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BRIEF REPORT

Evaluation of screening instruments for depression and anxiety in breast cancer survivors

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Abstract Although cases of anxiety and depression post-breast cancer can be reliably identified using a structured psychiatric interview, such interviews are time consuming for both practitioner and patient and effective screening tools would increase detection rates. The purpose of this study was to evaluate the effectiveness of the Edinburgh Depression Scale (EDS) and the Hospital Anxiety and Depression Scale (HADS) in screening for depression and anxiety in a population of breast cancer survivors. For this purpose, The Structured Clinical Interview for the Diagnostic and Statistical Manual of mental disorders was administered to 200 breast cancer survivors to identify those suffering from an anxiety and/or depressive disorder. All study participants also completed the EDS and the HADS. Using the recommended cut-off score of >12 to screen for depression, the sensitivity and specificity of the EDS were found to be 72 and 90%, respectively. Lowering the cut-off score to >9 resulted in a sensitivity of 94% and a specificity of 78%. At the recommended cut-off score of >10, the HADS had a sensitivity of 50% and a specificity of 97% for depression, and a sensitivity of 71% and a specificity of 86% when screening for anxiety. A HADS total score (HADS-T) of >13 and an EDS of >9 had sensitivities of 96 and 91% and specificities of 74 and 84%, respectively, in screening for anxiety and/or depression. In conclusion, the study demonstrated that both the EDS and HADS can be used reliably as screening tests for anxiety and depression in this cohort. In both cases, a lower cut-off score than normally recommended delivers optimal screening properties.

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Background

Rates of depression and anxiety among patients recently diagnosed with breast cancer are high, with prevalence rates of depression, anxiety, or both reaching up to 50% in the year after diagnosis [1]. However, for most women, symptoms will decrease dramatically the longer the time elapsed since diagnosis. Depression is more than three times as likely to occur in women when first diagnosed than in the general population, but levels among women in remission from breast cancer have been found to be comparable to those of the general female population [1, 2]. As the likelihood a patient will suffer from depression decreases, efforts to identify new cases can move down the agenda of patient care and it has been suggested that in focusing on the medical management of a patient's cancer, the psychological aspects may be neglected [3]. There is evidence that the relative risk of suicide is significantly raised even years after the disease has been treated [4]. It is also suggested that despite comparable rates of depression to those without a history of cancer, cancer survivors may experience greater impairment from major depressive disorder (MDD) compared to those without cancer [2]. Fatigue is also a common complaint among disease-free breast cancer survivors with good evidence of severe fatigue affecting women up to 5 years after completion of therapy [5]. Depression is a significant correlate of post-treatment fatigue, and significant psychological disorders should be excluded before patients are considered to have cancer-related fatigue syndrome [6]. For all of these reasons,

screening tests which are both sensitive and specific for psychological distress can be extremely valuable in follow-up care.

The purpose of this study was to assess the effectiveness of two different screening tools for detecting cases of anxiety and/or depression.

Methods

This study was part of a larger investigation into the prevalence and correlates of Cancer-Related Fatigue Syndrome in breast cancer survivors, the results of which have been published elsewhere [7, 8]. As part of this study, it was necessary to thoroughly evaluate the psychological state of participants, and for this reason, women completed various questionnaires and participated in a structured psychiatric interview.

Subjects

Disease-free ambulatory breast cancer patients were recruited from a nurse-led follow-up clinic. All women had undergone successful primary therapy (any combination of surgery, radiotherapy, and/or chemotherapy) and were interviewed between 3 months and 2 years after completion of treatment. Approval for the study was given by the Wandsworth Research Ethics Committee and St George's NHS Trust Research and Development Office.

After written informed consent had been obtained, women underwent the Structured Clinical Interview for the Diagnostic and Statistical Manual of mental disorders (SCID), and self-completed both the Hospital Anxiety and Depression Scale (HADS) and the Edinburgh Depression Scale (EDS).

SCID

The non-patient version of the SCID, designed for use in patients who are not known to be psychiatric patients, was used to identify cases of depression and anxiety. A case of MDD is defined according to the *Diagnostic Statistical Manual of mental disorders, 4th edition (DSM-IV)* as the presence of at least five of nine listed symptoms during the previous 2-week period. The symptoms must include depressed mood, and/or loss of interest or pleasure in all, or almost all activities. The remaining listed symptoms include lack of concentration, weight change, insomnia or hypersomnia, excessive feelings of worthlessness or guilt, psychomotor agitation or retardation, fatigue or loss of energy, and recurrent thoughts of death or suicidal ideation. Although the interviews were also used to diagnose a variety of anxiety disorders (such as specific phobias), only those with generalized anxiety disorder (GAD) were included as a current case of anxiety. The same researcher (SA) conducted all SCID interviews after training and observation by two consultant psychiatrists.

The HADS

The HADS [9] is a 14-item self-report instrument designed to screen for presence and severity of symptoms of depression and anxiety over the past week in medical patients. Seven items related to a depression sub-scale (HADS-D) are intermingled with seven items related to an anxiety sub-scale (HADS-A), each item scoring 0–3. The items do not include somatic symptoms such as insomnia and fatigue in order to reduce the likelihood of false-positive diagnoses. The authors suggest that a score >10 on either the depression or anxiety scales is a positive screening test. It is a brief and effective screening tool for symptoms of depression and anxiety in patients with physical illness and has been found to be appropriate for use in primary care, somatic, psychiatric, and general population samples [10, 11]. However, when screening for depression in cancer patients, studies suggest that the HADS-D should be used with caution due to the variability in optimal cut-off scores [12]. Although not recommended by the original authors, HADS-A and HADS-D can be combined to produce a total score (HADS-T), used as a screen for general psychological distress [13–15]. Ravazi et al. suggested that a score >13 is an appropriate cut-off to screen specifically for adjustment disorders and major depressive disorders in cancer in-patients. A more recent study suggests that a cut-off >12 offers optimal sensitivity and specificity in screening for all types of psychological distress in cancer in-patients [15]. We are not aware of studies validating HADS-T cut-off scores for psychological distress in disease-free cancer survivors.

The EDS

The EDS [16] is a 10-item self-report scale originally developed to screen for depression in women 6–8 weeks postnatally. It can be completed in about 5 min. The authors suggest that a threshold score >12 will identify women most likely to be suffering from a depressive illness of varying severity and who should be further assessed to confirm whether or not clinical depression is present. This threshold has been validated in further studies [17]. However, a lower threshold of >9 is suggested if considered for routine use by primary health care workers, due to the importance of obtaining a high sensitivity [16, 17]. The authors note that it may be useful as a general screening scale for depressive illness in other clinical settings. The EDS has been validated as a useful screening instrument

for depression in women outside the postnatal period [18] and in patients with advanced metastatic cancer [19], but its use has never previously been reported in breast cancer survivors.

Statistical analyses

The sensitivity and specificity of both the HADS and the EDS in screening for anxiety and/or depression were assessed against the presence or absence of a gold-standard diagnosis of MDD or GAD using the SCID. Receiver operating characteristic (ROC) curves, which show the trade-off between sensitivity and specificity, were plotted for each of the questionnaires using SPSS (version 16). Each test's performance at the authors' recommended cut-off scores for detecting cases was described in terms of sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). In addition to assessing the performance of the screening tools at the recommended cut-offs, the data was analysed to determine the optimal screening scores in this population. The optimal cut-off was defined as the score on the questionnaire which resulted in the maximum combined sensitivity and specificity.

Results

Over a 2-year period, 292 women were deemed eligible for inclusion in the main study, and 208 consented to participate. Reasons cited for non-participation included other medical problems (41%), work (16%), and not wanting to think about cancer (12%), and for the remaining 31%, reasons related to not wanting the inconvenience or unpleasantness of further tests and visits. Eight women consented to participate in the study but did not actually proceed to interview leaving 200 women who completed the questionnaires and to whom SCID was administered. Participants had a mean age of 58.1 years (SD = 12.2; range 29–89), and 79% (158/200) were white. The mean time since the last treatment was 10.1 months (SD = 5.7; range 3–23). The majority (86%) had received hormone therapy, 73% had received radiotherapy, and 50% had received chemotherapy. Overall, 18 (9%) women were diagnosed with MDD and 7 (3.5%) with GAD, of which 3 cases were co-morbid with MDD.

Screening for depression

Figure 1 shows the ROC curves for the HADS-D and the EDS screening for depression.

The ROC curves show that both scales are good discriminators for depression. The EDS (AUC 0.930, 95% CI 0.888–0.972; $P < 0.0001$) marginally outperforms the HADS-D (AUC 0.916, 95% CI 0.846–0.986; $P < 0.0001$), although there is no statistically significant difference between the two AUCs ($P = 0.18$). Using the recommended [14, 16] cut-off score of >12 to screen for depression, the sensitivity and specificity of the EDS were found to be 72% (95% CI 0.46–0.89) and 90% (95% CI 0.84–0.93), respectively, suggesting that it is also well calibrated in this population. PPV and NPV were 41% (95% CI 0.34–0.59) and 97% (95% CI 0.93–0.99), respectively. At the recommended cut-off score of >10, the HADS-D had a sensitivity of 50% (95% CI 0.27–0.73) and a specificity of 97% (95% CI 0.93–0.99) when screening for depression. PPV and NPV were 60% (95% CI 0.33–0.83) and 95% (95% CI 0.91–0.98), respectively. The low sensitivity of the HADS-D at the recommended cut-off suggests that it is not well calibrated in this population.

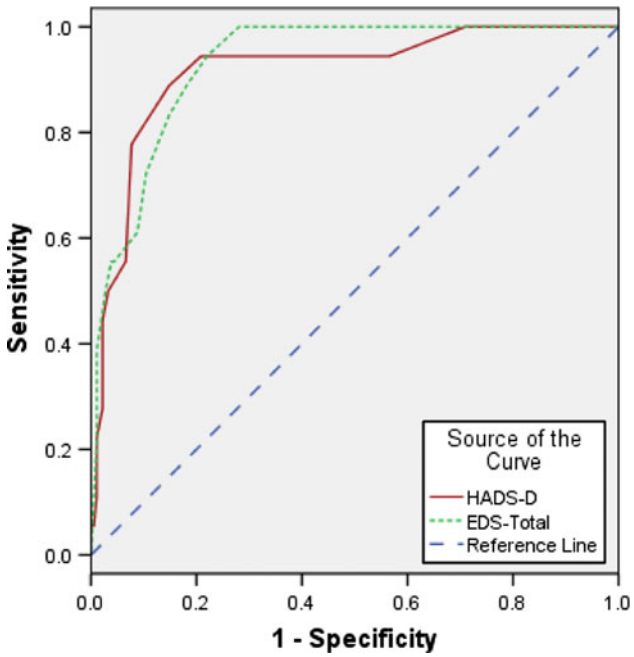

Fig. 1 Receiver operating characteristic curves for the HADS-D and the EDS as a screen for depression

Screening for anxiety

Figure 2 shows the ROC curve for HADS-A screening for anxiety.

The AUC for the curve is 0.907 (95% CI 0.846–0.986; $P < 0.0001$). At the recommended cut-off score of >10, the HADS-A had a sensitivity of 71% (95% CI 0.30–0.95) and a specificity of 87% (95% CI 0.81–0.91) when screening for anxiety. PPV and NPV were 16% (95% CI 0.06–0.34) and 99% (95% CI 0.95–1.0), respectively. Since

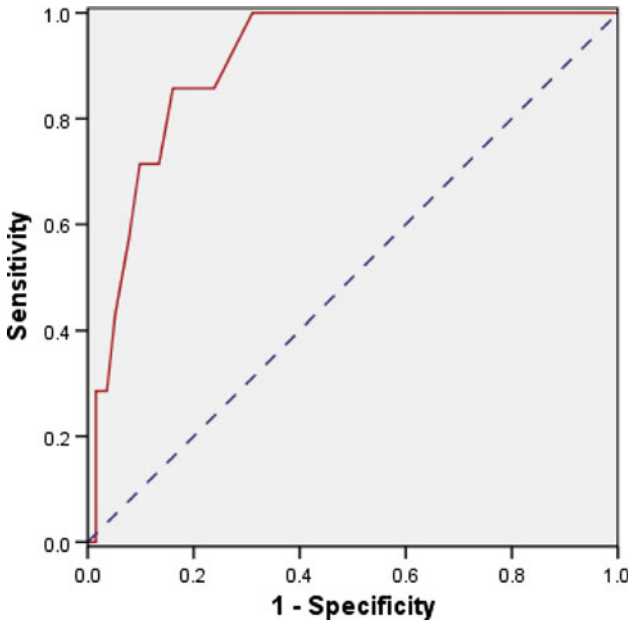

Fig. 2 Receiver operating characteristic curves for the HADS-A as a screen for anxiety

the AUC is >0.9, the HADS-A is both a good discriminator for anxiety and is well calibrated for this population.

Screening for anxiety and/or depression

Figure 3 shows the ROC curves for the HADS-T and EDS screening for anxiety and/or depression.

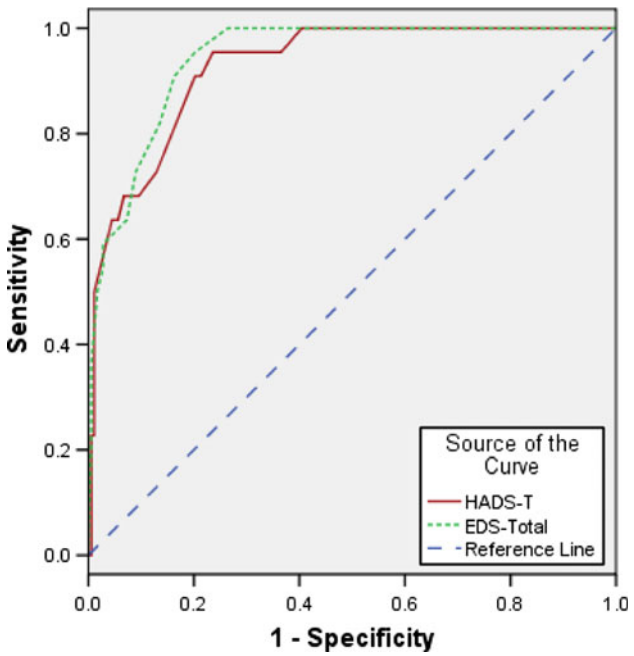

Fig. 3 Receiver operating characteristic curves for the HADS-T and the EDS as a screen for anxiety and/or depression

The performance of the EDS (AUC 0.942, 95% CI 0.907–0.978, $P < 0.0001$) is non-significantly superior ($P = 0.38$) to the HADS-T (AUC 0.926, CI 0.879–0.973; $P < 0.0001$) in screening for psychological distress in this group. For the HADS-T, the cut-off score of >13 recommended by Razavi et al. [13] was found to be optimal (determined from the ROC). At this cut-off, the sensitivity of the HADS-T was 95% (95% CI 0.76–1.0) and the specificity was 76% (95% CI 0.69–0.82). PPV and NPV were 33% (95% CI 0.22–0.46) and 99% (95% CI 0.95–1.0), respectively. The EDS has not been previously evaluated as a screening tool for anxiety and/or depression. However, at the optimal cut-off of >9 (determined from the ROC), the EDS had a sensitivity of 95% (95% CI 0.75–1.0) and a specificity of 80% (95% CI 0.74–0.86) and hence a good discriminator for anxiety and depression in this population. PPV and NPV were 38% (95% CI 0.25–0.51) and 99% (95% CI 0.96–1.0), respectively. This was non-significantly better than the performance of the HADS-T ($P = 0.54$).

Discussion

This study investigated the performance of the HADS and the EDS as a screen for anxiety, depression, or both. In all cases, the ROC AUC was >0.9 indicating that the scales are excellent discriminators for psychological distress (HADS-T and EDS) or for depression (EDS and HADS-D), and in the case of HADS-A, anxiety alone. The study included a diagnosis of MDD and GAD as a case of psychological distress; whether the HADS-T and EDS could screen for other anxiety disorders such as cancer-related post-traumatic stress disorder was not tested due to the low prevalence of these disorders and study size. We also found it difficult to identify existing validated cut-offs for the EDS and HADS-T in screening for psychological distress. The EDS has not yet been validated as a screen for psychological distress and there are limited studies on HADS-T. Where studies on the use of HADS-T to screen for anxiety and depression exist, there is no consistent definition for 'psychological distress', with some studies incorporating all psychiatric disorders and others taking a narrower view. In practice [3], tests which screen for a variety of psychiatric problems are likely to be more useful in follow-up patient care. On this basis, the use of the HADS-T and the EDS to screen for psychological distress can be recommended above their use to screen for depression alone, although the appropriate cut-off scores would need to be validated with a consistent definition of psychological distress in a larger population.

Despite the performance of the EDS and HADS-D in terms of discrimination, with higher values indicating

increasing likelihood of depression, this study did not show either scale to be well calibrated in this population. The EDS delivered an acceptable level of sensitivity at the recommended cut-off, but lowering the cut-off from >12 to >9 produced the optimum performance of 94% sensitivity and 78% specificity. The low sensitivity of 50% delivered by the HADS-D at a cut-off of >10 would be unlikely to be acceptable in clinical practice, and it may be that the need to apply lower cut-off levels to achieve greater detection rates, as evidenced by studies on cancer in-patients [12], may also apply to this population.

The point prevalence of depression among this group of breast cancer survivors is much lower than reported in some previous studies [20], but at 9%, it is in line with rates in primary care settings of 5-10% [21] and rates reported in some studies of cancer outpatients [3, 22]. There is some evidence that after an initial rise, the prevalence of depression decreases over time following the diagnosis of breast cancer [1]. It would have been interesting to investigate the relationship between the prevalence of depression and the time since completion of treatment in this cohort. However, with only 18 cases of depression distributed across a 20-month time period, the study was not powerful enough to draw conclusions on this question. The low prevalence of depression in the current study may partially be explained by the fact that higher rates are found where studies report the prevalence of depressive symptoms rather than actual cases of MDD. Similarly, higher rates of anxiety are found where studies report cumulative incidence over the course of the disease rather than point prevalence as reported in this study. Moreover, in relation to higher rates of anxiety and depression reported in older studies, it has been suggested that a diagnosis of breast cancer may be less likely to provoke clinically important distress today because of improvements in prognosis, treatment, patient support, and reduced stigma [1].

As this study confirms, application of the recommended or optimal cut-off score will not produce 100% sensitivity, and the screening test should always be complemented with wider knowledge of which patients might be at risk. The EDS and HADS both focus on symptoms of anhedonia and anxiety to avoid false positives and so will not detect cases of depression presenting mainly with psychomotor retardation [23]. Although this study did not investigate risk factors within the cohort, other studies have identified clear risk factors for depression and anxiety among cancer patients. Such risk factors tend to be more closely related to the patient than factors surrounding disease or treatment and include lack of an intimate confiding relationship, marital issues, and history of depression or previous psychological treatment [1, 24–26].

The EDS can be abbreviated to a 6-item questionnaire, the Brief Edinburgh Depression Scale, which has been shown to maintain sensitivity and specificity in screening for depression in advanced cancer patients [27]. Further work could investigate whether this more efficient screening tool could be used with acceptable sensitivity and specificity in breast cancer survivors.

Conclusion

This study demonstrates that both the EDS and HADS can be used reliably as screening tests for psychological distress in disease-free breast cancer patients. The study suggests that at the recommended cut-off scores, the EDS performs better than the HADS at detecting cases of depression among breast cancer survivors. However, for both questionnaires, lower cut-off scores than that recommended in other patient groups delivered optimal sensitivity and specificity.

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