# The Utility of the PHQ-9 to Assess Suicide Risk in Patients with Systemic Sclerosis

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**ABSTRACT**

**Objective**. Item 9 of the Patient Health Questionnaire-9 (PHQ-9), which inquires about both passive thoughts of death and active ideas of self-harm, has been used to assess suicide risk in arthritis. The objectives of this study were (1) to determine the proportion of systemic sclerosis (SSc) patients who responded "yes" to Item 9 who endorsed active suicidal ideation in response to more direct questions during a structured clinical interview and (2) to report whether the PHQ-8, which does not include Item 9 from the PHQ-9, performs similarly to the PHQ-9.

**Methods.** Patients were recruited from the Canadian Scleroderma Research Group Registry. The PHQ-9 and Composite International Diagnostic Interview (CIDI) depression module were administered during a phone interview. Scores on the PHQ-8 were calculated by removing Item 9 from the PHQ-9. Item 9 responses were compared to suicidal ideation and intent in the last year based on the CIDI. Scores on the PHQ-8 and PHQ-9 were compared using Pearson correlations.

**Results.** There were 345 patients interviewed, of whom 31 (9.0%) endorsed Item 9 of the PHQ-9. Of those, based on the CIDI, 14 (45.2%) had passive thoughts of suicide or death. Only 1 (3.2%) had thought about suicide in some detail at any point in the last 12 months. The correlation between PHQ-9 and PHQ-8 scores was r=0.998.

**Conclusion.** Item 9 appears to identify many patients who do not report active suicidal ideation. The PHQ-8 may be a better option for assessment of depressive symptoms than the PHQ-9 in SSc patients.

## SIGNIFICANCE AND INNOVATION

- 9% of SSc patients screened positive for suicidal ideation based on Item 9 of the PHQ-9, which queries about passive thoughts of death or active ideas of self-harm.
- Of those patients, only 3% (1 of 31) had active suicidal ideation in the past 12 months based on a structured clinical interview. No patients had an active suicidal plan at the time of the interview.
- The association between PHQ-9 and PHQ-8 scores was very high in this sample, suggesting that the PHQ-8 is a reasonable alternative to the PHQ-9 for assessment of depressive symptoms in SSc.

Depression is common among patients with rheumatic diseases (1-3), including systemic sclerosis (SSc) (4, 5). SSc is a chronic autoimmune connective tissue disorder characterized by abnormal fibrotic processes and excessive collagen production, which manifests itself in thickening of the skin and fibrosis of internal organs, including the lungs, kidneys and gastrointestinal tract (6). SSc results in significant disability from reduced physical mobility and hand function, gastrointestinal and respiratory problems, pain, and fatigue (7, 8). Patients report high levels of depressive symptoms (4), and one study reported that 19% of 100 SSc patients studied met criteria for a major depressive episode (5).

In the general population, depression is associated with increased risk of suicidal ideation, attempts, and completion (9, 10). Among 1,545 adults with self-reported arthritis from the US National Health and Nutritional Examination Survey, 6% responded something other than “not at all” on Item 9 of the 9-item Patient Health Questionnaire (PHQ-9) (11). The PHQ-9 (12), which is used frequently in medical settings (12, 13), is a self-administered and easily scored measure of depressive symptoms that is comprised of 9 items that map onto the 9 DSM-IV criteria for Major Depressive Disorder (MDD) (14). Item 9 of the PHQ-9 asks patients “How often have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?” with response options ranging from “not at all” to “nearly every day.” The PHQ-9 can be used as a continuous measure of symptoms or to identify patients who are likely to have MDD. The PHQ-2, which is comprised of 2 of the PHQ-9 items, can be used as an initial step to rule out patients who do not have depression. However, it is overly sensitive, and a longer

instrument, such as the PHQ-9, should be administered as a second step when patients are identified as possible cases based on the PHQ-2 (15, 16).

Beyond arthritis, a number of studies in other patient groups have used PHQ-9 Item 9 to identify patients with suicidal ideation. The rate of suicidal ideation based on Item 9 has been reported to be 29% in multiple sclerosis (17), 14% in HIV (18), 8% in cancer (19) and 12-17% in heart disease (20, 21). Several authors (17, 20, 21) have recommended using Item 9 to routinely screen all patients for suicidal ideation, including patients with arthritis (11), with referral for mental health assessment if the item is endorsed. Item 9, however, includes two concepts – "thoughts of being better off dead," which is a passive concept that is not necessarily related to self-harm, and "thoughts of hurting yourself in some way," which is a more active concept. Thus, positive responses to Item 9 could identify patients who have thought passively about death without ever considering self-harm, patients who have thought passively about self-harm, and patients who have actively considered self-harm.

Previous studies in medical settings, including of patients with depression, have found that most patients who endorse Item 9 appear to be endorsing the first part only, passive thoughts about "being better off dead" (22-25). In two large samples of patients with depression, only 6% of patients who responded "yes" to Item 9 or a similar item indicated that they were "somewhat likely" or "very likely" to attempt suicide and did not identify factors that would prevent them from taking action when they were questioned more specifically (25).

Because Item 9 contains ambiguous content and appears to identify many patients who have had passive thoughts about death or about self-harm, but a relatively small

proportion who have actually considered self-harm, the PHQ-8, which omits Item 9, has been proposed as a better option for the assessment of symptoms of depression (22). A study of over 1,000 primary care patients from a US Department of Veterans Affairs setting found that the correlation of PHQ-9 and PHQ-8 scores was r = 0.998 and that only 3 patients at or above the standard cutoff score of 10 to identify possible depression on the PHQ-9 had a PHQ-8 score below 10 (23). In two other validation studies with over 6,000 patients total, the PHQ-8 and PHQ-9 correlated at r = 0.997 (22).

An important shortcoming of studies that have reported rates of positive responses to Item 9 of the PHQ-9 among patients with chronic medical conditions (11, 17, 18, 20, 21) is that they did not report how many patients with positive responses to Item 9 would be considered to be at risk based on more specific inquiry about suicide risk. If most patients who respond positively to Item 9 are not deemed to be at risk based on questions designed specifically to assess suicidality and if the PHQ-9 and PHQ-8 perform similarly, then the PHQ-8 would be a more appropriate measure for use with patients with rheumatic diseases.

Thus, the objectives of this study were (1) to determine the proportion of patients who responded anything other than “not at all” to Item 9 of the PHQ-9 who also endorsed active suicidal ideation or plan when more specific questions from a structured clinical interview were asked; and (2) to determine the degree of association of PHQ-9 and PHQ-8 scores.

## METHOD

### Patients and Procedures

The present study was a sub-study of the Canadian Scleroderma Research Group (CSRG) Registry. To be eligible for participation in the CSRG Registry, patients must have a diagnosis of SSc made by the referring rheumatologist, be age ≥18 years, and be fluent in English or French. At their annual Registry visit, patients undergo an extensive clinical history, physical evaluation, and laboratory investigations, and complete a series of self-report questionnaires. The CSRG Registry collects data from patients from 15 centers across Canada, and patients were recruited from 7 of those centers for the present study.

For the present study, patients were approached during their yearly CSRG Registry visit by staff at participating centers and asked whether they would be willing to participate in a phone survey about depression and fatigue. Patients who consented to participate were then contacted by phone to set the date and time of a phone interview. Two interviews related to depression and fatigue were conducted, one following the annual Registry visit and a second interview a month later. For the present study, we used only the data from the first interview. The study was approved by the McGill University Institutional Review Board and the research ethics boards of each participating CSRG center. Patients provided informed consent to participate in the CSRG Registry and the present sub-study.

**Measures**

The PHQ-9 (26), which is a 9-item measure of depressive symptoms that is commonly used in medical populations (12, 13), was administered to all patients. The 9 items reflect the criteria for MDD as described in the DSM-IV (14) and ask about the presence of symptoms in the past 2 weeks. Items are scored from 0 to 3 with response

options “not at all” (score 0), “several days” (score 1), “more than half the days” (score 2) and “nearly every day” (score 3). The maximum total score is 27. Higher scores represent increased severity of depressive symptoms, and the standard cutoff score to identify possible depression is 10 (12, 13, 27). Item 9 asks “Over the last two weeks how often have you been bothered by this problem: thoughts that you would be better off dead or hurting yourself in some way?” In the present study, consistent with previous studies (11, 17, 20, 21), any response other than “not at all” on Item 9 was considered to reflect a positive response regarding possible suicidal ideation. PHQ-8 scores were derived from responses to the PHQ-9, but eliminating Item 9.

The World Mental Health Composite International Diagnostic Interview Version 3.0 (WMH-CIDI 3.0) (28) was used to determine if patients met criteria for a diagnosis of MDD and to assess suicidality. The WMH-CIDI is a widely used epidemiological tool for assessment of psychiatric disorders in the general population that provides diagnoses based on DSM-IV. The interview is lay-administered and includes 30-day, 12-month and lifetime disorders, detailed assessment of clinical severity, and questions about treatment and risk factors. A question from the Depression Module was used to assess suicidal ideation and intent in the past 12 months. The question was administered to all patients who had at least one episode of MDD or minor depression in the past 12 months. Minor depression involves the presence of at least 2 of 9 symptoms rather than at least 5 of 9 as is required for a diagnosis of MDD. Patients with current MDD or minor depression (e.g., last two weeks) would have been assigned 30-day, 12-month and lifetime diagnoses and would have been administered this question. In cases when a patient had more than one episode, the questions referred to the episode when depressive symptoms were most

severe and frequent. The question includes four response options: (1) You did not think of suicide or death (None); (2) You felt that life was empty or wondered if it was worth living; (3) You thought of suicide or death several times a week for several minutes (Thoughts of Suicide or Death); and (4) You thought of suicide or death several times a day in some detail or you made specific plans for suicide or actually tried to take your own life (Detailed Suicide Thoughts or Plan). All patients who endorsed Detailed Thoughts or Plan in the last 12 months were also asked whether or not they had a plan at the time of the interview. Options 2 and 3 of the CIDI item for suicidality were collapsed into one because of similarity. Thus, the status of patients were coded as "None," "Thoughts of Suicide or Death," or "Detailed Suicide Thoughts or Plan."

It is possible that some patients without minor depression or MDD any time in the last 12 months could have been actively suicidal. Given that minor depression requires only 2 symptoms, however, and that patients in the study were not generally severely ill, if this were the case, it is reasonable to assume that the number would likely have been very small. Nonetheless, for the purpose of the current analysis, we report results both (1) assuming that patients who did not have a depressive episode in the past 12 months and, thus, were not administered these items, would have responded "None" to the CIDI suicide item and (2) removing patients without 12-month MDD or minor depression from analyses.

**Data Analyses**

Responses on item 9 of the PHQ-9 ("not at all" versus "several days" or more frequently) were compared to responses to items about suicidal ideation and intent from

the CIDI. To compare the association of the PHQ-9 and PHQ-8, a Pearson correlation was calculated for the total scores.

## RESULTS

### Patient Characteristics

In total, 408 patients were approached by site coordinators to participate in the study, and 373 (91.4%) consented to participate. Of these, 345 completed the phone interview (92.5%), including all items on the PHQ-9 with no missing or refused items. Patient sociodemographic and disease characteristics are shown in Table 1. Of the 345 patients, 79 (22.9%) had a lifetime MDD diagnosis, and 37 (10.7%) had a major depressive episode in the past 12 months, including 13 (3.8%) had a major depressive episode in the past 30 days. There were 20 patients with an episode of minor depression in the last 12 months who did not meet criteria for MDD. One patient with MDD did not provide a response to the CIDI question on suicide ideation and intent. Thus, 56 patients were administered the CIDI question on suicide ideation and intent.

### PHQ-9 Item 9 and CIDI responses

Of the 345 patients, 31 (9.0%) responded something other than “not at all” on Item 9 of the PHQ-9, including 26 (7.5%) who responded “several days,” 4 (1.2%) who responded “more than half the days,” and 1 (0.3%) who responded “nearly every day” in the past two weeks. For the other 8 items of the PHQ-9, between 29.3% and 83.4% of patients answered something other than “not at all.”

Of the 56 patients who were administered the CIDI item on suicidality, in the preceding 12 months, 22 (39.3%) had wondered if life was empty or worth living, 5 (8.9%) had thought of suicide or death and 2 (3.6%) had thought of suicide in some detail.

None had a plan for suicide at the time of the interview. Of the overall sample of 345 patients, this is equivalent to 6.4% who wondered if life was empty or worth living, 1.4% who thought of suicide or death, and 0.6% who thought of suicide in some detail.

As shown in Table 2, of the 31 patients who answered anything other than "not at all" on PHQ-9 Item 9, 14 (45.2%) had thoughts of suicide or death and 1 patient (3.2%) had detailed thoughts of suicide in the past 12 months based on the CIDI. Of the 31 patients with a positive response on Item 9, 21 (67.7%) scored at least 10 on the PHQ-8.

**The PHQ-9 versus PHQ-8**

The mean PHQ-9 score was 6.8 (standard deviation = 5.4; range 0 to 26), and 92 patients (26.7%) scored 10 or greater. For the PHQ-8, the mean score was 6.7 (standard deviation = 5.2; range 0 to 24), and 89 (25.8%) scored at least 10. There were only 3 patients who scored at least 10 on the PHQ-9, but not on the PHQ-8. The correlation between PHQ-8 and PHQ-9 scores was r = 0.998.

**DISCUSSION**

The results of the present study suggest that most SSc patients who respond something other than "not at all" on PHQ-9 Item 9 do not appear to have suicidal thoughts or intentions as assessed by a structured clinical interview. Forty-five per cent of patients with a current positive response on Item 9 had thoughts about suicide or death any time in the last 12 months, and 1 patient (3.2%) had detailed thoughts of suicide. None had a current suicide plan at the time of the interview. The PHQ-9 and the PHQ-8, which omits Item 9 of the PHQ-9, were very highly associated.

Three previous studies have compared responses on Item 9 to other assessments of suicidality. In a study of 1,022 Coronary Artery Disease (CAD) patients (29) the

authors compared responses to Item 9 to responses related to suicide on a structured clinical interview, the Diagnostic Interview Schedule. Of 110 patients who screened positive on Item 9, only 19.8% had any suicidal ideation and only 8.2% had made a suicide plan in the 12 months prior to assessment. A study in over 4,000 cancer patients (30) reported that 10% of their sample endorsed Item 9; of those patients 29% were assessed as having active thoughts about suicide by "Symptom Monitoring Staff" (psychology graduates and nurses) who clarified patients' questionnaire responses in a follow-up phone call. However, the study did not use a structured clinical interview, limiting interpretability of results. Only one previous study has compared responses to Item 9 to current suicidality. That study (25) compared Item 9 responses to responses on the P4. The P4, which is designed to assess potential suicide risk, asks specific questions about past suicide attempts, suicide plan, probability of completing suicide and factors that would prevent a person from making an attempt (25). In this study, only 6% of patients who had endorsed PHQ-9 Item 9 or a similar item were deemed to be at risk based on the P4.

The high level of consistency between PHQ-9 and PHQ-8 scores is also consistent with previous studies. Three previous studies have compared continuous PHQ-9 and PHQ-8 scores, and, as in the present study, all reported correlations >0.99 (22, 23, 29). Among more than 1,000 CAD patients, sensitivity, specificity and negative and positive predictive value were virtually the same for the PHQ-9 and PHQ-8 (27). In the present study, we were not able to compare diagnostic accuracy characteristics because of the very small number of patients with concurrent MDD. However, compared to the PHQ-9, only 3 fewer patients scored 10 or higher on the PHQ-8.

In light of the findings of the present study and several previous studies, recommendations to use Item 9 as a screen for suicide in medical settings (17, 20, 21), including arthritis (11), would not appear to be warranted. In general, recommendations for screening should be based on evidence from well-conducted randomized controlled trials (RCT) showing that the benefits from screening outweigh potential harms (35, 36). No clinical trials have ever found that screening for suicide risk has improved patient outcomes. Consistent with this, the United States Preventive Services Task Force has concluded that there is not evidence to recommend routine screening for suicide risk in primary care (31, 32), even though primary care settings are typically better equipped to deal with mental health issues than specialty settings, including rheumatology. Preventing suicide by identifying individuals at the population level who may be at risk is not a straightforward task, and it has been suggested that not enough is known yet to do this effectively (30).

Several limitations should be considered in interpreting results from this study. First, because the CIDI is a structured clinical interview for depression, only patients who had an episode of MDD or minor depression in the last 12 months were assessed for suicidal ideation and intent. It is possible that some patients who never had at least 2 symptoms of depression (the criteria for minor depression), in the preceding 12 months could have been actively suicidal, in which case we may have underestimated the rate of suicidal ideation and intent. It is also possible, on the other hand, that some of the patients who were identified as having suicidal thoughts based on the CIDI were not currently suicidal, since the CIDI assesses suicidal ideation and intent over the last 12 months, not specifically at the time of the interview. In addition, the present study was conducted with

a convenience sample of patients enrolled in the CSRG Registry. Patients with very severe SSc who were too sick to participate, as well as those who may have died earlier in their disease course, are not enrolled in the Registry, which may result in an over-representation of healthier patients. However, sample characteristics were similar to those reported from other large North American and European SSc cohorts (33).

In summary, this study found that almost 10% of patients with SSc responded something other than "not at all" on Item 9 of the PHQ-9, but less than half had thought about suicide at any time in the past year and only 1 patient thought in any detail about suicide in the past year. This is likely because Item 9 does not adequately differentiate between benign thoughts about death and thoughts of self-harm. The use of Item 9 as a screen for suicide risk could result in a very large expenditure in resources to evaluate all positive screens without any evidence that suicide risk would be reduced in the very small number of patients who have actually considered suicide. The PHQ-8, which performs similarly to the PHQ-9 and is increasingly used in medical settings, may be a good alternative to assess depressive symptoms in rheumatology settings.

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**Table 1. Patient sociodemographic and disease characteristics**

| **Sociodemographic Characteristics** | **N = 345** |
|---|---|
| Age in years, *mean (standard deviation)* | 57.7 (11.8) |
| Female sex, *n (%)* | 302 (87.5) |
| Education, *n (%)*: | |
| ≤ High School | 153 (44.3) |
| > High School | 183 (53.0) |
| Not reported | 9 (2.6) |
| Ethnicity, *n (%)*: | |
| White | 302 (87.5) |
| Other | 26 (7.5) |
| Not reported | 17 (4.9) |
| Marital Status, *n (%)*: | |
| Married or common law | 236 (68.4) |
| Single | 26 (7.5) |
| Separated/Divorced/Widowed | 72 (20.9) |
| Not reported | 11 (3.2) |
| **Clinical Characteristics** | |
| Time since non-Raynaud's symptom onset in years, *mean (standard deviation)* | 12.9 (9.7) |
| Time since diagnosis of SSc in years, *mean (standard deviation)* | 9.7 (8.2) |
| Modified Rodnan skin score, *mean (standard deviation)* | 8.3 (9.6) |
| Disease Class, *n (%)* | |
| Diffuse | 84 (24.3) |
| Limited | 251 (72.8) |
| SINE | 9 (2.6) |

| | |
|---|---|
| Not reported | 1 (0.3) |

**Table 2. Number of Patients Endorsing PHQ-9 Item 9 Compared to Responses for Suicide Ideation or Plan During Sad Period in Past 12 Months from the Composite International Diagnostic Interview (CIDI).**

| | PHQ-9 Item 9 (Past 2 Weeks) | | | | |
|---|---|---|---|---|---|
| **CIDI item (Past 12 Months)** | **Not at All (N=314)** | **Several Days (N=26)** | **More Than Half the Days (N=4)** | **Nearly Every Day (N=1)** | **Total (N=345)** |
| **Not administered the CIDI item[1]** | 275 | 13 | 0 | 1 | 289 |
| | (87.6%) | (50.0%) | (0.0%) | (100 %) | (83.8%) |
| **No thought of or plan for suicide** | 25 | 1 | 1 | 0 | 27 |
| | (8.0%) | (3.8%) | (25.0%) | (0.0%) | (7.8%) |
| **Thoughts of suicide or death** | 13 | 11 | 3 | 0 | 27 |
| | (4.1%) | (42.3%) | (75.0%) | (0.0%) | (7.8%) |
| **Detailed thoughts of suicide or plan** | 1 | 1 | 0 | 0 | 2 |
| | (0.3%) | (3.8%) | (0.0%) | (0.0%) | (0.6%) |

[1]Patients without minor depression (2 symptoms of major depressive disorder) or major depressive disorder in last 12 months were not administered the CIDI suicide item.