SCREENING FOR DEPRESSION IN CARDIAC PATIENTS

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ABSTRACT

No validation studies appear to have been conducted with the Beck Depression Inventory – II (BDI-II) or the Geriatric Depression Scale (GDS) with a cardiac population. Because depression is an independent risk factor for mortality in cardiac patients, it is essential to identify a depression screen that is appropriate for this group. A total of 119 patients were recruited from the coronary care units of three hospitals. Home interviews were conducted approximately 2 weeks post-myocardial infarction (MI) or post-unstable angina (UA). Participants were screened for depressive symptoms using the BDI-II and GDS. Research diagnoses of depression were determined using, as a gold standard, the Structured Clinical Interview for *DSM-IV-TR* (SCID-I/NP) criteria for depression. Reliability estimates for both the BDI-II and GDS scores were satisfactory. Criterion-related validity was examined by comparing the scores obtained on the BDI-II and GDS with the SCID-I/NP diagnoses of depression. Sensitivity, specificity, positive predictive values (PPV), and negative predictive values (NPV) were evaluated for different cut scores for the BDI-II and GDS using three diagnostic categories of depression.

INTRODUCTION

Depression is an independent risk factor for death within as few as 4 months to 1 year following patient hospitalization for acute myocardial infarction (MI; Bush et al., 2001; Frasure-Smith et al., 1999; Frasure-Smith et al., 1993). Older cardiac patients are especially at risk. For those patients who already had a higher risk of mortality due to being age 65 or older, a fourfold increase in death occurred in those who were depressed (Bush et al., 2001). Previous studies have determined a prevalence rate for major depressive disorder (MDD) ranging from 9.5% to 18% in patients recovering from acute MI (Bush et al., 2001; Frasure-Smith et al., 1993; Schleifer et al, 1989) with as many as an additional 27% of acute MI patients showing evidence of a minor depressive disorder (Schleifer et al., 1989). However, depression in male and female patients who have undergone a cardiac event is neither adequately identified nor treated (Carney et al., 1987; Frasure-Smith et al., 1993). Depressed female cardiac patients are a particularly understudied group (Con et al., 1999).

The first step in the process of improving the identification and treatment of depression in cardiac patients is to identify a reliable and valid screen for depression in this group. Two widely used depression inventories with older adults are the Beck Depression Inventory-II (BDI-II) and the Geriatric Depression Scale (GDS). No research to date has examined the criterion-related validity of the BDI-II or the GDS with a sample of post-MI or post-unstable angina (UA) patients. The purposes of this study were twofold: (a) determine the reliability and criterion-related validity for participants' scores on the BDI-II and GDS, and (b) recommend appropriate cut scores for the BDI-II and GDS for identifying depression after a cardiac event.

METHOD

Participants

The sample consisted of 119 cardiac patients (89 men and 30 women) who ranged in age from 37 to 92 years (*M* = 62.97, SD = 11.61). Fifty-eight percent of participants had been diagnosed with acute MI whereas 42% had been diagnosed with UA. The sample was 82.4% Caucasian, 9.2% South Asian or Middle Eastern, 4.2% East Asian, 1.7% First Nations or Aboriginal, and 2.5% Other.

Measures

Beck Depression Inventory – II (BDI-II). The BDI-II (Beck et al., 1996) is a self-report measure of depressive symptomatology. Each item contains four response options ranging from 0 to 3; higher scores indicate a greater severity of depressive symptoms. Total scores are obtained by summing the responses to the 21 items and can range from 0 to 63.

Geriatric Depression Scale (GDS). The GDS (Yesavage et al., 1983) is a 30-item measure of depressive symptoms specifically designed for evaluating depression in elderly persons. A simplified (yes/no) response format is used. Responses reflecting a depressed response are scored as “1” whereas responses in the nondepressed direction are scored as “0”. Items are summed and total scores can range from 0 to 30; higher scores indicate a greater severity of depressive symptoms.

Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID-I/NP). The SCID-I/NP (Research Version, Non-patient Edition; First et al., 2002) is a semi-structured diagnostic interview constructed to aid researchers, trainees, and clinicians in making reliable psychiatric diagnoses based on *DSM-IV* criteria (First, Gibbon, Spitzer, & Williams, n.d.). This diagnosis served as the criterion measure.

Mini-Mental State Examination (MMSE). The MMSE (Folstein et al., 1975) was administered to screen for, and exclude, participants with cognitive impairment. Scores can range from 0 to 30; higher scores indicate a greater level of cognitive functioning.

Personal demographic form. The personal demographic form enquired about age, education, marital status, living arrangement, ethnic/racial/cultural background, smoking status, personal and familial history of depression, medical history, and level of social support.

Procedure

Post-MI and post-UA patients were assessed at home 12-16 days after the date of admission to hospital. Patients were first screened for cognitive impairment using the MMSE. No one scored in the impaired range. The first author administered the gold standard, SCID-I/NP. Research assistants administered the BDI-II and GDS. The first author and the research assistants were blind to the results of the other’s measures. Order of administration of the BDI-II, GDS, and SCID-I/NP were counterbalanced to control for order effects. At the end of each interview, the personal demographic form was administered orally.

RESULTS

Reliability

Cronbach’s alpha reliability estimates were .94 for women and .81 for men on the BDI-II and .91 for women and .85 for men on the GDS.

Gender Differences in Mean Scores for the BDI-II and GDS

Mean performance on the BDI-II and GDS by males and females was examined using independent samples t-tests. Significantly higher mean scores on the BDI-II were found for women (*M* = 11.73, *SD* =

10.74) than for men (M = 6.84, SD = 5.21), t(28.64) = -2.25, p = .03, d = 1.0. Similarly, the mean overall score on the GDS for women (M = 8.30, SD = 6.54) was significantly higher than that for men (M = 5.48, SD = 4.71, t(117) = -2.56, p = .01, d = 0.55.

Criterion-Related Validity

Criterion-related validity was examined by evaluating sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of the BDI-II and GDS in differentiating depressed and not depressed cardiac patients using the research diagnosis from the SCID-I/NP. Cut scores recommended in current literature for the BDI-II and the GDS were examined using receiver operating characteristic (ROC) curves. Tables 1 to 3 show these results for three diagnostic categories of depression. Both the BDI-II and GDS demonstrated excellent sensitivity for detecting major depressive disorder and double depression; however, the GDS demonstrated greater specificity and PPV than the BDI-II with this sample. Neither the BDI-II nor the GDS was effective in screening for the broader or milder forms of depression (i.e., minor depressive disorder, partial remission of major depressive disorder, or dysthymia) in this sample.

CONCLUSIONS

In selecting a cut score, institutions must balance the consequence of not identifying truly depressed individuals against the probability of incurring costs for further diagnostic testing of individuals who turn out *not* to be depressed (Swets et al., 2000). In selecting appropriate cut scores for post-MI and post-UA patients, one must consider that depression is a significant predictor of mortality in cardiac patients within as few as 4 months to 1 year following an acute MI (Bush et al., 2001; Frasure-Smith et al., 1999; Frasure-Smith et al., 1993). Reported prevalence rates for major depression in cardiac patients, which range from approximately 6% (in the present study) to 18% (Bush et al., 2001; Frasure-Smith et al., 1993; Schleifer et al., 1989; Strik et al., 2001), when viewed together with the possible physical and emotional cost to depressed cardiac patients, suggest that the focus should be more on sensitivity than specificity when selecting appropriate cut scores for this population.

Based on the present results, it is recommended that:

1. for the BDI-II, the best cut score was 10 or greater for detecting major depressive disorder or the category of either major depressive disorder or double depression.
2. for the GDS, the best cut score was 14 or greater for detecting major depressive disorder and 13 or greater for detecting either major depressive disorder or double depression.
3. only the GDS with its appropriate cut score be used to screen for major depression or double depression with cardiac patients. Although the BDI-II and the GDS both demonstrated excellent reliability and sensitivity, the GDS showed greater specificity and PPV than the BDI-II.
4. neither the BDI-II nor the GDS be used to screen for the broader and milder forms of depression with cardiac patients as there was no cut score for either measure that had adequate sensitivity with this sample.

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Table 1

SCID-I/NP Diagnosis of Major Depressive Disorder

Depression scale & cut score	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
BDI-II ≥ 10	100	75	18	100
BDI-II ≥ 11	83	76	17	99
BDI-II ≥ 12	83	80	19	99
BDI-II ≥ 13	83	84	23	99
BDI-II ≥ 14	83	88	28	99
GDS ≥ 10	100	79	21	100
GDS ≥ 11	100	83	25	100
GDS ≥ 12	100	88	32	100
GDS ≥ 13	100	90	35	100
GDS ≥ 14	100	94	50	100

Note. SCID-I/NP = Structured Clinical Interview for *DSM-IV-TR* Axis I Disorders, Research Version, Non-patient Edition; GDS = Geriatric Depression Scale; BDI-II = Beck Depression Inventory-II; PPV = positive predictive value, and; NPV = negative predictive value.

Table 2

SCID-I/NP Diagnosis of Major Depressive Disorder or Double Depression

Depression scale & cut score	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
BDI-II ≥ 10	100	75	21	100
BDI-II ≥ 11	86	77	20	99
BDI-II ≥ 12	86	81	23	99
BDI-II ≥ 13	86	85	27	99
BDI-II ≥ 14	86	89	34	99
GDS ≥ 10	100	80	25	100
GDS ≥ 11	100	84	29	100
GDS ≥ 12	100	89	37	100
GDS ≥ 13	100	91	41	100
GDS ≥ 14	86	94	50	99

Note. SCID-I/NP = Structured Clinical Interview for *DSM-IV-TR* Axis I Disorders, Research Version, Non-patient Edition; GDS = Geriatric Depression Scale; BDI-II = Beck Depression Inventory-II; PPV = positive predictive value, and; NPV = negative predictive value.

Table 3

SCID-I/NP Diagnosis of Major Depressive Disorder, Double Depression, Minor Depressive Disorder, Partial Remission of Major Depressive Disorder, or Dysthymic Disorder

Depression scale & cut score	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
BDI-II $\geq$ 10	79	78	33	96
BDI-II $\geq$ 11	71	80	33	95
BDI-II $\geq$ 12	64	83	35	94
BDI-II $\geq$ 13	57	86	36	93
BDI-II $\geq$ 14	50	89	39	93
GDS $\geq$ 10	71	82	36	95
GDS $\geq$ 11	71	86	42	96
GDS $\geq$ 12	71	91	53	96
GDS $\geq$ 13	71	93	59	96
GDS $\geq$ 14	50	95	58	93

Note. SCID-I/NP = Structured Clinical Interview for *DSM-IV-TR* Axis I Disorders, Research Version, Non-patient Edition; GDS = Geriatric Depression Scale; BDI-II = Beck Depression Inventory-II; PPV = positive predictive value, and; NPV = negative predictive value.