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REVIEW

Psychometric Properties of the Cardiac Depression Scale: A Systematic Review

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Background The prevalence of depression is high in cardiac patients. Depression has a significant impact on quality of life, adherence to therapy, and an independent effect on prognosis. The Cardiac Depression Scale (CDS) is the only instrument designed to measure depression in cardiac patients. This study systematically reviewed the psychometric properties of the CDS for screening of depression in patients with coronary heart disease (CHD).

Methods A search of MEDLINE, EMBASE, CINAHL Plus, PsycINFO, Scopus and Web of Science was performed using the search term Cardiac Depression Scale in the title or abstract. Eligible studies were those that assessed reliability, validity or diagnostic accuracy of the CDS in patients with CHD. Methodological quality was assessed using the QUADAS-2 and STARD.

Results Most studies assessed the reliability and validity of the CDS: three studies assessed construct validity using factor analysis; six studies assessed the validity of the CDS with other measures of depression; and four studies assessed its diagnostic accuracy. However, some studies reported overlapping samples, which reduces confidence in their evaluation.

Conclusion This review finds the CDS to be a psychometrically sound measurement instrument for identifying mild, moderate and severe depression in cardiac populations.

Keywords Cardiac Depression Scale • Validity • Reliability • Diagnostic accuracy • Screening

Introduction

Depression is a major cause of disease burden worldwide and is predicted to be the leading cause by 2030 [1]. The prevalence of depression is high in patients with coronary heart disease (CHD) [2,3] and is associated with increased mortality and cardiovascular events [4]. Current clinical guidelines recommend that depression is assessed in all patients with CHD [5,6].

A recent review of depression screening instruments [7], as recommended by the National Heart Lung and Blood Institute (NHLBI) for use in patients with CHD [8], identified several limitations including, instrument vulnerability to Type I error attributable to the assessment of a general state of distress or negative affectivity rather than a discrete depressive disorder, and measures derived from non-cardiac populations being ''used for purposes quite different from their original intended purpose'' [7, p.910]. Examples of

Abbreviations: BDI, Beck Depression Inventory; CABG, coronary artery bypass grafting; CDS, Cardiac Depression Scale; CES-D, Center for Epidemiologic Studies Depression Scale; CHD, coronary heart disease; CRI, Coping Resource Inventory; ESSI, ENRICHD Social Support Instrument; GDS-SF, Geriatric Depression Scale-Short Form; HADS, Hospital Anxiety and Depression Scale; HRQoL, health-related quality of life; MI, myocardial infarction; NHLBI, National Heart Lung and Blood Institute; PANAS-X, Positive and Negative Affect Schedule-Expanded Form; PCI, percutaneous coronary intervention; PSSS, Perceived Social Support Scale; QUADAS-2, Quality Assessment of Diagnostic Accuracy Studies; SF-36, Short Form 36 Health Survey; STARD, Statement for Reporting Studies of Diagnostic Accuracy; WHO QOL-BREF, World Health Organisation Quality of Life Brief assessment

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reviewed instruments included the Beck Depression Inventory (BDI I and II), the Hospital Anxiety and Depression Scale (HADS), and the Center for Epidemiologic Studies Depression Scale (CES-D) [7]. The BDI is a 21-item self-administered questionnaire, used to assess the severity of depressive symptoms [9]. Items of the BDI-I, initially derived from observations made on psychiatric patients undergoing psychotherapy for depression, assess symptoms experienced within the past two weeks [9,10]. The BDI-II, also derived from psychiatric patients, has satisfactory internal consistency (α=0.80 to 0.90) [11]. The HADS is a 14-item self-report screening scale, originally developed to indicate presence of anxiety and depressive states in the setting of a medical out-patient clinic [12]. The HADS has satisfactory internal consistency for the anxiety (0.68 to 0.93) and depression (0.67 to 0.90) subscales [13]. Items of the CES-D were selected from a pool of items obtained from previously validated depression scales, including the BDI [14]. None of the depression instruments recommended by the NHLBI [7] were constructed specifically for cardiac patients and their psychometric properties cannot be generalised across populations. The diagnostic accuracy of various depression screening tools (including those above) has been assessed in cardiac populations with inconsistent findings for sensitivity and specificity [15].

The Cardiac Depression Scale (CDS) is the only instrument designed to measure depression in cardiac patients. The original study population included patients with a range of cardiac diagnoses attending a clinic representative of cardiac clinics throughout the western world [16]. The need for a cardiac patient-specific depression screening instrument was prompted as other questionnaires excluded somatic symptoms and lacked the sensitivity to measure moderate or severe depression evident in cardiac patients [16]. Since cardiac patients do not necessarily experience the ''full criteria for major depressive syndrome'' [16, p.383] as per the Diagnostic and Statistical Manual of Mental Disorders third edition revised (DSM-III-R), criteria considered in its construction were that for 'Adjustment Disorder with Depressive Mood' [16]. Items on the CDS were selected by consulting health professionals from cardiology, psychiatry, psychology, occupational therapy, physiotherapy and cardiac nursing [16]. The scale is comprised of 26 items scored on a Likert scale (1 to 7); the higher the score the worse the depressive symptomology [16]. The CDS demonstrated satisfactory correlations with clinical assessment (0.67, two-tailed, $p<0.001$) and the BDI (0.73, two-tailed, $p<0.001$) as well as good internal reliability (Cronbach's α=0.90) [16]. More recently, the CDS was assessed with the removal of one item that asked about sexual activity as ''some patients find answering this item embarrassing or intrusive, for others, the interpretation of the question varies considerably from patient to patient'' [17, p.391].

The aim of this systematic review was to evaluate the psychometric properties - diagnostic accuracy, validity and reliability - of the CDS.

Methods

Types of studies

Eligible studies were those that assessed reliability, validity or diagnostic accuracy of the CDS. Therefore the CDS had to be compared with an alternative validated depression screening instrument or to a valid major depressive disorder criterion standard administered by a mental health professional. Only English language publications were included.

Types of participants

Adults, 18 years of age or older, with CHD were included. CHD was defined as a primary diagnosis of myocardial infarction (MI); angina; a revascularisation procedure such as percutaneous coronary intervention (PCI); coronary artery bypass grafting (CABG); or heart failure. Studies that included mixed participant groups were included if either the results were reported separately for CHD patients or if more than 80% of the participants had CHD.

Search strategy

A search of MEDLINE, EMBASE, CINAHL Plus, PsycINFO, Scopus and Web of Science was performed on 1 June 2013. The search term was Cardiac Depression Scale in the title or abstract. Reference lists of relevant articles were searched for additional studies. Web of Science was used to search for relevant publications/studies which cited relevant articles.

Selection of studies

Studies were reviewed for eligibility by two independent reviewers; disagreements were resolved through discussion or by consulting a third reviewer. When multiple articles were published on the same study, relevant outcomes were extracted from articles as necessary.

Assessment of methodological quality

Methodological quality was assessed independently by two authors (CC and CS) using two risk of bias tools: the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) instrument [18] and the Statement for Reporting Studies of Diagnostic Accuracy (STARD) [19]. While both tools assess potential for bias in the accuracy and comprehensiveness of reporting studies of diagnostic accuracy, use of the STARD and QUADAS combined has been identified as having the ability to confer greater rigour to the evaluation of published studies than using only one tool [20]. The QUADAS-2 was developed to critique the methodological rigour of a study and consists of 14 items assessed as 'yes', 'no' or 'unclear', which refer to internal validity [18]. The STARD checklist has 25 items which assist in the assessment of a well-designed study, including participant recruitment and data collection. Moreover, ''the flexibility of both instruments allows them to be adapted to the purpose of each study'' [20, p.5]. Modified versions of these tools were used to assess studies that only analysed the reliability and/or validity of the CDS, thus items specific to diagnostic accuracy were eliminated;