Agreement between a single-item measure of anxiety and depression and the Hospital Anxiety and Depression Scale: A cross-sectional study

Heidi Turon¹,²,³*, Mariko Carey¹,²,³, Allison Boyes¹,²,³, Bree Hobden¹,²,³, Sophie Dilworth¹,²,³, Rob Sanson-Fisher¹,²,³

¹ Health Behaviour Research Collaborative, University of Newcastle, Callaghan, New South Wales, Australia, ² Priority Research Centre for Health Behaviour, University of Newcastle, Callaghan, New South Wales, Australia, ³ Hunter Medical Research Institute, New Lambton Heights, New South Wales, Australia

* heidi.turon@newcastle.edu.au

Abstract

Anxiety and depression can be heightened among individuals living with chronic diseases. Identifying these individuals is necessary for ensuring they are provided with adequate support. Traditional tools such as clinical interviews or symptom checklists are not always feasible to implement in practice. Robust single-item questions may be a useful alternative. This study aimed to measure agreement, sensitivity, specificity, positive predictive value and negative predictive value of a single-item question about anxiety and depression compared to the widely used Hospital Anxiety and Depression Scale (HADS). A cross-sectional survey of 2,811 people with cancer attending 19 treatment centres in Australia. Patients were approached in the waiting room prior to an outpatient clinic appointment and invited to complete a pen and paper survey. Participants completed the HADS as well as 2 single-items asking if they have felt anxious or depressed in the last week. The single-items for anxiety and depression each demonstrated moderate levels of sensitivity (0.78 for anxiety; 0.63 for depression) and specificity (0.75 for anxiety; 0.84 for depression) against the relevant HADS subscale. Positive predictive values were moderate (0.53 for anxiety and 0.52 for depression) while negative predictive values were high for both single-item questions (0.90 for anxiety and 0.89 for depression). The single-item measures of anxiety and depression may be useful to rule out individuals who do not require further psychological assessment or intervention for anxiety and depression. Further research is needed to explore whether these findings generalise to other chronic diseases.

Introduction

Identifying depression and anxiety among those with a chronic disease is difficult in clinical practice

The prevalence of depression and anxiety amongst people with a chronic disease (including stroke, cancer, heart disease and diabetes) is higher than in the general population[1]. While it is recommended across several disease groups that these conditions be identified, monitored and
securely on a University of Newcastle server and only accessed by authorised members of the research team; 3) be reported in de-identified aggregate format. Requests for access to a deidentified copy of the data can, however, be sent to the University of Newcastle Human Research Ethics Committee (email: human ethics@newcastle.edu.au) for their consideration.

**Funding:** This research was supported by a National Health & Medical Research Council (NHMRC) (https://www.nhmrc.gov.au) Project Grant (ID 1010536), a Strategic Research Partnership Grant (CSR 11-02) from Cancer Council NSW to the Newcastle Cancer Control Collaborative (New-3C) (https://www.cancercouncil.com.au) (https://www.cancer.nsw.gov.au), and infrastructure funding from the Hunter Medical Research Institute (HMRI) (https://hmri.org.au). MC is supported by a NHMRC Translating Research Into Practice fellowship (APP1073031), AB is supported by a NHMRC Early Career Fellowship (APP1073317) and a Cancer Institute New South Wales Early Career Fellowship (13/EGF1-37). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

**Competing interests:** The authors have declared that no competing interests exist.

Patient self-report assessments can assist in identifying depression and anxiety amongst those with chronic diseases

Self-report instruments can serve an important role in routinely assessing psychological symptoms across a variety of clinical applications. For example, these measures can be used to determine which patients might require further evaluation, or to measure the severity of distress so that appropriate levels of support can be provided [4, 13]. They may also be used to monitor outcomes of those receiving psychosocial interventions to determine whether the intervention is successful in reducing the severity of symptoms [14, 15]. There are a number of brief tools for assessing psychological wellbeing which have been recommended for routine use in clinical settings [16], including the Hospital Anxiety and Depression Scale (HADS) [17, 18]. These tools typically have moderate to high sensitivity and specificity compared to gold standard clinical interview, and usually range in length from 5 to 14 items [19, 20]. However, these tools may still be poorly implemented in clinical practice due to lack of time to administer the tools in a busy clinic setting, and lack of staff training in tool administration, scoring and interpretation [21, 22]. Given the barriers to using clinical interviews and brief screening tools, there has been increasing interest in utilising ultra-short tools to identify those who may have anxiety or depression in clinical settings. Ultra-short tools, such as the Distress Thermometer [23] or the Patient Health Questionnaire-2 (PHQ-2) [24], typically consist of between 1 and 4 items and can be rapidly completed by patients [19]. Studies have suggested that ultra-short tools may have some clinical utility in accurately screening out non-cases [19, 25, 26]. Although much of the research to date has focused on the Distress Thermometer, the wording of this tool is not ideal for use in all clinical contexts [27]. The Distress Thermometer focuses on a singular broad construct, i.e “distress” and has been shown to have only modest performance when anxiety and depression are the targets for assessment [28, 29]. Therefore, there is value in exploring the performance of single-item questions which focus on the constructs of anxiety and depression within chronic disease groups.

Examine single-item questions within an oncology setting

It is estimated that approximately 16% of people with cancer experience depression, and approximately 10% experience anxiety [30]. Emotional distress may be associated with poor treatment adherence and reduced quality of life [31, 32]. A key feature of quality cancer care is the provision of psychosocial care that aims to reduce the impact of cancer on emotional well-being [33, 34]. Although the utility of single-item measures of anxiety and depression are starting to be explored in other chronic diseases [35, 36], most of the studies examining single-item measures, and indeed anxiety and depression screening, have been conducted in oncology.
settings [37, 38]. Thus we believe cancer patients, in the first instance, are an appropriate chronic disease population to test newly developed single item measures to allow for performance comparisons. When considering the potential clinical utility of a new screening measure, several metrics are useful to consider. Agreement examines how frequently the outcome of the measure agrees with the outcome of alternative measure. Sensitivity and specificity refer to the accuracy of the test to correctly identify those who do and do not have a particular condition. Positive predictive value (PPV) and negative predictive value (NPV) are related to the prevalence of a condition and provide insight into the likelihood an individual has (or does not have) a specific condition given a positive (or negative) test result[39]. The aim of this study was therefore, to examine the level of agreement, sensitivity, specificity, PPV and NPV of a single-item question for: (i) anxiety compared with a HADS anxiety score ≥8; and (ii) depression compared with a HADS depression score ≥8. The impact of gender on accuracy of the single-item measures was also explored, given previous studies suggesting that gender may influence reported distress [40, 41].

**Method**

**Design and setting**

This work was part of a larger cross-sectional study examining individual, social, and disease-related factors on psychological wellbeing in people diagnosed with cancer. It was conducted in 19 hospitals across six Australian states. This included 13 medical oncology clinics and nine haematology clinics, some of which were co-located within the same hospital. Sixteen hospitals were located in major metropolitan areas, while 3 were located in major regional areas. Participants were recruited between October 2012 and October 2014.

**Participants**

Eligible participants were: (i) those with a confirmed diagnosis of cancer (any type or stage); (ii) attending an outpatient oncology appointment at one of the participating clinics; (iii) aged 18 years or older; (iv) able to read and understand English; (v) judged by clinic staff to be physically and psychologically capable of completing the questionnaire; and (vi) attending their second or subsequent appointment at the clinic.

**Procedure**

Ethics approval for the study was gained from the University of Newcastle Human Research Ethics Committee (H-2011-0312, H-2010-1324), as well as all applicable hospital/health service ethics committees. Clinic staff identified potentially eligible patients who were then approached by a research assistant prior to their appointment and invited to participate in the study. Informed written consent was obtained from all participants.

Participants were asked to complete a self-report pen-and-paper questionnaire containing items about their sociodemographic characteristics and emotional wellbeing. Participants could complete the questionnaire while waiting for their appointment or take it home and post it back to the research team in the reply paid envelope provided. Non-responders were sent up to two reminders at two-weekly intervals. The age and gender of non-consenters were recorded so that any evidence of consent bias could be examined.

**Measures**

**Demographic, disease and treatment characteristics.** Demographic items assessed gender, age, home postcode, Aboriginal or Torres Strait Islander background, marital status, education
level, country of birth, and employment status. Disease and treatment items assessed cancer type, cancer stage at diagnosis, time since diagnosis, and treatments received and planned.

Hospital Anxiety and Depression Scale (HADS). The HADS [17] is a 14 item self-report questionnaire comprising of two subscales measuring symptoms of depression (HADS-D, 7-items) and symptoms of anxiety (HADS-A, 7-items) over the last week. Items are worded to direct participants to reflect on how frequently they have experienced common symptoms including restlessness, enjoyment of everyday things, and worry. Scoring for each item ranges from 0 to 3, with a maximum possible score of 21 for each subscale. A cut-off score of 8 or more for each subscale is recommended for identifying 'possible caseness' of anxiety and depression [17]. The HADS has demonstrated reliability and validity among people with cancer [42]. The HADS was selected as a proxy for the “gold-standard” in this study as it is commonly used and accepted amongst both clinicians and researchers as a screening tool for depression and anxiety in patients with chronic diseases [43, 44] including cancer [45–47]. It was also designed to exclude references to somatic symptoms, which make it suitable for use with chronic disease populations [48].

Single-items for depression and anxiety. Participants were asked: Over the past week have you: a) Felt anxious? (Response options: Yes/No); and b) Felt depressed? (Response options: Yes/No). The correlation between the two items was 0.477.

Data analysis

Frequencies and percentages were calculated for all demographic and disease characteristics. HADS subscale scores were calculated for those participants with no more than 1 item missing from the subscale. The mean score for the remaining subscale items was imputed for the missing item, if needed. Agreement was calculated as the sum of: a) the proportion of participants who were classified as anxious/depressed by HADS and also self-reported being anxious/depressed; and b) the proportion of participants who were classified as not anxious/depressed by HADS and also self-reported being not anxious/depressed. Sensitivity, specificity, PPV and NPV were calculated using the HADS as the gold standard (actual) and self-report items as the test classifier. Sensitivity refers to the proportion of people answering “yes” to the single-item question who were classified as cases on the corresponding HADS subscale. Specificity refers to the proportion of people responding “no” to the single-item question who were classified as non-cases on the corresponding HADS subscale. PPV refers to the probability of someone being anxious (or depressed), given they answered “yes” to the single-item question. NPV refers to the probability of someone not being anxious (or depressed), given they answered “no” to the single-item question. A HADS-D and HADS-A cutoff score of 8 or higher was used to define “caseness”, per the original authors recommendation [17]. To explore whether the self-report measure differed by gender, a logistic regression of HADS measures on self-report measure adjusting for age and gender was performed. An interaction term for self-report by gender was initially included to determine if there was a statistically significant difference by gender. If the interaction term was not significant it was removed from the model. From the resulting model, comparison of accuracy of the self-report measure by gender was done by comparing AUROCs (plots of sensitivity vs 1-specificity) for each gender [49]. Statistical analyses were programmed using Stata v14.0 (StataCorp Ltd, College Station, TX).

Results

Sample

A total of 4,233 eligible patients were approached about the study of which 3,472 (82%) consented to participate. Of consenting patients, 2,811 (81%) completed the questionnaire and
were included in the analyses. There were no statistically significant differences in the age or gender of consenters and non-consenters (p > .05). A slight majority of the included sample were female (56%) and aged over 60 (56%). Breast was the most common cancer type (26%), however, a large portion selected ‘other’ cancer (29%). The characteristics of the study sample are shown in Table 1.

Agreement between HADS and single-item for identifying possible cases of anxiety and depression

Anxiety: Agreement between single-item and HADS classified anxiety is displayed in Table 2. Overall, there was a 76% observed agreement between the single-item and HADS-A for possible anxiety. The single-item anxiety measure had a sensitivity of 0.78 (95% CI = 0.75–0.81) and a specificity of 0.75 (95% CI = 0.73–0.77). The positive predictive value (PPV) of the single-item anxiety measure was 0.53 (95% CI = 0.50–0.56), and the negative predictive value (NPV)

Table 1. Demographic and disease characteristics of the study sample (N = 2,811).

| Characteristic                     | Total n (%) |
|-----------------------------------|-------------|
| **Gender**                        |             |
| Male                              | 1,216 (43%) |
| Female                            | 1,588 (56%) |
| **Age at questionnaire completion** |         |
| 18–49                             | 516 (18%)   |
| 50–59                             | 684 (24%)   |
| 60–69                             | 837 (30%)   |
| 70+                               | 730 (26%)   |
| **Type of cancer**                |             |
| Breast                            | 727 (26%)   |
| Colorectal                        | 332 (12%)   |
| Non-Hodgkin’s lymphoma            | 249 (8.86%) |
| Leukaemia (all types)             | 234 (8.32%) |
| Myeloma                           | 174 (6.19%) |
| Lung                              | 171 (6.08%) |
| Other                             | 807 (29%)   |
| **Time since diagnosis**          |             |
| 0–12 months                       | 1,195 (43%) |
| 1–2 years                         | 475 (17%)   |
| 2+ years                          | 1,106 (39%) |
| **Received surgery**              |             |
| Yes                               | 1,622 (58%) |
| No                                | 1,146 (41%) |
| **Received radiotherapy**         |             |
| Yes                               | 1,166 (41%) |
| No                                | 1,500 (53%) |
| **Chemotherapy**                  |             |
| Yes, have received or are planning on receiving | 2,330 (83%) |
| No, have not received and are not planning on receiving | 422 (15%) |
| **Marital status**                |             |
| Married or partner                | 1,824 (65%) |
| Single, divorced, separated or widowed | 950 (34%) |
| **Education completed**           |             |
| High school or below              | 1351 (48%)  |
| Vocational, University, other     | 1410 (50%)  |
| **Employment status**             |             |
| Paid employment                   | 888 (32%)   |
| Not in labour force, unemployed, other | 1880 (67%) |
| **Place of birth**                |             |
| Australia                         | 1936 (69%)  |
| Other than Australia              | 802 (29%)   |

Note: Totals may not add up to 100% due to missing values.

https://doi.org/10.1371/journal.pone.0210111.t001
was 0.90 (95% CI = 0.89–0.92). The interaction of self-reported anxiety and gender was not statistically significant (p = 0.245) and was removed from the model. The resulting model AUROC was 0.79 (95%CI: 0.77–0.81). AUROCs by gender were 0.79 (95% CI 0.76–0.82) for males and 0.78 (95%CI 0.75–0.80) for females and these were not statistically significantly different (p = 0.4860).

Depression: Agreement between single-item and HADS classified depression is displayed in Table 3. Overall, there was an 80% observed agreement between the single-item and HADS-D for possible depression. The single-item depression measure had a sensitivity of 0.63 (95%CI = 0.59–0.67) and a specificity of 0.84 (95% CI = 0.83–0.86). The positive predictive value (PPV) of the single-item anxiety measure was 0.52 (95% CI = 0.48–0.56), and the negative predictive value (NPV) was 0.89 (95% CI = 0.88–0.91). The interaction of self-reported depression and gender was not statistically significant (p = 0.442) and was removed from the model. The resulting model AUROC was 0.77 (95%CI: 0.74–0.79). AUROCs by gender were 0.75 (95% CI 0.71–0.79) for males and 0.77 (95%CI 0.73–0.80) for females and these were not statistically significantly different (p = 0.5500).

### Discussion

Accuracy of a single-item measure of anxiety and a single-item measure of depression, compared to the HADS subscales for anxiety and depression, were examined in this study amongst a large sample of people diagnosed with cancer. The pattern of results was similar for both the anxiety and depression subscales. The single-item anxiety measure demonstrated moderate levels of sensitivity and specificity with the HADS-A. Of every 100 people identified as having possible anxiety by the HADS-A, the single-item identified 78 of these. Conversely, of every 100 people identified as not anxious as measured by the HADS-A, 75 were identified as not anxious by the single-item. A previous meta-analysis examined four studies comparing the sensitivity and specificity of the Distress Thermometer to HADS-A [26] and found a pooled sensitivity of 0.77 and pooled specificity of 0.56. The single-item anxiety measure used in our study, therefore, performed slightly better than the Distress Thermometer among a sample of cancer patients, particularly for specificity.

The single-item depression measure had slightly lower sensitivity compared to the anxiety item, identifying 63 out of every 100 people that the HADS-D identified as possibly depressed. The specificity of the depression item was slightly higher than the anxiety item. Of every 100 people identified as not depressed as measured by the HADS–D, the single-item depression

### Table 2. Agreement between single-item and HADS classified anxiety.

| Anxiety (single-item) | Possible anxiety (HADS-A) | Total |
|-----------------------|---------------------------|-------|
|                       | No                        | Yes   |       |
| No                    | 1,477 (55%)               | 158 (6%) | 1,635 (60%) |
| Yes                   | 499 (18%)                 | 570 (21%) | 1,069 (40%) |
| Total                 | 1,976 (73%)               | 728 (27%) | 2,704 (100%) |

https://doi.org/10.1371/journal.pone.0210111.t002

### Table 3. Agreement between single-item and HADS classified depression.

| Depression (single-item) | Possible depression (HADS-D) | Total |
|--------------------------|------------------------------|-------|
|                          | No                           | Yes   |       |
| No                       | 1,771 (66%)                 | 214 (8%) | 1,985 (74%) |
| Yes                      | 329 (12%)                   | 358 (13%) | 687 (26%) |
| Total                    | 2,100 (79%)                 | 572 (21%) | 2,672 (100%) |

https://doi.org/10.1371/journal.pone.0210111.t003
measure identified 84 of these as similarly not depressed. Compared to the findings of a meta-analysis of ultra-short screening methods for depression (including the distress thermometer, as well as some single or dual question items), we found a lower level of sensitivity (0.63 versus 0.78 in the meta-analysis), but a higher level of specificity (0.84 versus 0.67 in the meta-analysis) [26]. When examining single studies included in the meta-analysis there appears to be a trend for studies using the distress thermometer to have higher sensitivity and lower specificity, than studies using other ultrashort measures (such as 1 or 2 items about depression). However, this finding is complicated by the choice of gold-standard comparator, which was more commonly HADS or another scale for the distress thermometer, whereas the other ultrashort measures were mostly compared with a structured clinical interview.

Other potential reasons contributing to this difference in findings may include differences in the setting under investigation, i.e. palliative care; or a limited sample size in previous studies.

We found that the PPVs and NPVs were similar for both single-items compared to the HADS subscales. The single-items had moderate PPVs, indicating that just over half of those who answered “Yes” to the single-item had possible anxiety or depression. Comparatively, the value of the NPVs were high. Most who answered “No” to the single-items (89% for depression and 90% for anxiety), were not anxious or depressed according to HADS. These findings echo results from Mitchell et al. [19, 26, 50] demonstrating that across a variety of ultra-short tools, ability to identify potential cases of anxiety or depression is modest, and cannot be solely relied upon to detect probable cases. These tools have potential validity, however, in identifying non-cases of anxiety and/or depression.

We did not find any differences in accuracy for the single-item measures based on gender. This suggests that the single-item depression and anxiety questions were not better proxy measures of anxiety or depression for females as opposed to males (or vice versa) and supports the use of the single-item measures for both females and males in a clinical environment.

**Clinical implications**

The findings suggest that use of a single-item as a screening tool for anxiety and depression amongst people who have cancer may have value in identifying non-cases. There could be benefit in a 2 stage assessment approach, whereby single-items could be used as a first step in identifying people with possible anxiety and depression. Such an approach represents a relatively low burden method for quickly identifying people who are not experiencing these symptoms and are unlikely to require additional psychosocial support. Those who answer “yes” to feeling anxious or depressed could be referred for a more detailed assessment and then, based on this assessment, provided with the necessary support. Mitchell and Coyne [51] argue that when applying a second step in the screening process, particularly for a condition with relatively low prevalence (such as depression), and a tool with high specificity is used in the first step, a tool with high sensitivity should be selected for the second step in order to have the greatest gains in overall accuracy. Screening tools with higher sensitivity, include for example, the Beck Depression Inventory-II [25, 52]. Alternatively, dependent on clinic resources, this may be a formal diagnostic interview. Individuals who answer “yes” but do not meet diagnostic criteria could also be provided with self-management resources and re-assessed at a later point.

The HADS takes longer to administer than the single item measures to complete, i.e. approximately 2–5 minutes to complete the HADS [53] compared to less than 30 seconds for the single item measures. The HADS also requires additional time and expertise to be scored and interpreted, hence the advantage of ultra-short tools. It is possible that repeated positive responses on a single item (for example, at two consecutive consultations) may have greater
utility in identifying clinically relevant distress than the single item assessment on a single occasion. This may be a focus of future research, particularly for settings and contexts where the implementation of longer assessments is unlikely to be feasible.

**Study limitations**

Although this study included a large and diverse sample of people with cancer attending outpatient clinics from multiple treatment centres, the survey was not administered to inpatients, or people who were acutely unwell on the day of recruitment. Therefore, results may not be generalisable to these groups. As with all self-report measures, the likelihood of response bias should be considered, however, we attempted to minimise this by ensuring the survey was de-identified and individual responses were not shared with treatment providers. While a large proportion of participants completed the survey prior to the consultation, due to variations in waiting times across clinics, some participants completed the survey post-consultation. This is a common but unfortunate pragmatic issue when recruiting participants in outpatient clinics. The consultation itself thus presents a possible source of bias in the results. An additional limitation of the single-item for self-identifying feeling anxious or depressed in the past week is the individual variance in interpreting this question. The simplicity of the yes/no response scale does not capture the severity of an individual’s symptoms. It should also be acknowledged that although the HADS has been extensively validated, debate remains about appropriate cut points [54]. As such, we elected to use the threshold recommended by the authors of the tool for identifying possible cases of anxiety and/or depression.

**Conclusion**

This large, multisite cross-sectional study of people with cancer attending outpatient clinics revealed that a single-item regarding anxiety or depression had relatively high levels of specificity in detecting non-cases when compared to the HADS, but poor levels of sensitivity. This finding is concordant with previous literature examining the accuracy of ultra-short tools. The high NPVs in this study supports the notion that a single-item measure has potential utility in ruling out those who are likely to require psychosocial intervention. Further research is needed to determine whether these results can be replicated for other chronic diseases, however the single-item approach has the potential to provide a quick and pragmatic option for healthcare providers wishing to routinely screen for anxiety and depression in cancer patients.

**Acknowledgments**

Our thanks to the participating cancer treatment centres; Rochelle Smits, Alison Zucca, and Hannah Small for research support; Sandra Dowley for data management; and Alessandra Bisquerra, Tiffany Evans and Alix Hall for statistical assistance.

**Author Contributions**

**Conceptualization:** Mariko Carey, Allison Boyes, Rob Sanson-Fisher.

**Data curation:** Heidi Turon, Mariko Carey, Allison Boyes.

**Funding acquisition:** Mariko Carey, Rob Sanson-Fisher.

**Investigation:** Heidi Turon, Mariko Carey, Allison Boyes, Rob Sanson-Fisher.

**Methodology:** Mariko Carey, Allison Boyes, Rob Sanson-Fisher.

**Project administration:** Heidi Turon, Allison Boyes.
Resources: Mariko Carey, Allison Boyes, Rob Sanson-Fisher.

Supervision: Mariko Carey, Allison Boyes, Rob Sanson-Fisher.

Visualization: Heidi Turon, Mariko Carey, Allison Boyes, Bree Hobden, Sophie Dilworth, Rob Sanson-Fisher.

Writing – original draft: Heidi Turon, Mariko Carey, Allison Boyes, Bree Hobden.

Writing – review & editing: Sophie Dilworth, Rob Sanson-Fisher.

References

1. Clarke DM, Currie KC. Depression, anxiety and their relationship with chronic diseases: a review of the epidemiology, risk and treatment evidence. Med J Australia. 2009; 190(7):SS4. WOS:000266222500002.

2. International Diabetes Federation Clinical Guidelines Taskforce. Global Guideline for Type 2 Diabetes. Brussels: IDF Communications; 2012.

3. Glozier N. Screening, referral and treatment for depression in patients with coronary heart disease. Med J Australia. 2013; 198(9):1–7. https://doi.org/10.5694/mja13.10153 WOS:000320566200021.

4. Andersen BL, Rowland JH, Somerfield MR. Screening, Assessment, and Care of Anxiety and Depressive Symptoms in Adults With Cancer: An American Society of Clinical Oncology Guideline Adaptation. Journal of Oncology Practice. 2015; 11(2):133–4. Epub 2014/12/18. https://doi.org/10.1200/JOP.2014.002311 PMID: 2551721.

5. First M, Williams J, Karg R, Spitzer R. User’s Guide for the Structured Clinical Interview for DSM-5 Disorders, Clinician Version (SCID-5-CV). Arlington, VA: American Psychiatric Association; 2015.

6. Vodermaier A, Linden W, Siu C. Screening for Emotional Distress in Cancer Patients: A Systematic Review of Assessment Instruments. JNCI: Journal of the National Cancer Institute. 2009; 101(21):1464–88. Epub 2009/10/15. https://doi.org/10.1093/jnci/djp336 PMID: 19826136; PubMed Central PMCID: PMCPMC3298956.

7. Palmer S, Vecchio M, Craig JC, Tonelli M, Johnson DW, Nicoulucci A, et al. Prevalence of depression in chronic kidney disease: systematic review and meta-analysis of observational studies. Kidney International. 2013; 84(1):179–91. Epub 2013/03/15. https://doi.org/10.1038/ki.2013.77 PMID: 23486521.

8. Willgoss TG, Goldbart J, Fatoye F, Yohannes AM. The Development and Validation of the Anxiety Inventory for Respiratory Disease. CHEST. 2013; 144(5):1587–96. Epub 2013/08/03. https://doi.org/10.1378/che.st.13-0168 PMID: 23907347.

9. Newell S, Sanson-Fisher RW, Girgis A, Bonaventura A. How well do medical oncologists’ perceptions reflect their patients’ reported physical and psychosocial problems? Cancer. 1998; 83(8):1640–51. https://doi.org/10.1002/(sici)1097-0142(19981015)83:8<1640::aid-cncr213.3.3.co;2-r PMID: 9781960.

10. Fallowfield L, Ratcliffe D, Jenkins V, Saul J. Psychiatric morbidity and its recognition by doctors in patients with cancer. British Journal of Cancer. 2001; 84(8):1011. Epub 2001/04/20. https://doi.org/10.1054/bjoc.2001.1724 PMID: 11308246; PubMed Central PMCID: PMCPMC2363864.

11. Poulsen KM, Pachana NA, McDermott BM. Health professionals’ detection of depression and anxiety in their patients with diabetes: The influence of patient, illness and psychological factors. Journal of Health Psychology. 2016; 21(8):1566–75. Epub 2014/12/17. https://doi.org/10.1177/1359105314559618 PMID: 25512198.

12. Huffman JC, Smith FA, Blais MA, Beiser ME, Januzzi JL, Fricchione GL. Recognition and Treatment of Depression and Anxiety in Patients With Acute Myocardial Infarction. The American Journal of Cardiology. 2006; 98(3):319–24. Epub 2006/07/25. https://doi.org/10.1016/j.amjcard.2006.02.033 PMID: 16860016.

13. Yohannes AM, Willgoss TG, Baldwin RC, Connolly MJ. Depression and anxiety in chronic heart failure and chronic obstructive pulmonary disease: prevalence, relevance, clinical implications and management principles. International Journal of Geriatric Psychiatry. 2010; 25(12):1209–21. Epub 2009/12/25. https://doi.org/10.1002/gps.2463 PMID: 20039905.

14. Willems RA, Bolman CA, Mesters I, Kanera IM, Beaulen AA, Lechner L. Short-term effectiveness of a web-based tailored intervention for cancer survivors on quality of life, anxiety, depression, and fatigue: randomized controlled trial. Psycho-Oncology. 2017; 26(2):222–30. Epub 2016/03/19. https://doi.org/10.1002/pon.4113 PMID: 26988800.

15. Lengacher CA, Reich RR, Paterson CL, Ramesar S, Park JY, Aلينat C, et al. Examination of Broad Symptom Improvement Resulting From Mindfulness-Based Stress Reduction in Breast Cancer
Agreement of single-item measures of anxiety and depression with HADS

16. Goldberg DP, Gater R, Sartorius N, Ustun TB, Piccinelli M, Gureje O, et al. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. Psychological Medicine. 1997; 27 (1):191–7. Epub 1997/01/01. https://doi.org/10.1017/S0033291796004242 PMID: 9122299.

17. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatrica Scandinavica. 1983; 67(6): 361–70. Epub 1983/06/01. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x PMID: 6880820.

18. Turk DC, Dworkin RH, Trudeau JJ, Benson C, Biondi DM, Katz NP, et al. Validation of the Hospital Anxiety and Depression Scale in Patients With Acute Low Back Pain. The journal of pain: official journal of the American Pain Society. 2015; 16(10):1012–21. Epub 2015/07/26. https://doi.org/10.1016/j.jpain.2015.07.001 PMID: 26208762.

19. Mitchell AJ. Short screening tools for cancer-related distress: a review and diagnostic validity meta-analysis. Journal of the National Comprehensive Cancer Network. 2010; 8(4):487–94. Epub 2010/04/23. https://doi.org/10.6004/jnccn.2010.0035 PMID: 20410338.

20. Mitchell AJ, Coyne JC. Do ultra-short screening instruments accurately detect depression in primary care? British Journal of General Practice. 2007; 57(535):144–51. PMID: 17263931

21. Mitchell AJ, Lord K, Slattery J, Grainger L, Symonds P. How feasible is implementation of distress screening by cancer clinicians in routine clinical care? Cancer. 2012; 118(24):6260–9. https://doi.org/10.1002/cncr.27648 PMID: 22674666

22. Mitchell AJ. Screening for cancer-related distress: when is implementation successful and when is it unsuccessful? Acta Oncologica. 2013; 52(2):216–24. https://doi.org/10.3109/0284186X.2012.745949 PMID: 23320770

23. National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology—Distress Management [Version 1. 2017] 2017 [8/8/17]. Available from: https://www.nccn.org/professionals/physician_gls/pdf/distress.pdf.

24. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Medical care. 2003; 41(11):1284–92. Epub 2003/10/30. https://doi.org/10.1097/01.MLR.0000093487.78664.3C PMID: 14583691.

25. Mitchell AJ, Meader N, Davies E, Clover K, Carter GL, Loscalzo MJ, et al. Meta-analysis of screening and case finding tools for depression in cancer: evidence based recommendations for clinical practice on behalf of the Depression in Cancer Care consensus group. Journal of Affective Disorders. 2012; 140 (2):149–60. Epub 2012/05/29. https://doi.org/10.1016/j.jad.2011.05.043 PMID: 22633127.

26. Mitchell AJ. Pooled Results From 38 Analyses of the Accuracy of Distress Thermometer and Other Ultra-Short Methods of Detecting Cancer-Related Mood Disorders. J Clin Oncol. 2007; 25(29):4670–81. Epub 2007/09/12. https://doi.org/10.1200/JCO.2006.10.0438 PMID: 17846453.

27. Hughes KL, Sargeant H, Hawkes AL. Acceptability of the distress thermometer and problem list to community-based telephone cancer helpline operators, and to cancer patients and carers. BMC Cancer. 2011; 11(1):46. Epub 2011/02/02. https://doi.org/10.1186/1471-2407-11-46 PMID: 21281476; PubMed Central PMCID: PMCPMC3040161.

28. Boyes A, D’Este C, Carey M, Lecathelinais C, Girgis A. How does the Distress Thermometer compare to the Hospital Anxiety and Depression Scale for detecting possible cases of psychological morbidity among cancer survivors? Supportive care in cancer: official journal of the Multinational Association of Supportive Care in Cancer. 2013; 21(1):119–27. Epub 2012/05/24. https://doi.org/10.1002/jad.201493-3 PMID: 22618735.

29. Mitchell AJ, Baker-Glenn EA, Granger L, Symonds P. Can the Distress Thermometer be improved by additional mood domains? Part I. Initial validation of the Emotion Thermometers tool. Psycho-Oncology. 2010; 19(2):125–33. Epub 2009/03/20. https://doi.org/10.1002/pon.1523 PMID: 19296462.

30. Mitchell AJ, Chan M, Bhatti H, Halton M, Grassi L, Johansen C, et al. Prevalence of depression, anxiety, and adjustment disorder in oncological, haematological, and palliative-care settings: a meta-analysis of 94 interview-based studies. The Lancet Oncology. 2011; 12(2):160–74. Epub 2011/01/22. https://doi.org/10.1016/S1470-2045(11)70002-X PMID: 21251875.

31. Mystakidou K, Tsilika E, Parpa E, Katsouda E, Galanos A, Vlahos L. Assessment of anxiety and depression in advanced cancer patients and their relationship with quality of life. Qual Life Res. 2005; 14(8):1825–33. WOS:000231807200004. https://doi.org/10.1007/s11136-005-4324-3 PMID: 16155770

32. DiMatteo MR, Lepper HS, Crogan TW. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. Arch Intern
Agreement of single-item measures of anxiety and depression with HADS
51. Mitchell AJ, Coyne JC. Screening for Depression in Clinical Practice: An Evidence-Based Guide. New York, NY: Oxford University Press; 2009.

52. Beck A, Steer R, Brown G. BDI-II Manual. San Antonio, TX: The Psychological Corporation; 1996.

53. Snaith RP. The Hospital Anxiety And Depression Scale. Health and Quality of Life Outcomes. 2003; 1:29–. PMC183845. https://doi.org/10.1186/1477-7525-1-29 PMID: 12914662

54. Carey M, Noble N, Sanson-Fisher R, MacKenzie L. Identifying psychological morbidity among people with cancer using the Hospital Anxiety and Depression Scale: time to revisit first principles? Psycho-Oncology. 2012; 21(3):229–38. Epub 2011/09/16. https://doi.org/10.1002/pon.2057 PMID: 21919120.