The Edmonton Symptom Assessment System as a Screening Tool for Depression and Anxiety

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ABSTRACT

Purpose: Mood disorders are among the most important psychiatric problems in patients with cancer. However, they are frequently underdiagnosed and therefore undertreated. This may lead to difficulties with symptom control, social withdrawal, and poor quality of life. This study was conducted to evaluate the screening performance of the Edmonton Symptom Assessment System (ESAS) for depression and anxiety, compared to Hospital Anxiety and Depression Scale (HADS).

Methods: We retrospectively reviewed and analyzed ESAS and HADS data collected from three previous clinical trials conducted by our group. The diagnosis of depression and/or anxiety, and moderate/severe depression and/or anxiety made when patients scored 8 or more, and 11 or more in HADS questionnaire, respectively. The sensitivity, specificity, positive, and negative predictive values for ESAS were calculated.

Results: Of 216 patients analyzed, the median (range) score for depression was 2 (0–10) and anxiety 3 (0–10) using ESAS, and 6 (0–16) and 7 (0–19) using HADS, respectively. A cut off of 2 out of 10 or more in the ESAS gave a sensitivity of 77% and 83% with a specificity of 55% and 47% for depression and moderate/severe depression, respectively. A cutoff of 2 out of 10 or more in the ESAS gave a sensitivity of 86% and 97%, and a specificity of 56% and 43% for anxiety and moderate/severe anxiety, respectively.

Conclusion: Our data suggest that the ideal cutoff point of ESAS for the screening of depression and anxiety in palliative care is 2 out of 10 or more. More research is needed to define the ideal cutoff point for screening of severe depression and anxiety.

INTRODUCTION

Mood disorders are among the most important psychiatric problems in patients with cancer.\(^1\) The frequency of depression in patients with cancer is approximately 25%, although different studies have shown a wide variation.\(^2,3\) This variability in frequency range can be attributed to different factors such as age and gender of the patient, type of assessment tools,\(^4,5\) patient’s observation at different stages of illness (ambulatory versus hospitalized cancer patients),\(^6\) or different primary cancer sites.\(^7\)

It is well known that mood disorders in medically ill patients are frequently underdiagnosed and therefore undertreated.\(^8-13\) Untreated depression leads to difficulties with physical symptom control, social withdrawal, and reduces qual-
ity of life. There are many antidepressants available with acceptable side effect profiles, and their use may be of benefit to terminally ill patients with depression, even in the last weeks of life.\textsuperscript{12-13}

In view of the high rate of missed psychiatric morbidity, several efforts have been made to develop self-report tools that would improve the accuracy of detection of depression and yet brief enough for routine administration to the medically ill. Their use is strengthened by ease of administration and scoring without extensive training, speed of completion by the patient, and ability to obtain a gross assessment before a direct interview.

One of the most frequently used tools is the Hospital Anxiety and Depression Scale\textsuperscript{14} (HADS). It has been shown to be a reliable and valid instrument for assessing anxiety and depression in medically ill patients.\textsuperscript{15,16} It consists of 14 questions in 2 subscales for anxiety and depression. HADS has been used successfully in a number of different settings as a screening tool for depression and anxiety. However, because of its considerable length and relatively complex scoring, it is difficult to use HADS in the clinical setting, particularly in palliative care patients who also require assessment of many other symptoms such as fatigue, pain, delirium, etc.\textsuperscript{17}

The Edmonton Symptom Assessment System\textsuperscript{18} (ESAS) is a concise palliative care assessment tool for multiple symptoms. It has been widely used in the clinical setting,\textsuperscript{19-21} and has been validated for their use in patients with advanced cancer.\textsuperscript{22} It consists of ten 0 to 10 self-report scales that evaluate a mix of psychological and physical symptoms, in addition to a global sense of well-being. The advantage of the ESAS is that it is easy to administer, requires minimal effort and concentration from the patient, and can be displayed on a graph in the chart. However, the anxiety and depression components of the ESAS have not been validated in the assessment of depression and anxiety.

The purpose of this study is to evaluate the screening performance of depression and anxiety measured by ESAS compared to that measured by HADS.

**PATIENTS AND METHODS**

In this retrospective review we have analyzed data collected from patients who participated in three clinical trials conducted by our group. In all cases patients gave written informed consent to participate in the study. The University of Texas M.D. Anderson Cancer Center’s institutional review board approved this retrospective study.

Patients who agreed to participate in the clinical trial underwent a number of assessments including HADS and ESAS. The assessments were conducted by one of three research nurses in the department of Palliative Care and Rehabilitation Medicine.

The first study was conducted to determine whether long-term consumption of oral opioids by male survivors of cancer would lead to central hypogonadism and whether this hypogonadism was associated with symptoms of sexual dysfunction, fatigue, anxiety, and depression. Patients ($n = 48$) underwent a number of assessments in order to determine the frequency of hypogonadism.\textsuperscript{23,24} The second study was designed to characterize dyspnea in patients with advanced cancer ($n = 69$) with dyspnea referred to a palliative care program.\textsuperscript{25} The third study was aimed to determine the degree of correlates between spirituality and internal locus of control in patients ($n = 99$) referred to a palliative care outpatient clinic for the first time. The study surveyed patients about issues of spirituality (unpublished data). All patients admitted to these three studies had normal cognitive status and were able to complete a series of questionnaires lasting between 30 and 45 minutes. All patients had assessments of ESAS and HADS in addition to other assessments required by the trials. Patients were not offered therapeutic interventions as part of participation in these clinical trials.

The diagnosis of depression and/or anxiety was made when patients presented a score of 8 of 21 or more in the HADS questionnaire for depression and/or anxiety following the instrument developer’s instruction.\textsuperscript{26} The diagnoses of moderate and severe depression and/or anxiety were made when the HADS was 11 of 21 or more and 15 of 21 or more, respectively, according to the developer’s recommendations.\textsuperscript{26}

In the analysis of the ESAS, depression and anxiety were considered present when the intensity of the symptom was 1 of 10 or more and moderate/severe when the symptom was 4 of 10 or more. This was done followed 0 to 10 intensity criteria used for symptoms such as pain\textsuperscript{27} and fatigue.\textsuperscript{28}
The screening performance of the ESAS was assessed using HADS as a gold standard. The following definitions were considered:

**Sensitivity**

The percentage of persons with the condition [HADS depression or anxiety] who were positive to the test [ESAS depression or anxiety]. This was calculated as:

\[
\text{Sensitivity} = \frac{\text{True positive}}{\text{True positive} + \text{False negative}} \times 100
\]

**Specificity**

The percentage of persons without the condition [HADS depression or anxiety] who were negative to the test [ESAS depression or anxiety]. This was calculated as:

\[
\text{Specificity} = \frac{\text{True negative}}{\text{True negative} + \text{False positive}} \times 100
\]

**Positive predictive value**

The percentage of persons with a positive test who have the disease. This was calculated as follows:

\[
\text{Positive predictive value} = \frac{\text{True positive}}{\text{True positive} + \text{False positive}} \times 100
\]

**Negative predictive value**

The percentage of persons with a negative test who did not have the condition. This was calculated as follows:

\[
\text{Negative predictive value} = \frac{\text{True negative}}{\text{True negative} + \text{False negative}} \times 100
\]

We also reported the sensitivity, specificity, positive and negative predictive values for each of the different scores of ESAS when using a HADS cutoff of 8 and 11 or more for anxiety and depression, respectively.

Because of the very limited number of patients who scored positive for severe depression in HADS (5/216) and anxiety (6/216) it was not possible to establish sensitivity, specificity, positive and negative predictive values for severe case finding in this series.

Finally, we reported a new value for sensitivity and specificity for the ESAS according to newly defined cut off values based on our findings of an ideal cut off in the ESAS of 2 of 10 or more as compared to the previously used 4 of 10 or more.

**RESULTS**

In Table 1, we show selected demographic and clinical characteristics of the 216 patients from three clinical trials. The age, gender, and primary tumor distribution are representative to patients referred to palliative care programs.

Table 2 summarizes the median intensity of symptoms measured by ESAS and HADS in these patients. Overall, these values are also representative of the severity of ESAS and HADS values observed in patients referred to a palliative care program.\(^{18,22}\)

According to the interpretation of HADS score, 0–7 is normal, 8–10 is mild, 11–14 is moderate, and 15–21 is severe. Mild, moderate, and severe depression was reported in 50 (23.1%), 24 (11.1%), and 5 (2.3%) patients, and mild, moderate and severe anxiety was reported in 63 (29.2%), 25 (11.6%), and 6 (2.8%) patients, respectively.

Table 3 highlights the screening performance of ESAS for presence and moderate/severe depression and/or anxiety according to HADS. Values of 2 of 10 or more for depression and/or anxiety offer an acceptable balance between sensitivity (absence of false-negative) and specificity (absence of false-positive).

**Table 1. Patient Characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median age (range)</td>
<td>59 (20–91)</td>
<td>38</td>
</tr>
<tr>
<td>Female gender</td>
<td>81</td>
<td>38</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>166</td>
<td>76</td>
</tr>
<tr>
<td>Black</td>
<td>32</td>
<td>15</td>
</tr>
<tr>
<td>Hispanic</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Asian</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Cancer diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td>79</td>
<td>36.6</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>32</td>
<td>14.8</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>30</td>
<td>13.9</td>
</tr>
<tr>
<td>Breast</td>
<td>18</td>
<td>8.3</td>
</tr>
<tr>
<td>Gynecological</td>
<td>12</td>
<td>5.6</td>
</tr>
<tr>
<td>Hematologic</td>
<td>11</td>
<td>5.1</td>
</tr>
<tr>
<td>Head and Neck</td>
<td>10</td>
<td>4.6</td>
</tr>
<tr>
<td>Other</td>
<td>24</td>
<td>11.1</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 4 summarizes the sensitivity, specificity, positive and negative predictive values of best performance level of ESAS for the presence of depression and anxiety, and for the moderate/severe levels of depression and/or anxiety according to the ESAS score.

The Spearman’s correlation between HADS and ESAS for depression and anxiety were 0.39 ($p = 0.001$), and 0.50 ($p = 0.001$), respectively.

**DISCUSSION**

In this retrospective study we completed the HADS and ESAS assessment at the same time in a number of patients who agreed to participate in three palliative care clinical trials. All patients were referred to a palliative care team for the assessment and management of different symptom complexes. Our data regarding demographics and symptom distress is similar to the characteristics of patients normally referred to our outpatient palliative care services.29,30

However, these patients are not completely representative of the ambulatory outpatient group because they had agreed to participate in a clinical trial. Therefore, it is possible that these patients had less physical and psychosocial distress. This is suggested by the low frequency of patients scoring as having severe depression (2%) and anxiety (3%). This frequency is lower as compared to other studies reported in the literature for patients with cancer.31,32

Sensitivity measures how well a diagnostic test detects a target disorder when it is present, and specificity measures how often a diagnostic test is negative when the target disorder is not present. Given these definitions, cutoff scores are directly related to sensitivity and specificity, because a high cutoff score decreases sensitivity and increases specificity and a low cutoff score increases sensitivity and decreases specificity. The majority of researchers on depression in patients with cancer have used the HADS, with much of this research focused on identifying the optimal cutoff scores for depressed patients with cancer.33–36 Unfortunately, the cutoff score has often varied in different studies.37–39 There is variability in the sensitivity and specificity that may be attributed to differences in validation measures, sample studied, or other particular issues of each study.10,37 However, a recent review demonstrates this in 10 studies of patients with cancer.38

Our data using a higher level of symptom intensity as a cutoff for the diagnosis of depression and anxiety suggests that the screening performance of the ESAS was poor, particularly with regard to sensitivity.

Although the most commonly used screening tool is HADS, some studies suggest that because the major construct of the HADS is anhedonia, this can result in lower screening performance in
Table 3. The Screening Performance of the ESAS Depression and Anxiety Score of Mild, Moderate/Severe According to HADS

<table>
<thead>
<tr>
<th>ESAS Depression (n)</th>
<th>ESAS Anxiety (n)</th>
<th>HADS-Depression Present (n = 79)</th>
<th>HADS-Moderate/severe Depression (n = 29)</th>
<th>HADS-Anxiety Present (n = 94)</th>
<th>HADS-Moderate/severe Anxiety (n = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sensitivity</td>
<td>Specificity</td>
<td>Sensitivity</td>
<td>Specificity</td>
</tr>
<tr>
<td>All depressed</td>
<td></td>
<td>1.0</td>
<td>0</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>≥ 0</td>
<td>216</td>
<td>216</td>
<td>1.0</td>
<td>0.86</td>
<td>0.37</td>
</tr>
<tr>
<td>≥ 1</td>
<td>142</td>
<td>153</td>
<td>0.81</td>
<td>0.83</td>
<td>0.47</td>
</tr>
<tr>
<td>≥ 2</td>
<td>123</td>
<td>135</td>
<td>0.77</td>
<td>0.72</td>
<td>0.61</td>
</tr>
<tr>
<td>≥ 3</td>
<td>94</td>
<td>110</td>
<td>0.63</td>
<td>0.69</td>
<td>0.71</td>
</tr>
<tr>
<td>≥ 4</td>
<td>75</td>
<td>82</td>
<td>0.54</td>
<td>0.52</td>
<td>0.77</td>
</tr>
<tr>
<td>≥ 5</td>
<td>58</td>
<td>67</td>
<td>0.38</td>
<td>0.45</td>
<td>0.87</td>
</tr>
<tr>
<td>≥ 6</td>
<td>37</td>
<td>43</td>
<td>0.28</td>
<td>0.31</td>
<td>0.90</td>
</tr>
<tr>
<td>≥ 7</td>
<td>27</td>
<td>29</td>
<td>0.20</td>
<td>0.24</td>
<td>0.93</td>
</tr>
<tr>
<td>≥ 8</td>
<td>20</td>
<td>22</td>
<td>0.15</td>
<td>0.24</td>
<td>0.93</td>
</tr>
<tr>
<td>≥ 9</td>
<td>9</td>
<td>10</td>
<td>0.08</td>
<td>0.10</td>
<td>0.97</td>
</tr>
<tr>
<td>≥ 10</td>
<td>4</td>
<td>6</td>
<td>0.03</td>
<td>0.05</td>
<td>0.99</td>
</tr>
</tbody>
</table>

*Depression and anxiety HADS criteria: Present ≥8, Moderate/Severe: ≥11.

ESAS, Edmonton Symptom Assessment System; HADS, Hospital Anxiety and Depression Scale.
patients with advanced cancer. In addition to HADS, other measures have been used as well. Chochinov et al. compared the performance of a single-item question of the Schedule for Affective Disorders and Schizophrenia (SADS), “Have you had depressed mood most of the day, nearly every day?,” the Beck Depression Inventory-Short Form, and a 100-mm visual analogue scale (VAS) against a diagnostic interview adapted from the SADS. In this study, the sensitivity and specificity of the single-item interview was 1. However, because the question was derived from the gold standard interview, a positive response was required to be part of the diagnostic criteria. It was noted that the screening test was not independent of the gold standard, and the interviewer applying the “test” would not have been blinded to the gold standard results. Hence, this exceptionally good result should be considered preliminary. Despite these problems, a single-item questionnaire has obvious advantages in palliative care populations. The study showed that the VAS sensitivity and specificity was 72% and 0.50 respectively, using a cutoff of less than 55 mm with lower scores indicating greater levels of depression. A recent prospective study in 74 palliative care day unit patients, compared three screening tools using a semistructured clinical interview according to Diagnostic and Statistical Manual of Mental Disorders, Fourth edition (DSM-IV-TR) criteria as a gold standard. They used a 0–10 mood rating scale, a single-item question, “Are you depressed,” and the Edinburgh Depression Scale. The single question had a sensitivity of 55% and specificity 75%, the Edinburgh depression scale at a cutoff point of more than 13 had a sensitivity of 70% and specificity of 80%, and mood 0 to 10 scale with a cutoff point of more than 3 had a sensitivity of 80% and specificity of 43%.

From a clinical perspective, our findings show that using a cutoff of 2 or 10 or more in the ESAS, a total of 123 of 216 patients (57%) screened positive for depression. Of these patients, 61 (50%) were confirmed to be depressed by the HADS (≥ 8), and 62 (50%) were found to be false-positive. In addition, 18 of 93 patients (19%) who screened negative for depression by ESAS were found by the HADS to be depressed.

Our results suggest that the ESAS should not be used as a diagnostic tool for depression or anxiety. Patients who score positive by this instrument should undergo a more comprehensive assessment following DSM-IV-TR criteria for diagnosis of depression and/or anxiety. In addition, because of the significant number of false-negatives it is also important to conduct a comprehensive assessment in all patients who appear to present clinically depressed and/or anxiety even though they may score anxiety and/or depression as absent in a tool such as the ESAS. On the other hand, since the under diagnosis of mood disorders occurs in the majority of depressed cancer patients, our results suggest that the ESAS can be used as a screening tool to allow for clinical improvement in the management of depression and anxiety in palliative care patients.

Other tools specifically designed for psychiatric screening are likely to perform better than the ESAS in the screening of mood disorders. However, palliative care patients require careful assessment and management of multiple symptoms. This is demonstrated by the symptom profile observed by our group in this study (Table 2) and others. The use of specific tools for the assessment of pain, fatigue, dyspnea, cachexia, mood disorders, and overall quality of life in the same patient is likely to become logistically difficult and overwhelming for the patient under these circumstances, the ESAS and other general

<table>
<thead>
<tr>
<th>ESAS</th>
<th>Diagnosed by HADS (%)</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive predictive value</th>
<th>Negative predictive value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressed (≥2/10)</td>
<td>79 (36.6)</td>
<td>0.77</td>
<td>0.55</td>
<td>0.50</td>
<td>0.81</td>
</tr>
<tr>
<td>Anxiety (≥2/10)</td>
<td>94 (43.6)</td>
<td>0.86</td>
<td>0.56</td>
<td>0.60</td>
<td>0.84</td>
</tr>
<tr>
<td>Moderate/Severe depression (≥4/10)</td>
<td>29 (13.4)</td>
<td>0.83</td>
<td>0.47</td>
<td>0.20</td>
<td>0.95</td>
</tr>
<tr>
<td>Moderate/Severe anxiety (≥4/10)</td>
<td>31 (14.4)</td>
<td>0.97</td>
<td>0.43</td>
<td>0.22</td>
<td>0.99</td>
</tr>
</tbody>
</table>

ESAS, Edmonton Symptom Assessment System; HADS, Hospital Anxiety and Depression Scale.
symptom assessment tools offer a reasonable alternative for daily clinical care.

We conclude that values of more than 2 of 10 in the ESAS scale provide acceptable sensitivity for the diagnosis of depression (0.77) and anxiety (0.83) according to the HADS. Further research needs to be conducted for the appropriate definition of cut off values for severe depression and/or anxiety, and should attempt to establish the best performance tools for the screening of depression/anxiety in palliative care.

REFERENCES


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