempt was included as a suicide risk factor. In a recent study by Majidi et al. (2), nearly 9% pediatric patients with type 1 diabetes (aged $>$10 years) endorsed the suicide risk item on the PHQ-9. Our findings suggest integration of a suicide-specific screener could have resulted in the identification of additional patients at risk for suicide.

Differences in observed rates of suicide risk across the PHQ-9 and C-SSRS may be associated with the nature of questions on each measure. The PHQ-9 suicide-risk item may perform poorly because it does not directly ask about thoughts of killing oneself (11) nor does it delineate between passive thoughts about death and self-harm ideation. It uses vague phrasing (e.g., lack of clarity about what "several" or "bothered by" means) and does not assess other important suicide risk factors (e.g., active suicide ideation, plan, or intent) that are considered essential elements of suicide risk assessment (12). The extent to which the second half of the question (i.e., "hurting yourself in some way") may reflect thoughts of self-harm versus other behaviors, such as nonadherence, is unclear (13). Higher rates of suicide risk reported on the C-SSRS may be associated with the inclusion of direct questions about passive and active suicide ideation, plan, and intent. The C-SSRS may have identified more patients because of the longer assessment window (1 month) compared with the PHQ-9 (2 weeks).

Although depression screeners play an important role in the care of youth with type 1 diabetes, results of this study suggest integration of suicide-specific measures may aid in the identification of those at risk for suicide and minimize the number of patients who may move through the health care system undetected (11). Suicide screeners, such as the Ask Suicide-Screening Questions, can be used to triage services, including quickly identifying patients requiring additional assessment or intervention related to suicidality (e.g., referral to therapy, emergency services in the event of imminent risk). The Ask Suicide-Screening Questions can be integrated into standard clinical practice, administered by nonmental health personnel (14), and takes $<$20 s to complete (15), thus making it a potentially excellent option for suicide-specific screening in an ambulatory clinic setting with limited behavioral health resources.

This study's key strengths are its use of a suicide-specific instrument to assess suicidal thoughts and behaviors and use of a clinically derived sample. We are unable to discern how suicide risk may change over time and caution extending our findings to younger patients. In addition, although it is possible there was underreporting of suicide risk in the in-person C-SSRS interview format, it does not alter the finding that the PHQ-9 failed to detect nearly 50% of patients who reported suicide risk on the C-SSRS. Finally, it is unclear to what extent the presence of a pediatric psychologist may have influenced intake practices, particularly for patients with greater mental

**Table 1—Descriptive characteristics**

| Characteristic | Overall sample (*N* = 133) | Endorsed suicide risk | |
|---|---|---|---|
| | | PHQ-9, item 9 (*n* = 13) | C-SSRS (*n* = 15) |
| Age (years) | 19.6 ± 1.1; 16, 22 | 20.0 ± 1.2; 17.5, 21.3 | 20.1 ± 1.1; 17.5, 21.3 |
| Female sex | 68 (51.1) | 8 (61.5) | 9 (60.0) |
| Race | | | |
| White | 99 (74.4) | 9 (69.2) | 11 (73.3) |
| Black | 9 (6.8) | 3 (23.1) | 2 (13.3) |
| Asian | 3 (2.2) | 0 (0) | 1 (6.7) |
| Multiracial | 6 (4.5) | 1 (7.7) | 0 (0) |
| Other | 12 (9.0) | 0 (0) | 1 (6.7) |
| Unknown/not reported | 4 (3.0) | 0 (0) | 0 (0) |
| Ethnicity | | | |
| Non-Hispanic/Latino | 116 (87.2) | 13 (100.0) | 15 (100.0) |
| Hispanic/Latino | 12 (9.0) | 0 (0) | 0 (0) |
| Unknown/not reported | 5 (3.8) | 0 (0) | 0 (0) |
| Preferred language of care | | | |
| English | 125 (94.0) | 13 (100.0) | 14 (93.3) |
| Spanish | 1 (0.8) | 0 (0) | 0 (0) |
| Other | 3 (2.2) | 0 (0) | 1 (6.7) |
| Unknown/not reported | 4 (3.0) | 0 (0) | 0 (0) |
| Type 1 diabetes characteristics | | | |
| Age at diagnosis (years) | 9.8 ± 4.3; 0.5, 18.5 | 9.1 ± 5.2; 0.5, 15.6 | 9.5 ± 4.9; 1.4, 16.4 |
| Duration (years) | 9.7 ± 4.3, 1.0, 19.7 | 10.8 ± 5.0; 4.4, 20.0 | 10.6 ± 4.9; 1.8, 19.4 |
| Insulin delivery method | | | |
| Multiple daily injections | 56 (42.1) | 8 (61.5) | 8 (53.3) |
| Pump | 74 (55.6) | 5 (38.5) | 6 (40.0) |
| CGM prescription | 75 (56.4) | 5 (38.5) | 7 (46.7) |
| $HbA_{1c}$ | 8.7 ± 2.0; 5.4, <14 | 9.8 ± 2.4; 7.0, 13.9 | 9.3 ± 1.9; 6.9, 13.2 |

Data are reported as *n* (%) or mean ± SD; minimum, maximum. CGM, continuous glucose monitor.

health needs, and thus we cannot exclude referral bias.

Given mounting evidence of suicide risk in this population, clinical guidelines should explicitly recommend use of validated, suicide-specific screeners in addition to routine depression screening as a part of comprehensive medical care for this vulnerable population. The findings of this study also reinforce the critical role of embedded behavioral health resources as part of a multidisciplinary team to address the needs of this unique population.

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