Heart & Lung xxx (2017) 1–6

Contents lists available at ScienceDirect

Heart & Lung

journal homepage: www.heartandlung.org

# Depression screening and treatment recall in male and female coronary artery disease inpatients: Association with symptoms one year later

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ARTICLE INFO

*Article history:*
Received 13 January 2016
Received in revised form
22 January 2017
Accepted 9 February 2017
Available online xxx

*Keywords:*
Coronary artery disease
Depression
Screening
Treatment
Depressive symptoms

ABSTRACT

*Background:* This study examined whether cardiac inpatients recall depression screening and how it is related to depressive symptoms and treatment one year later.
*Methods:* 2635 cardiac inpatients from 11 hospitals completed a survey and were mailed a follow-up survey one year later; both surveys included the BDI-II.
*Results:* Of the 1809 (68.7%) retained participants, 513 (30.0%) recalled depression screening. Recall was not significantly related to depressive symptoms at either time point ($P > 0.05$). Participants who were recommended antidepressants had higher BDI-II scores than those who were not, both as inpatients ($P < 0.01$) and one year later ($P < 0.05$). There was no significant change in depressive symptoms over time in patients who received any type of therapy.
*Conclusion:* Less than one-third of cardiac inpatients recalled being screened for depression. Recall of screening was not significantly related to depressive symptoms, and use of treatment was related to greater symptoms.



Cardiovascular disease is the leading cause of global mortality,[1] and depressive disorders are the second leading cause of years lived with disability.[2] Accordingly, 15–20% of cardiac patients suffer from major depression, an estimate which is three-times higher than that observed in age-matched community samples.[3,4] As many as 50% of cardiac patients report elevated depressive symptoms.[5] The prevalence of major depression in women cardiac patients is approximately two-times greater than what is observed among men,[6] rendering them a particularly vulnerable population considering depressed cardiac patients have increased morbidity and mortality compared to cardiac patients without depression.[7–12] Specifically, depressive symptomatology confers a relative risk between 1.5 and 2.5 for future cardiac morbidity and mortality; this is of similar magnitude to traditional risk factors.[13,14]

Unfortunately, comorbid depression in cardiac patients is grossly under-recognized.[15] This has led to recommendations for the screening and treatment of depression in this population. Guidelines/statements from the American Heart Association,[14] American Association for Cardiovascular Prevention and Rehabilitation,[16] American Academy of Family Physicians,[17] and Canadian Network for Mood and Anxiety Treatments,[18] among other Societies[19–23] include recommendations for depression screening. While setting is not specified, screening in hospital cardiac wards versus an outpatient setting would enable more universal capture of depressed patients.

Screening refers to a strategy applied in a population for the detection of a problem among individuals with no apparent symptoms.[24–26] The limited evidence available shows few cardiac patients are screened, and questions have been raised regarding its benefits.[27] For instance, recent work has suggested that 1000 depression screenings would result in 304 (30%) patients needing further evaluation, of whom only 126 (13%, and only 41% of those who screen positive) would have major depressive disorder.[28] There is generally a lack of research assessing the effects of screening on depression itself (i.e., it would not be ethical to screen, if those who screen positive do not undergo diagnostic testing and receive effective treatment where indicated, which ultimately mitigates the depression).[29,30] In addition, the extent to which

Conflicts of interest: The authors have no conflicts of interest to disclose.

Source of funding: This study was funded by Canadian Institutes of Health Research (CIHR) and Heart and Stroke Foundation of Canada grant #HOA-80676. Dr. Shanmugasegaram was supported in her graduate studies by the CIHR Frederick Banting and Charles Best Canada Graduate Scholarship Doctoral Award.

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0147-9563/$ – see front matter © 2017 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.hrtlng.2017.02.002

patients are aware of the depression screening, whether they find it acceptable, and whether they are informed of the results are not known. This is crucial to engaging patients in the diagnostic and treatment process if they screen positive.

The low rates of screening are not due to the lack of effective treatment. Evidence-based treatments for depression include antidepressants and psychotherapy[31,32]; these therapies have also been shown to be effective in cardiac patients.[32–36] For instance, findings from the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) trial showed that Cognitive–Behavioral Therapy significantly reduces depression.[31,32] The Coronary Psychosocial Evaluation Studies (COPES) trial demonstrated that Problem–Solving Therapy and/or pharmacotherapy using a stepped approach showed promise in not only reducing depression, but also in reducing death, recurrent myocardial infarction, and angina.[37] Despite the evidence demonstrating the efficacy of these therapies, few patients access treatment, and those who do may not receive adequate follow-up to achieve remission.[38]

Accordingly, the objectives of the current study were to: (1) describe the extent to which cardiac inpatients recalled depression screening; (2a) investigate whether screening varied by gender (among other patient characteristics), and (b) examine whether screening was related to depressive symptom severity one year later; (3) describe the use and type of depression treatment among those with a diagnosis; and (4a) investigate whether treatment varied by gender, and (b) examine whether treatment was related to depressive symptom severity one year later.

## Methods

### *Design and procedure*

Secondary analysis of a larger study entitled Cardiac Rehabilitation care Continuity through Automatic Referral Evaluation (CRCARE) was undertaken. Further details regarding the methodology of the CRCARE Study are available elsewhere.[39] Ethics approval was granted from all participating institutions. This was a prospective, observational study in design.

In brief, adult inpatients on cardiology wards (i.e., coronary care unit, general cardiology ward, cardiac surgery ward or interventional cardiology ward) from 11 hospitals across Ontario were approached to participate in this study. After obtaining informed consent, clinical data were extracted from medical charts, and a self-report survey was administered to participants. This survey included the Beck Depression Inventory-II (BDI-II) and investigator-generated questions about recall of depression screening and treatment. One year later, participants were mailed a follow-up survey which again included the BDI-II.

### *Participants*

CRCARE study inclusion criteria were: (i) confirmed acute coronary syndrome diagnosis and/or (ii) history of percutaneous coronary intervention, coronary artery bypass graft surgery, valve repair/replacement, or heart failure. Exclusion criteria were: (i) participation in cardiac rehabilitation within the past two years, (ii) significant orthopedic, neuromuscular, visual, cognitive and/or any serious mental illness (e.g., schizophrenia, but not mood or anxiety disorders) which would preclude cardiac rehabilitation participation, and (iii) lack of proficiency in the language of the survey (English, French, Punjabi, Hindi or Urdu). An additional exclusion criterion for this study was failure to respond to the survey question regarding depression screening recall (yes/no).

### *Measures*

Sociodemographic variables assessed via self-report in the in-hospital survey included marital status, ethnocultural background (response options were based on Statistics Canada's ethnic origin classification), highest education attainment, annual family income, and work status. The MacArthur Scale of Subjective Social Status[40] was also included in the survey administered in hospital. Participants were asked to demarcate their socioeconomic status on a 10-rung ladder compared to others in Canada. Scale scores ranged from 1 to 10, with higher scores indicating greater subjective socioeconomic status.

Sociodemographic data obtained from the medical chart were age and gender. Clinical variables obtained from the chart included risk factors (e.g., body mass index [$kg/m^2$], diabetes mellitus, hypertension, dyslipidemia), reason for cardiac admission, and comorbidities. Participants were also administered the Duke Activity Status Index in the in-hospital survey.[41] This brief self-administered scale assesses functional capacity through metabolic equivalents. The validity of the scale was demonstrated by strong correlations with peak oxygen uptake.[41]

The Beck Depression Inventory-II (BDI-II)[42] was administered to assess depressive symptoms, in the surveys administered in hospital and one year later. It is a reliable and well-validated 21-item scale with a forced-choice 4-alternative response format. It has been widely used in both psychiatric and medical populations, including cardiac patients.[37] Higher scores reflect greater depressive symptomatology, with scores $\geq$14 reflecting at least mild symptomatology (i.e., "elevated").

Finally, investigator-generated items assessed depression screening, diagnosis and treatment in the in-hospital survey via self-report. Participants were asked whether any healthcare provider had ever asked them if they were "feeling down or depressed" (i.e., assessment of patient-recalled depression screening, with some examples of screening tools) since their cardiac diagnosis (yes/no), and which healthcare provider asked them. They were also asked if they had ever been diagnosed with depression (yes/no). If yes, they were asked to report what types of treatment, if any, they were prescribed (i.e., psychotherapy, antidepressants, exercise, none, other; yes/no for each); participants were asked to check all that apply.

### *Statistical analyses*

SPSS Version 24.0[43] was used to analyze the data. First, a descriptive examination of patient-recalled screening was performed. Percentages took into account missing data. Then *t*-tests and chi-square analyses were performed to assess differences in sociodemographic (including gender) and in-hospital clinical characteristics, between participants who reported screening for depression and those who did not, as appropriate. To test the remainder of the second objective, differences in depressive symptoms at both assessment points by screening recall were assessed using a *t*-test. Repeated measures analysis of covariance was then used to assess whether screening recall (independent variable) was related to depressive symptoms (dependent variable), after adjusting for variables that were significantly different between those who recalled and those who did not recall screening for depression identified through the bivariate analyses above.

To test the third objective, a descriptive examination of treatment types was performed. To test the fourth objective, chi-square and *t*-tests were performed to assess differences in treatment types by gender and depressive symptoms, respectively. To fully test the latter, again repeated measures analysis of covariance was used to assess whether treatment (independent variable) was related to depressive symptoms (dependent variable), after adjusting for