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Using a Single Screening Question for Depressive Symptoms in Acute Coronary Syndrome Patients

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INTRODUCTION

The prevalence of depression in hospitalized acute coronary syndrome (ACS) patients is 20% to 30%, which is three times greater than in the general population.^{1,2} Studies indicate that the presence of depressive symptoms is a major independent risk factor for future major adverse coronary events (MACE) in patients with ACS contributing to decreased quality of life and increased health care costs.³⁻⁵ Results from a 2004 meta-analysis assessing the link between depression and ACS and subsequent MACE indicate a consistent association between post-ACS depression and increased future MACE from either all-cause or cardiac mortality independent of severity of cardiac disease.⁵ Several potential mechanisms linking the presence of depressive symptoms and poor cardiovascular outcomes have been hypothesized in depressed patients. Potential mechanisms include unhealthy lifestyle behaviors (for example cigarette smoking and lack of exercise) and poor medical compliance (for example poor cardiac rehabilitation attendance and poor medication adherence), as well as potential physiological changes, including increases in sympathetic nervous system activity and increases in inflammatory and platelet responses.^{3,5-7} Our team has previously reported that a single question “Have you ever felt sad or depressed much of the time in the past year?” is significantly associated with future MACE in patients with

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coronary artery disease (CAD).³ Despite the clinical significance of the presence of depressive symptoms on adverse cardiac outcomes, screening for depressive symptoms is not a part of routine care for ACS patients in the acute care setting. Potential reasons for this discrepancy are limited provider awareness and level of comfort with depressive symptom screening, provider time constraints, the stigma of depression, limitations in reimbursement for psychiatric patient services, and the lack of consensus on what screening method to use with the ACS population.^{8,9} While the traditionally accepted depressive symptom screening instruments are validated in this population, they require time and effort to use. The feasibility and cost-effectiveness of depressive symptom screening, for all cardiovascular patients has been called into question.¹⁰ Both the American Heart Association (AHA) and the National Institute for Health and Clinical Excellence (NICE) has recommended depressive symptom screening in primary and secondary care settings.^{11,12} The AHA recommends a simple two question screening instrument, the Patient Health Questionnaire-2 (PHQ-2) to identify depressive symptoms in patients with CAD.¹¹ Hasnain et al. provide a summary and critical evaluation of the 2008 AHA guidelines concluding that researchers must first demonstrate that depressive symptom screening is effective and efficient, in patients with CAD, before routine screening measures are implemented.¹³ The NICE has released updated guidelines that support short depressive symptom screening tools, including two recommended depressive symptom screening questions, when recognizing depressive symptoms in adults.¹⁴ A summary of points from the updated NICE guidelines for depressive symptom recognition in adults are provided in Table 1.¹⁴ The guidelines include the use of a two-question depressive symptom screening tool and stress the importance of recognizing potential “sub-threshold” depressive symptoms that may not meet the criteria for a formal depression diagnosis, but are considered to be disabling symptoms that warrant appropriate management.¹⁴

Utilization of effective and efficient brief depressive symptom screening methods for ACS patients is an important objective. On busy inpatient cardiovascular units, utilizing depressive symptom screening methods that are accurate, efficient, and easy to administer may have a significant impact on identifying those high risk patients who may need additional depressive symptom assessment and management. While the potential cardiovascular benefits of depressive symptom screening remain unclear, research has determined that the management and treatment of depressive symptoms in CAD patients has been associated with improvement in depressive symptom experience.¹⁵ In addition, treatment with selective serotonin reuptake inhibitors, in depressed patients recovering from acute coronary syndrome, has been associated with improvements in depressive symptom screening scores as well as lower rates of re-hospitalization from all causes.¹⁶ Brief screening methods are available for depressive symptom screening but to our knowledge the accuracy of these one to two item screening methods have not been thoroughly investigated among patients hospitalized for ACS. Investigating the accuracy of a single screening question to potentially identify depressive symptoms in ACS patients may improve recognition of depressive symptoms in this vulnerable population. The purpose of this study was to determine how a single screening question for depressive symptoms “Have you ever felt sad or depressed much of the time in the past year?” was associated with Beck

Depression Inventory-II (BDI-II)¹⁷ screening instrument scores in a sample of patients hospitalized for ACS.

METHODS

Design, Setting, & Sample

A cross sectional sample of patients admitted for ACS was recruited between November 1, 2007 and July 31, 2011 from two large multidisciplinary teaching and research hospitals. Inclusion criteria into the present study included the following: (1) age 18 years and older, (2) final discharge diagnosis of ACS, defined as hospitalization for acute myocardial infarction; unstable angina; or angina requiring revascularization, (3) a completed BDI-II¹⁷ during current hospital admission and an answer to the single screening question for depressive symptoms: “Have you ever felt sad or depressed much of the time in the past year?” and (4) English or Spanish speaking. Human subject approval was obtained through the University’s Institutional Review Board and written informed consent was obtained from each participant.

Data Collection Procedure

Trained research nurses approached admitted hospitalized patients for informed consent in the emergency rooms, coronary intensive care units, telemetry units, chest pain clinics, or intensive care units. The ACS patients were approached for the demographic questions concerning current health status, demographic variables, and previous health and hospitalizations and depression data after the acute event when they were more psychologically and physically stable. Depressive symptoms were measured using two methods. The first method was a single screening question: “Have you ever felt sad or depressed much of the time in the past year?” was asked at the completion of the demographic data collection. After the single screening question was completed the patient was given the BDI-II to self-report depressive symptoms.¹⁷ The research nurse was not blinded to the history of depression or antidepressant use.

Depressive Symptom Screening Measures

Depressive symptoms were measured using the BDI-II, which asks individuals to consider each statement as it relates to the way they have felt for the past two weeks.¹⁷ The BDI-II was administered, by trained research nurses, within 1 to 3 days of hospital admission. The BDI-II is a self-report 21-item screening instrument used to screen for and assess the severity of depressive symptoms, including symptoms of depression listed in the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders.^{17,18} The total BDI-II score is the sum of all items and ranges from 0 to 63. A BDI-II score 14 was considered a positive screen for depressive symptoms.¹⁹ In addition, BDI-II instrument scores were categorized into three distinct categories with a depressive symptom score 14 considered mild, 20 considered moderate, and 29 considered severe.¹⁹ One self-report single screening question for depressive symptoms was obtained as a question listed on the demographic questionnaire administered by the trained research nurses. The single screening question for depressive symptoms read as follows: “Have you ever felt sad or depressed

much of the time in the past year?" An answer of yes was regarded as a positive response and an answer of no was regarded as a negative response.

Data Analysis

Descriptive statistics (means, standard deviations (SD), and percentages) were computed for the total sample. Independent sample t-tests and chi-square tests were initially used to compare the depressive symptoms (BDI-II ≥ 14) and non-depressive symptoms groups (BDI-II < 14). In addition, three separate agreement analyses were conducted using categorized BDI-II scores (≤ 14 , 20, and ≥ 29) as the gold standards to define depressive symptoms based on the cutoffs described by Beck et al.¹⁹ Agreement of BDI-II categories with responses to a single screening question was assessed with the simple kappa statistic. Sensitivity was calculated as the percentage of patients categorized with depressive symptoms by the BDI-II score that responded yes to the single depressive symptom screening question. Specificity was calculated as the percentage of patients categorized as non-depressive symptoms by the BDI-II score that responded no to the single depression screening question. All statistical analyses were performed using SAS for Windows, version 9.2.

Results

Sample Characteristics

Of the 1140 ACS patients recruited under the parent study, 18 did not meet inclusion criteria. All 18 patients were missing an answer to the single screening question for depressive symptoms: "Have you ever felt sad or depressed much of the time in the past year?" Therefore, we examined baseline demographic and clinical data from a total of 1122 patients hospitalized for ACS, including 769 men (69%) and 353 women (31%) with a mean age of 62 ± 12 years. Table 2 summarizes the demographic and clinical characteristics of the 1122 patients. Table 3 summarizes the baseline depressive symptom data collected from the 1122 patients. Average BDI-II scores were 9.7 ($SD = 8.76$) and 25% ($n=279$) of the patients reported a mild or greater level of depressive symptoms (BDI-II ≥ 14) ($M=22.12 \pm 7.57$). In addition to the single screening question for depressive symptoms "Have you ever felt sad or depressed much of the time in the past year?" patients were asked if they currently take antidepressants and if they have ever been diagnosed with depression or treated for depression by a health care provider.

Agreement analysis between categorized Beck Depression Inventory-II scores and a single screening question for depressive symptoms

A total of 1122 patients were included in the agreement analysis to explore the accuracy of using a single question to screen for depressive symptoms. BDI-II instrument scores were categorized into three distinct categories with a depression score ≤ 14 considered mild, 20 considered moderate, and ≥ 29 considered severe.¹⁷ A moderate level of Cohen's kappa coefficient ($\kappa = 0.42$) was reported when a cut score of BDI-II > 14 was used. When the cut score was adjusted to 20, a fair level of kappa coefficient was calculated ($\kappa = 0.37$). The kappa coefficient decreased to slight agreement ($\kappa = 0.18$) as the cut score increased to 29. Table 4 illustrates the change of agreement level when different BDI-II categories were used to

define depressive symptoms. The single depressive symptom screening question “Have you ever felt sad or depressed much of the time in the past year?” had a sensitivity level of 62% and specificity level of 82% when a BDI-II score of 14 was used to identify patient with at least mild level of depressive symptoms. When higher BDI-II cut scores were used to define depressive symptoms, sensitivity increased to 76% (BDI-II 20) and 90% (BDI-II 29) with a trade-off in specificity (79% and 74% respectively).

Discussion

While there is compelling evidence that depressive symptoms impact cardiac outcomes and multiple depressive symptom screening instruments have identified by researchers for use in cardiac patients, including the Beck Depression Inventory, Hospital Anxiety and Depression Scale, Cardiac Depression Scale, Cardiac Depression Visual Analogue Scale, Hamilton Depression Scale, Patient Health Questionnaire-9, or Patient Health Questionnaire-2; screening for depressive symptoms is still not a part of routine care.²⁰ Feinstein et al. examined the perceptions of cardiologists on depressive symptom identification and management and found that almost half are unaware that depressive symptoms are an independent risk factor for cardiovascular events and the majority fails to screen for depressive symptoms.²¹ Time constraint may be a potential barrier for health care providers on busy cardiovascular units supporting the need to utilize an efficient and easy to administer depressive symptom screening instrument to initially identify at-risk patients who may then need additional depressive symptom assessment and management.

Our findings demonstrate that a single screening question for depressive symptoms correctly identifies positive BDI-II depressive symptom screening scores (BDI-II 14) 62% of the time, but inappropriately identifies patients with depressive symptoms 18% of the time (false positive rate). Our results support that the sensitivity of a single screening question “Have you ever felt sad or depressed much of the time in the past year?” increases when BDI-II scores for moderate (20) and severe (29) depressive symptoms were used. The false negative rate is relatively high with 38% of the patients with a BDI-II score 14 incorrectly labeled as non-depressive symptoms. Further analyzes show that this single depressive symptom screening question would potentially miss a positive screen for depressive symptoms in 24% of patients that have a BDI-II score 20 and in 10% of patients that have a BDI-II score 29. Our findings are similar to the Huffman et. al., (2006) in 131 patients hospitalized for acute myocardial infarction who were diagnosed with major depression.²² These hospitalized patients were administered the BDI-II along with the structured diagnostic interview for major depression. Three individual BDI-II questions (sadness, loss of interest, and loss of pleasure) were also evaluated as individual depressive symptom screening items as well as in two-question screening combinations. Since this study compared one and two question screening items from the BDI-II to identify major depression, we compared our one screening question sensitivity and specificity findings for the severe (BDI-II 29) depressive symptoms group only. A positive response to all three of their single question depressive symptom screen was 76-87% sensitive and 82-88% specific for major depression, compared to the 90% sensitive and 74% specific values in our study. In addition, Huffman et al. examined one item of the BDI-II that essentially asks the same question our study asked “Have you ever felt sad or depressed much of the time in the past

year?” The main difference is the BDI-II restricts the question to the past two weeks instead of a one year time frame.²² Huffman et al. found this one BDI-II question was the most effective screening tool for major depression when compared to several two BDI-II question combinations.²² When we compared the number of patients in our study who screened positive for severe depressive symptoms (BDI-II ≥ 29) with the same question we found that 90% of the patients with a BDI-II ≥ 29 had a positive response to the question (sensitivity) and 78% with a BDI-II <29 had a negative response (specificity). These results are similar to the results we obtained for our one question screening question with a 90% (BDI-II ≥ 29) sensitivity. These results suggest that among patients with acute coronary syndrome that a single question screening instrument may screen 9 out of 10 patients who have severe depressive symptoms. These patients would then go on for testing methods to accurately diagnose major depression.

Given the importance of recognizing depressive symptoms among patients with ACS, it is important to interpret our findings with caution, noting our studies limitations. First, it was performed in a single academic medical center, with largely Caucasian patients, in two hospitals, potentially limiting the generalizability of the study results. Second, in an attempt to limit patient burden, our study did not obtain a formal depression diagnosis. However, we did utilize a well validated depressive symptom screening instrument, as our gold standard, to determine validity of a one depressive symptom screening question. We selected the BDI-II for several reasons. First, the BDI-II is a reliable and well-validated 21-item depressive symptom screening scale that uses a forced-choice, four-alternative response format that has been used previously in the ACS population. It is important to note that the 2008 American Heart Association Advisory Board discussed the use of the Patient Health Questionnaire-2 (PHQ-2) as an initial minimum screening instrument followed by the PHQ-9, if a positive PHQ-2 response is detected.¹¹ In a study of primary care patients, with major depression, a sensitivity score of 0.61 was reported using a PHQ-2 score > 3 to determine depression, when compared with the Composite International Diagnostic Interview (CIDI) as a diagnostic standard.²³ The one-question depressive symptom screening tool used in this study yielded similar probabilities with a slightly lower specificity (82% versus 92%) than the PHQ-2.²³ While these results suggest the PHQ-2 has a better ability to rule out true negatives, in patients with major depression, it requires an additional anhedonia question and consists of additional scoring variations compared to the one-item question. Second, the 2004 NHLBI working group on the Assessment and Treatment of Depression in Patients with Cardiovascular Disease recommends the BDI for identifying depressive symptom in research involving the CVD population.²⁴ Third, two recent meta-analyses concluded that self-report questionnaires of symptomatology are as good as clinical interviews based on diagnostic criteria for depression, because both are similarly predictive of mortality.^{25,26} Fourth, previous studies assessing depression in ACS patients with structured interviews have had large refusal rates mainly because of the considerable clinical burden such interviews place on patients that limit their generalizability. Fifth, symptoms of depression as measured by the BDI-II are known to be linked to poor outcome in ACS.

Conclusion

Screening for depressive symptoms in ACS patients is not routinely done, due in part to the perceived cost ineffectiveness and time consuming nature of administering depressive symptom screening instruments. This study suggests that a single depressive symptom screening question could be used to initially identify ACS patients experiencing depressive symptoms, who can then undergo a more thorough screening assessment or referral for diagnosis and if necessary treatment. Future research should focus on establishing whether routine brief depressive symptom screening affects cardiovascular outcomes in patients with ACS.

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“What’s New?”

- Depression remains an independent risk factor for future adverse cardiac events.
- Despite the clinical significance of depressive symptoms on adverse cardiac outcomes, depressive symptom screening is not a part of routine care for ACS patients in the acute care setting.
- A single screening question for depressive symptoms could be used to identify vulnerable ACS patients who have clinically significant depressive symptoms. This identified vulnerable sub-group would subsequently undergo a more thorough assessment for depression.

Table 1

Points from the National Institute for Health and Clinical Excellence for Depressive Symptom Recognition in Adults

Depressive Symptom Recognition Points
Be alert for possible depression in people with a personal or family history of depression.
Be alert for possible depression in people with a chronic health condition.
Consider asking potentially depressed individuals two screening questions. ¹
A positive result on a short depressive symptom screening tool indicates the need for a mental health assessment. ²
If you suspect depression, it may be appropriate to consider using a validated depressive symptom screening measure or diagnostic tool.
When assessing using a formal diagnostic tool, be aware of “sub-threshold depressive symptoms that fall below the diagnostic threshold.” ³

¹Two screening questions: “During the last month, have you often been bothered by feeling down, depressed or hopeless?” and “During the last month, have you often been bothered by having little interest or pleasure in doing things?”

²The mental health assessment should include assessment of mental state, functional and interpersonal abilities and social difficulties.

Table 2

Demographic and Clinical Characteristics of Patients Hospitalized for Acute Coronary Syndrome

Demographic & Clinical Variables	Total (n=1122)
Age at Consent	
<i>M</i> (year) ± SD	62 ± 12
Range	26-96
Gender	
Male	769 (68.54)
Female	353 (31.46)
Self-Reported Race	
Caucasian	680 (60.61)
African American	214 (19.07)
Spanish/Hispanic/Latino descent	182 (16.22)
Some other race	46 (4.10)
Body Mass Index	
<i>M</i> ± SD	30.22 ± 6.43
Range	16.47-69.73
Education	
High school	471 (42.24)
Some college/vocational/technical	290 (26.01)
College degree and above	354 (31.75)
Current myocardial infarction diagnosis	512 (45.63)
Clinical Health History	
Diabetes	399 (35.56)
Hypertension	799 (71.21)
Stroke	106 (9.46)
Myocardial infarction	398 (35.99)
Coronary artery disease	560 (50.18)
Coronary artery bypass surgery	207 (18.47)
Coronary angioplasty	70 (6.24)
Coronary stent	401 (35.77)

Values in parentheses are percentages.

Table 3

Baseline Depressive Symptom Data Obtained from Patients Hospitalized for Acute Coronary Syndrome

Depressive Symptom Data	Total (n=1122)
Beck Depression Inventory-II score (0-63)	
<i>M</i> ± <i>SD</i>	9.63 ± 8.74
Range	0-48
Current anti-depressant use	158 (14.18)
Sad/depressed feelings in past year *	320 (28.52)

Values in parentheses are percentages.

* Positive response to the single depressive symptom screening question "Have you ever felt sad or depressed much of the time in the past year?"

Table 4

Agreement Analysis between Beck Depression Inventory-II Categories and a Single Screening Question for Depressive Symptoms

Measurement	BDI-II 14	BDI-II 20	BDI-II 29
N=1122	25% (n=279)	13% (n=147)	4.4% (n=49)
Level of Agreement (Kappa Coefficient)	0.42	0.37	0.18
Sensitivity	62% (172/279)*	76% (112/147)*	90% (44/49)*
Specificity	82% (695/843)**	79% (767/975)**	74% (797/1073)**

BDI-II = Beck Depression Inventory-II;

* Values in parentheses: numerator = number of patients that answered yes to the single depressive symptom screening question and denominator = number of patients with BDI-II scores the specified value.

** Values in parentheses: numerator = number of patients that answered no to the single depressive symptom question and denominator = number of patients with BDI-II scores < the specified value.