COMPARISON OF THE BECK DEPRESSION INVENTORY-II AND GERIATRIC DEPRESSION SCALE AS SCREENS 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 sample. 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 St. Paul's Hospital, Vancouver General Hospital, and Surrey Memorial Hospital in Vancouver, BC. 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) [1, 2, 3]. 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 [1]. Previous studies have determined a prevalence rate for major depressive disorder ranging from 9.5% to 18% in patients recovering from acute MI [1, 3, 4] with as many as an additional 27% of acute MI patients showing evidence of a minor depressive disorder [4]. However, depression in male and female patients who have undergone a cardiac event is neither adequately identified nor treated [5, 3]. Depressed female cardiac patients are a particularly understudied group [6].

By accurately identifying depression in men and women recovering from MI or unstable angina (UA) and providing some sort of intervention (e.g., counselling, medication, or some combination), lives could perhaps be saved [7]. At the very least, medical costs for increased post-MI physician and emergency room visits could be limited [8]. The first step in this process 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) [9] and the Geriatric Depression Scale (GDS) [10]. 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-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). Ethnic/racial/cultural background 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". Patients were required to meet the criteria for either an acute (including, recent, or evolving) MI, or UA pectoris [11]. Fifty-eight percent of participants had been diagnosed with acute MI whereas 42% had been diagnosed with UA. As a result of their cardiac event, 49.4% of the men and 53.3% of the women underwent angioplasty, 18.0% of the men and 3.3% of the women received by-pass surgery, 1.1% of the men had a valve replacement and by-pass surgery, and 1.1% of the men had a pacemaker inserted.

Measures

Beck Depression Inventory – II (BDI-II). The BDI-II is a 21-item self-report measure of depressive symptomatology [9]. Each item contains four response options. Total scores are obtained by summing the responses to the 21 items and can range from 0 to 63; higher scores indicate a greater severity of depressive symptoms.

Geriatric Depression Scale (GDS). The GDS is a 30-item measure of depressive symptoms specifically designed for evaluating depression in elderly persons [10]. A simplified (yes/no) response format is used. 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) is a semi-structured diagnostic interview constructed to aid researchers, trainees, and clinicians in making reliable psychiatric diagnoses based on _DSM-IV_ criteria [12, 13]. This diagnosis served as the criterion measure.

Mini-Mental State Examination (MMSE). The MMSE was administered to screen for, and exclude, participants with cognitive impairment [14]. 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.

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 (i.e., major depression overlaid on dysthymia); however, the GDS demonstrated greater specificity and PPV than the BDI-II with this sample. The GDS was better able to differentiate those who were depressed from those who were not depressed. 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.

Recommended Cut-Scores

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 [15]. 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, and
3. neither the BDI-II nor the GDS be used to screen for the broader categories and milder forms of depression with cardiac patients as there was no cut score for either measure that had adequate sensitivity with this sample.

CONCLUSIONS

It is strongly recommended that cardiac patients be routinely screened for depression prior to being discharged from hospital given that depression is a significant predictor of mortality in cardiac patients within as few as 4 months to 1 year following an acute MI [1, 2, 3] and prevalence rates for major depression in cardiac patients range from approximately 6% (present study) to 18% [1, 3, 4, 16]. Both the BDI-II and GDS produced reliable scores, particularly for women. Although both the BDI-II and GDS demonstrated excellent sensitivity for detecting both major depressive disorder and double depression, the GDS was better able to differentiate those who were depressed from those who were not depressed. Thus, the GDS is recommended as the better screen for major depression or double depression with cardiac patients. Neither the BDI-II nor the GDS is recommended as a screen for broader categories or milder forms of depression.

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Table 1

SCID-I/NP Diagnosis of <u>Major Depressive Disorder</u>

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 <u>Major Depressive Disorder or Double Depression (Combined Category)</u>

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 <u>Major Depressive Disorder, Double Depression, Minor Depressive Disorder, Partial</u>
<u>Remission of Major Depressive Disorder, or Dysthymic Disorder (Combined Category)</u>

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.