Brief Emotional Screening in Oncology: Specificity and sensitivity of the Emotion Thermometers in the Portuguese Cancer Population

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A definitive version was subsequently published as: 3. Teixeira, R. J., Faria, S., Remondes-Costa, S., Brandão, T., Branco, M., Moreira, S., Machado, J. C., & Pereira, M. G. (2019). Brief Emotional Screening in Oncology: Specificity and sensitivity of the Emotion Thermometers in the Portuguese Cancer Population. *Palliative & Supportive Care*. Advanced online publication. Doi: 10.1017/S1478951519000208

Abstract

Objectives: This study aimed to determine the cut-offs and the specificity and sensitivity of the Emotion Thermometers in a Portuguese sample of cancer patients.

Methods: 147 patients (mean age = 49.2; *SD* = 12.6) completed the Emotion Thermometers (ET), the Brief Symptom Inventory (BSI), and the Subjective Experiences of Illness Suffering Inventory (SEISI). Data was collected in a cancer support institution and in a major hospital in the North of Portugal.

Results: The optimal cut-off for the Anxiety Thermometer was 5v6, which identified 74% of the BSI-anxiety cases and 70% of non-cases. For the Depression Thermometer the cut-off was 4v5, which identified 85% of BSI-depression cases and 82% of non-cases. Cut-off for the Anger Thermometer was 4v5, which identified 83% of BSI-hostility cases and 73% of non-cases; for the Distress Thermometer the optimal cut-off was 4v5, which identified 84% of the suffering cases and 73% of non-cases. Finally, for the Help Thermometer, it was 3v4, which helped to identify 93% of the suffering cases and 64% of non-cases.

Significance of results: Results supported the Portuguese version of the ET as an important screening tool for identifying the emotional distress in cancer patients.

Keywords: Emotion Thermometers; Distress; Cancer; Portugal; Validation.

Introduction

The way cancer patients respond emotionally to the diagnosis and treatment of cancer is a long-standing concern in the psycho-oncology field. During the cancer trajectory, patients tend to exhibit signs and symptoms of emotional distress (Holland & Mastrovito, 1980). The presence of stress and anxiety and depressive symptoms among cancer patients is well documented in the literature. Studies indicate that depressive symptoms are significantly more common in depressed and non-depressed patients, regardless of the stage of the disease (Mitchell, Lord, & Symonds, 2012). For example, approximately 16% of the cancer patients experience major depression, and about 22% exhibit minor depression and dysthymia combined (Mitchell et al., 2011). High stress levels are also reported in different phases of the cancer trajectory; at the beginning of the chemotherapy treatments (Faul, Heather, Williams, Leftus, & Jacobsen, 2010) as well as at the completion of the treatment (Garafalo, Choppala, Hamann, & Gjender, 2009).

Psychological morbidity may interfere with the effectiveness of cancer treatments, compromising significantly the patients' survival. Indeed, the emotional stress triggered by the disease seems to affect the immunosuppressive function of the immune system, favouring the progression of malignancy (McDonald, O'Connell, & Lutgendorf, 2013). Moreover, the emotional stress as well as the depressive symptoms may also increase the risk of recurrence (Antoni et al., 2009; Spiegel & Giese-Davis, 2003). Moreover, empirical evidence has suggested that when patients have stress management skills or are helped to develop these skills, the anxiety and depression symtpoms as well as the stress levels tend to decrease, and their mental health tend to improve (Faul et al., 2010). The evaluation, monitoring and treatment of emotional distress have been recognized as an important practice with clinical and economic benefits for cancer patients

and their family. Indeed, some studies pointed to the importance of this practice to improve the effectiveness of the oncology treatment (e.g., Bultz & Holland, 2006).

The assessment of emotional distress in clinical settings was initially focused on the identification of symptomatic cases of anxiety, stress and depression in cancer patients. However, this assessment procedure immediately began to be questioned. In fact, the instruments used (despite its recognized validity and reliability) were too long (Mitchell, 2010a). Moreover, the inclusion of items about the experience of somatic symptoms, created problems in differentiating signs and symptoms of emotional disorders and the common side effects of treatments for cancer (Jacobsen & Heather, 2008). Also, this type of assessment conferred a psychopathological and psychiatric connotation to the emotional distress experienced by the cancer patient due to the oncological disease (Mitchell, 2010b). Therefore, a scientific term more suited to represent the emotional experience of people affected by cancer diagnosis was developed and is currently defined as 'emotional distress' (National Comprehensive Cancer Network, 2007).

Based on this new conception, emotional distress is now recognized as the sixth vital sign and, for that reason, should be periodically monitored among cancer patients, along with the other vital signs such as the blood pressure, temperature or pain (Bultz & Holland, 2006). Thus, the National Comprehensive Cancer Network (NCCN) developed specific guidelines for the screening of emotional distress among cancer patients in clinical settings. The first brief instrument recommended for screening the emotional distress in clinical settings was the Distress Thermometer (DT). Different studies have proven the reliability and the accuracy of this instrument to identify emotional distress in cancer patients as compared to other longer instruments (i.e., Psychological Distress Inventory - PDI, Hospital Anxiety and Depression Scales - HADS, Brief Symptoms Inventory - BSI). Furthermore, the DT have revealed the same precision of these

longer measures, but it has as advantages its brevity and ease of administration and scoring. For these reasons, it has been considered as a more cost-effective way for screening the emotional distress among cancer patients and is therefore preferred by the researchers as an appropriate instrument to be used in clinical settings (Gessler et al., 2008; Gil et al., 2005; Mitchell, 2007; VanHouse et al., 2015).

However, more recently, another instrument, the Emotion Thermometers (ET; Mitchell, Baker-Glenn, Granger, & Symonds, 2010a) has been recognized to have greater scientific sustainability with regard to the precision in the screening of emotional distress in cancer patients. The ET is a combination of five visual-analogue scales in the form of four predictor domains (distress, anxiety, depression, anger) and one outcome domain (need for help). In comparison to the DT, the ET gives a more precise evaluation of the level of emotional distress (Mitchell et al., 2010a). When applied alone, the Anxiety Thermometer can identify higher levels of emotional suffering (93.9% of accuracy) as compared to the assessment obtained by the DT (54.4% of accuracy), thus revealing an increased sensitivity for identifying emotional complications in cancer patients (Mitchell et al., 2010a). Anxiety and Depression Thermometers have also a statistically significant relationship with the anxiety and the depression subscales of the HADS (Beck, Tan, Lum, Lim, & Krishna, 2014). Against the Beck Depression Inventory (BDI), the ET has also shown good accuracy (greater than 80%) for diagnosing depression in cancer patients (Schubart, Mitchell, Dietrich, & Gusani, 2015).

In Portugal, a preliminary study to validate the ET has been performed with 104 cancer patients (65% women; Mean age = 49.22; SD = 12.5). The results for each ET were: Mean = 5.58; SD = 2.55 for Anxiety; M = 4.81; SD = 2.76) for depression; M = 5.06; SD = 2.99) for anger; M = .398; SD = 2.53) for distress. Correlational analyses revealed that all of the five ET were

associated with the anxiety, depression and hostility subscales of the BSI (authors' personal communication).

The ET represents an advance in screening for anxiety and depression in the psycho-oncology field (Mitchell et al., 2010a; Mitchell, Baker-Glenn, Park, Granger, & Symonds, 2010b). The reasons to recommend the ET as an appropriate instrument for use in clinical settings is its ability to screen for emotional distress in cancer patients and allow a quick and appropriate referral for an adequate therapeutic response (Gusani et al., 2009; Mitchell, 2007; Mitchell et al., 2010a; Mitchell et al., 2010b; Schubart et al., 2015; Schubart et al., 2010). Despite the presence of guidelines and recommendations for the use of appropriate screening tools, the emotional distress of patients often goes unnoticed by oncologists in their clinical practice (Jacobsen, 2007). Although the international recommendations about the need of screening the emotional distress of cancer patients, this practice is still not consistently implemented (Fallowfield, Ratcliffe, Jenkins, & Saul, 2001; Pirl et al., 2007). In fact, since 2004 the Canadian Strategy for Cancer Control (Rebalance Focus Action Group, 2005) has worked on the development of a treatment protocol which includes the integration of a periodic monitoring of the patients' emotional distress in the physician's daily clinical routine (Bultz & Holland, 2006; Carlson & Bultz, 2003). This highlights the need of validating ET across countries in order to include the emotional screening as a regular practice in the care offered to cancer patients.

In Portugal, the NCCN recommendations for screening the emotional suffering of cancer patients is not yet widely implemented given the lack of information about the validity (in terms of specificity and sensitivity) of the ET among Portuguese cancer patients. Thus, the purpose of this study was to determine the cut-offs and the specificity and sensitivity of the emotion thermometers in the Portuguese oncology population in order to enable an early detection of

emotional disorders amongst cancer patients, and to facilitate and accelerate the referral for psychosocial services, thereby contributing to the improvement of cancer care in Portugal. Therefore, the present study presented the diagnostic cut-off scores of each thermometer scales (distress, anxiety, depression, anger and help). The establishment of cut-off scores is an important step to contribute to consolidate the emotional distress screening as a regular practice in Portugal and to help health care professionals to make faster and important decisions about the patients who may need most psychosocial support.

Methods

Participants

Participants were 147 cancer patients attending a cancer support institution or a major hospital in Portugal. Ninety-eight (66.7%) patients were female and 48 (32.7%) were male. The mean age of the sample was 49.2 years old (*SD* = 12.6; median = 50), and the mean disease duration was 6.8 months (*SD* = 7.3; median = 5), suggesting that this was predominantly an early cancer sample. One-hundred-and-one (68.7%) patients were active and 23 (15.6%) were retired. Regarding their marital status, 91 (61.9%) patients were married, 23 (15.6%) were single, 19 (12.9%) were divorced/separated, and 10 (6.8%) were widowers. The mean years of education was 9.4 years (*SD* = 4.0; median = 9).

The most common diagnosis was breast cancer, (*n* = 54, 36.7%), followed by bowel cancer, (*n* = 15, 10.2%). The mean number of chemotherapy sessions was 4.1 (*SD* = 2.2; median = 4). Forty-two (28.6%) had metastasis and 115 (78.2%) were being treated with QT-EV. Eighty-five (76.6%) had already undergone surgery, 42 (37.8%) had been administered QT-EV, and 32

(28.8%) had undergone radiotherapy (RT) treatment. The aim of the current treatment was to provide a cure for 36 (24.5%), maintain adjuvant for 32 (21.8%), a focus on neo adjuvant for 26 (17.7%), and palliative care for 11 (7.5%) patients.

Instruments

Emotion Thermometers (ET)

The ET (Mitchell et al., 2010a) is used in clinical practice to assess the severity of emotional disorders in cancer patients. It consists of five thermometers assessed on an eleven-point Likert scale (ranging from 0 to 10) and includes four emotional domains, Distress (DT), Anxiety (AnxT), Depression (DepT) and Anger (AngT); and one non-emotional domain, Need for Help (HT). All the domains include a visual analogue scale. A high score indicates higher levels of distress, anxiety, depression, anger and more need for help. The Cronbach's alpha of the original ET (Mitchell et al., 2010a) was .91, whereas in the present study was .93.

Brief Symptom Inventory (BSI)

The BSI (Derogatis & Spencer, 1982) is a self-report questionnaire that allows assessing clinical symptoms standards. The questionnaire comprises 53 items scored on a five-point Likert scale (ranging from 0 to 4). For the purpose of this study only the depression, anxiety and hostility subscales were used. A high score on these dimensions indicates higher levels of depression, anxiety, and hostility. The Cronbach's alpha of the original scale ranged from .71 to .85 (Derogatis & Spencer, 1982). This measure was translated and adapted to the Portuguese population by Canavarro (1999) that found an adequate internal consistency (alfas between .62 and .80). In the

present study alphas were .92, .93, and .90 for the subscales of depression, anxiety, and hostility, respectively.

The Subjective Experiences of Illness Suffering Inventory (SEISI)

The SEISI was developed by McIntyre and Gameiro (1999) with a sample of Portuguese cancer patients for assessing the suffering associated with their oncological disease. Based on a literature review and on the results of interviews with cancer patients, the authors developed a pool of items that was then piloted. The final version of the questionnaire includes 44 items scored on a five-point Likert scale (ranging from 1 to 5). It assesses five domains: physical suffering, psychological suffering, existential suffering, socio-relational suffering and positive experience of suffering. Only the total score was used in the present study, with higher scores indicating higher suffering. Alphas in the original version ranged from .69 to .85 (.93 for the total score) (McIntyre & Gameiro, 1999). In this study, the alpha was .97.

Procedure

Data was collected at the Portuguese League against Cancer or at the Central Hospital of Oporto (both institutions are located at the North of Portugal). Psychologists working in these institutions invited cancer patients to take part in this study. These cancer patients were receiving active treatment but none of them was hospitalized. Participation was voluntary, and all patients signed an informed consent. Participants were asked to indicate the number that best described their levels of distress, anxiety, depression, anger, and need for help, in the thermometer, over the past 7 days. The study was approved by the review board of the Portuguese League against Cancer

and the Ethical Committee of the Central Hospital. It follows all principles outlined in the Declaration of Helsinki.

Results

Thermometer variables

Means and *SD´*s were obtained for the five scales. The mean score on the DT was 5.05 (*SD* = 2.51), 5.02 (*SD* = 2.70) on AnxT, 4.19 (*SD* = 2.80) on the DepT. On the AngT the mean obtained was 4.07 (*SD* = 3.09), and on the HT the mean was 5.04 (*SD* = 2.96). Significant positive large correlations ($p < .001$) were found among all the thermometers (ranging from r = .66 to r = .85) (see Table 1 and Figure 1).

Insert Table 1 and Fig. 1

Diagnostic validity

Validity using the BSI-anxiety for AnxT

Using a cut-off of 1.753 in BSI-anxiety as the criterion (the cut-off found in the Portuguese population; Canavarro, 1999), 50 patients (34.0%) were identified as experiencing clinically significant anxiety. The ROC analysis for AnxT obtained an AUC of .81 (*SE* = .04; $p < .001$; 95% *CI* [.74; .88]), indicating an excellent discrimination (see Figure 2). The optimal cut-off point equally favouring sensitivity (Ss; 74%) and specificity (Sp; 70%) was 5v6. Table 2 shows the rule in accuracy (PPV) and summary measures and rule-out accuracy (NPV).

Validity using the BSI-depression for DepT

Using a cut-off of 1.828 in BSI-depression as the criterion (the cut-off found in the Portuguese population; Canavarro, 1999), 58 patients (39.5%) were identified as experiencing clinically significant depression. The ROC analysis for DepT obtained the AUC of .89 (*SE* = .03; $p < .001$; 95% *CI* [.83; .94]), indicating an excellent discrimination (see Figure 2). The optimal cut-off point equally favouring sensitivity (Ss; 85%) and specificity (Sp; 82%) was 4v5. Table 2 shows the rule in accuracy (PPV) and summary measures and rule-out accuracy (NPV).

Validity using the BSI-hostility for AngT

Using a cut-off of 1.411 in the BSI-hostility as the criterion (the cut-off found in the Portuguese population; Canavarro, 1999), 42 patients (28.6%) were identified as experiencing clinically significant hostility. The ROC analysis for AngT obtained the AUC of .84 (*SE* = .04; $p < .001$; 95% *CI* [.77; .92]), indicating an excellent discrimination (Figure 2). The optimal cut-off point equally favouring sensitivity (Ss; 83%) and specificity (Sp; 56%) was 4v5. Table 2 shows the rule in accuracy (PPV) and summary measures and rule-out accuracy (NPV).

Validity using the emotional suffering score for DT

Using a cut-off of 2.75 in suffering score as the criterion (because the SEIS has not a cut-off for clinical diagnosis, we have used the weighted mean obtained for the Portuguese population; Gameiro, 1999), 80 patients (54.4%) were identified as experiencing clinically significant suffering. The ROC analysis for DT obtained the AUC of .87 (*SE* = .03; $p < .001$; 95% *CI* [.81; .93]), indicating an excellent discrimination (see Figure 2). The optimal cut-off point equally favouring sensitivity (Ss; 84%) and specificity (Sp; 79%) was 4v5. Table 2 shows the rule in accuracy (PPV) and summary measures and rule-out accuracy (NPV).

Validity defined the suffering score for HT

Using a cut-off of 2.75 in suffering score as the criterion (weighted mean obtained for the Portuguese population; Gameiro, 1999), 80 patients (54.4%) were identified as experiencing clinically significant suffering. The ROC analysis for HT obtained the AUC of .83 (*SE* = .03; $p < .001$; 95% *CI* [.77; .90]), indicating an excellent discrimination (see Figure 2). The optimal cut-off point equally favouring sensitivity (Ss; 93%) and specificity (Sp; 64%) was 3v4. Table 2 shows the rule in accuracy (PPV) and summary measures and rule-out accuracy (NPV).

Insert Table 2 and Fig. 2

Discussion

The presence of anxiety, depression and anger among cancer patients, and their negative consequences for the process of adaptation to the cancer experience, highlights the importance of identifying appropriate tools for distress screening. Literature recommends the use of brief instruments capable of offering relevant information to help health care professionals in developing a differential diagnosis between normal symptomatology and pathological symptomatology (Mitchell, 2010b). Studies have shown that visual analogue scales (VAS) have superior metrical characteristics in comparison to discrete scales (e.g., Reips & Funke, 2008). The DT has been widely used in Portugal. However, a reliable measure to evaluate other emotional changes in cancer patients is needed. This is the first study examining the Emotion Thermometers (ET) tool (Mitchell et al., 2010a) in a Portuguese sample of cancer patients. The

main aim was to establish the diagnostic validity of the ET with the BSI (anxiety, depression and hostility subscales) and a global measure of suffering (SEISI). Previous studies have not examined Anxiety Thermometer, Depression Termometer and Anger thermometer against a standardized instrument to evaluate symptoms of psychopathology (BSI), or compared the results from the ET's Distress and Help thermometers against a measure of suffering.

The results of the present study showed that the criterion validity of the ET was established using ROC analysis with BSI subscales, which is considered a gold standard. The AUC of AnxT against BSI anxiety subscale was .81, while the AUC of the DepT thermometer against BSI depression subscale was .89. The AUC of AngT against BSI hostility subscale was .84. The AUC of the DT against the total score on SEISI was .87. Finally, the AUC of HT thermometer against the total score on SEISI was .83. Also, all the ET's were positively intercorrelated, as found in previous studies (Hinz, Mitchell, Dégi, & Mehnert-Theuerkauf, 2019; Mitchell et al., 2010a), suggesting that the set of thermomethers measure a more general 'emotional distress' construct. However, while intercorrelations are high, they are not high enough for considering the emotion thermometers as a unidimensional measure but a measure assessing different dimensions of emotional distress. Also, it is possible that patients may have difficulties in qualifying what is distress, anxiety or depression, as suggested by previous studies (e.g., Beck et al., 2014) leading to high intercorrelations among ETs.

Overall, the AUC values indicated that ET's have an excellent discrimination. These findings are in line with the results obtained by Mitchell et al. (2010a) that examined the discriminative value of the ETs among a sample of British cancer patients. Concerning the cut-offs for the Portuguese, using the BSI-Anxiety as the criterion, the optimal thermometers were AngT, and HT; using the BSI-Depression as the criterion, the optimal thermometers were DepT,

and HT; using the BSI-Hostility as the criterion, the optimal thermometers were AngT and DT. However, when the total suffering score was used as the criterion, the optimal thermometers were AngT, and DT. When the total suffering score was used as the criterion, the optimal thermometers were AngT, and AnxT. As found in the Mitchell's et al. study (2010a), the AngT showed to be better/optimal on detecting overall distress. Yet, the author recommended a combination of items to be more accurate (Mitchell et al., 2010b). In the present study, only the DepT showed to be optimal for detecting depression, since it presented a greater sensibility and specificity. The ETs have been found to have a good performance in detecting major depression (against DSM-IV depression) within other contexts (e.g., cardiovascular disease or epilepsy) (Mitchell et al., 2012; Rampling et al., 2012).

Many studies emphasize the need of evaluating emotion deregulation in oncology settings, mainly distress, anxiety and depression (Cordes et al., 2014; Pandey et al., 2006). However, while authors recognized the importance of anger assessment in oncology settings (Penedo et al., 2006; Philip, Gold, Schwarz, & Komesaroff, 2007), anger has been rarely examined. To our knowledge, this is the first study evaluating anger/hostility in a Portuguese sample of cancer patients. The use of the AngT should be of great utility since is an imperative deregulator of coping for individuals facing a cancer diagnosis and treatment. Anger is often one of the first emotional reactions a person has to a cancer diagnosis. Many cancer patients wonder "Why me?", which can lead to feelings of angry and frustration. According to Lown (2007), anger may represent a disruption in the doctor–patient relationship, and it is important for physicians to adjust their behaviour and communication accordingly. In this study, however, the AngT have the lowest PPV. From all the ETs, the AngT presented the lowest mean. It is possible that among these participants, anger is not so prevalent which can lead to the existence of a high

proportions of false positives. Probably, and in order to reduce false positives, the value of the AngT should be more restricted. Further research is needed with regards to the AngT.

The need for help of cancer patients should also be a concern for health care professionals. Indeed, more important than identify distress and its prevalence is to provide care for cancer patients in need (Mitchell, 2010a). Indeed, HT was the one with the highest PPV values - when using with suffering scores, reinforcing its utility for identifying cancer patients who need most psychosocial support. This is even more important since studies have shown that only a third of cancer patients with significant distress (using the DT), report wanting professional help for emotional problems (Graves et al., 2007). According to Baker-Glenn and Mitchell (2008), the most usual requests are face-to-face psychological support and complementary therapies. In Portugal, cancer patients who are undergoing treatment in public and private hospitals do not always get the psychological help they need. This is often due to a lack of effective communication between health professionals and patients. So, the HT can be a useful tool to identify and refer to adequate psychosocial support cancer patients who need help.

Having a screening tool capable of detecting the emotional distress experienced by cancer patients is of high importance given its role on protecting patients from future adjustment disorders (Iscoe, Williams, Szalai, & Osoba, 1991) and on reducing costs associated with the lack of treatment of these disorders (Boberg et al., 2003). The ET has several advantages related to its brevity and ease on administration and scoring. In fact, it can be administrated by health professionals with no mental health training (e.g., nurses). This is an advantage since cancer services not always have the support of a mental health professional; and patients contact much more with non-mental health professionals (even in cancer services that have the support of mental health professionals). When patients screen positive, the health care professionals can

refer them for further assessment by mental health care professionals (Beck et al., 2014). Because the administration of ETs only requires that patients circle the number that best describe their levels of distress, anxiety, depression, anger, and need for help, and because clinical cut-off are established for scoring ETs, we do not anticipate any limitation if ETs are administered by non-mental health care professionals.

There are some limitations in this study. The sample size is modest and patients were predominantly in the early stages of the disease. Future studies should be conducted with larger samples and with cancer patients in different stages of the disease (especially late stage cancers). However, for early stage cancer, ETs seem to be a valid screen tool. Moreover, ETs were not compared to the DT. Further research is needed with Portuguese cancer patients to study if ETs expand on the strengths of the DT as happen in a previous study (Mitchell et al., 2010b). Finally, the SEISI does not have a clinical cut-off for establishing a diagnosis which can limit our findings. Future studies should validate ETs against other diagnostic instruments.

Some implications for clinical practice can be derived from this study. For health professionals working in oncological settings the AnxT, the DepT, the AngT and the HT provides a way for health care professional to assess quickly a patient's pressing outcomes from the emotional disturbance.

Distress has been referred to as the sixth vital sign in cancer care, requiring that providers assess and treat it with the same importance as any physical illness (Bultz & Carlson, 2006; Mitchell et al., 2012; Mitchell & Coyne, 2009). Screening identifies unmet needs, but screening alone is an ineffective strategy requiring the availability of psychosocial services (Schubart et al. 2015). In the US, the American College of Surgeons (2012) now requires that cancer centres implement screening programs for psychosocial distress, using validated instruments with

established clinical cut-offs. In Portugal, further studies are needed to evaluate how health professionals use the information collected with the ET, in order to improve patient care and how this information impacts long-term patient outcomes.

Acknowledgements: none

Disclosures: The authors declare no conflict of interests.

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