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REVIEW PAPER

Stress levels during the journey of cancer treatment

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Abstract
A patient's journey with cancer may cause psychological disorders or exacerbate existing conditions. The field of psycho-oncology has found ways to link psychological disorders to cancer and research the effects of mental disorders on patient outcome and wellbeing. This review looked at current literature in the field of psycho-oncology to understand how the stress level changes during the patient's treatment journey. A search was performed to identify relevant published articles on electronic databases, including PubMed, ScienceDirect and Web of Science. The results demonstrate a direct link between cancer diagnosis and increased stress, depression and anxiety within patients, not as medication side-effects. These levels reduce over time, mainly due to patient acceptance coupled with either improved prognosis, or acceptance of death. Stress is complex and can precipitate a range of psychological disorders. Early psychological, counselling and even in some cases coaching interventions, could work preventively to help cancer patients more effectively to manage their stress, thereby promoting their greater wellbeing. Additionally, early diagnosis of mental disorders is crucial to improving long-term outcomes, therefore, the need for adequate psychological screening services in oncology patients for mental illness should be routine practice.

Keywords: Stress - cancer treatment journey - psycho-oncology - mental illness - palliative - acceptance - PTSD

Abstrait
Le parcours d'un patient atteint de cancer peut provoquer des troubles psychologiques ou exacerber les conditions existantes. Le domaine de la psycho-oncologie a trouvé des moyens de lier les troubles psychologiques au cancer et de rechercher les effets des troubles mentaux sur les résultats et le bien-être des patients. Cette revue a examiné la littérature actuelle dans le domaine de la psycho-oncologie pour comprendre comment le niveau de stress change au cours du traitement du patient. Une recherche a été effectuée pour identifier les articles publiés pertinents sur les bases de données électroniques, y compris PubMed, ScienceDirect et Web of Science. Les résultats démontrent un lien direct entre le diagnostic du cancer et l'augmentation du stress, de la dépression et de l'anxiété chez les patients, et non en tant qu'effets secondaires de médicaments. Ces niveaux diminuent au fil du temps, principalement en raison de l'acceptation du patient associée soit à un pronostic amélioré, soit à l'acceptation de la mort. Le stress est complexe et peut précipiter toute une gamme de troubles psychologiques. Les premières interventions psychologiques, de conseil et même, dans certains cas, de coaching, pourraient agir de manière préventive pour aider les patients cancéreux à gérer plus efficacement leur stress, favorisant ainsi leur plus grand bien-être. De plus, le diagnostic précoce des troubles mentaux est crucial pour améliorer les résultats à long terme, par conséquent, le besoin de services adéquats de dépistage psychologique chez les patients en oncologie pour maladie mentale devrait être une pratique de routine.

Mots clés: *Stress - parcours de traitement du cancer - psycho-oncologie - maladie mentale - palliatif - acceptation - TSPT*

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Introduction

In 2015 the number of new cases of cancer in England continued to rise and there were 299,923 cancers registered (Maddams et al., 2012, Bannister and Poole, 2017). The data within this report showed that more cancers were registered in males than in females, with the average incidence in males being 667.4 per 100,000 and the average incidence in females being 542.8 per 100,000. Of the cancers that were detected breast (15.4%), prostate (13.4%), lung (12.5%) and colorectal (11.6%) cancers account for more than half of the malignant cancers that were registered for all ages combined (Bannister and Poole, 2017).

Whilst much research is conducted into combatting cancer through the introduction of new treatments, there are various ways in which cancer can affect patients. One such factor is the psychological stress a patient may encounter when learning of a cancer diagnosis. Faced with such news, a natural reaction would be negative thoughts, such as death and foreboding, which in turn can lead to further mental health problems such as anxiety or depression. It is of great importance therefore that healthcare professionals screen for and understand how mental disorders can affect patients during their cancer journey.

There is much evidence to suggest that improper care for patients with psychological disorders associated with cancer can significantly impact patient's quality of life, disability and if left untreated may worsen over time (Krauß et al., 2006; Gandubert et al, 2009; van't Spijker et al., 1997; Carlsen et al., 2008; Desai et al., 1999; Bringmann et al., 2008). Steroid use can affect a patient's psychological distress through side effects such as insomnia, suicidal ideation and depressed mood (Levenson and Lesko, 1990; Massie et al., 1994).

Research from Akechi (2003) found that between 3-35% of cancer patients experience post-traumatic stress disorder (PTSD) following a diagnosis of terminal cancer. The shock of realisation that they are in end stage cancer can trigger this disorder, which has been associated with various risk factors such as age (i.e. those who are younger), gender (higher rates in females), physical symptoms (e.g. pain), the type of cancer (e.g. pancreatic cancer), the treatment therapy, hypercalcaemia, use of steroids, past history of major depression and lack of social support.

As stress and mental distress can manifest in many forms, and precede multiple forms of mental illness, it can be difficult to quantify.

Methods and Design

Aims

The aim of this review was to explore studies of the changes in stress levels and clinical presentation in cancer patients, documenting the changes from diagnosis to recovery, palliation or remission.

Search Strategy

A search was performed to identify relevant published articles on various electronic databases, including Pubmed, ScienceDirect and Web of Science. The terms: Depression, Adjustment, Mood, Anxiety, PTSD, Stress, Cancer, Palliative and Diagnosis were used. The search was also conducted using standardised subject terms, Boolean operators and alternative spellings.

Selection Criteria

Studies for the literature review were judged to be relevant if they met the following criteria: (i) all study participants had one or more definite cancer states diagnosed; (ii) all participants were adults, aged 18 or older; (iii) mental health issues were due to the nature of cancer from diagnosis to palliation/recovery; (iv) depression or mental disorders associated with stress, diagnosis was determined by using diagnostic interviews (ICD-10 and/or DSM). Studies included for the review were from primary sources where the full paper could be obtained. Review papers were considered mainly for background research and information regarding the issues of concern in psycho-oncology. Selection criteria were used to determine if the papers were to be used for the review. These included papers where results were reported for at least 80% of the initial cohort size, papers with error or misdiagnosis of below 10% of the patient sample size, papers with clinically significant results (i.e. P value <0.05) and papers that used similar inclusion and exclusion criteria for patient selection. It was envisaged that only papers with larger cohorts (i.e. above 100) would be used, however due to lack of available research, this had to be relaxed and allow for any paper that met the preceding criteria to be a candidate for the review.

As the studies identified to answer the review question adopted the medical model rather than the psychological model, this review will follow the same methodology.

Results

After conducting the search strategy on various electronic databases, many of the articles found within the search strategy

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were excluded from the final review due to factors such as outdated methodology (such as older versions of the DSM criteria not currently used in practice), non-clinically significant results and high rate of cohort dropout from the study. Out of the possible 131 there were 42 potential studies. After applying PICO principles (Patient/Population/Problem; Intervention; Comparison; Outcome) on the 42 articles, 15 articles were chosen for this review as they met the quality criteria required for this study. Some of the remaining articles (out of the 42) were used in the introduction and discussion sections.

The final 15 articles that were selected were analysed and factors such as the type of psychological disease researched, patient's stage within their cancer journey and overall cancer type within patients were compared. Significant results were highlighted and utilised for the results section of this thesis. Table 1 (pages 4-6) shows the 15 articles used for the review. The comparator for each paper was chosen by grouping all the articles together, listing all the similar variables and choosing a mental state that was compared against a standard, in this case cancer/type of cancer. The outcomes were chosen by reading the findings thoroughly and listing information relevant for this review. In order to understand the significance of each specific outcome, the conclusions of each article were included in the last column.

Figure 1 (page 7) shows the diagnostic prevalence of depression within the patients from each study. Each study had utilised a different method for diagnosis, for example Akechi (2003) used HADS and the mini-mental state examination (MMSE) examination, whereas Berard (1998) utilised BDI and HADS. The study from Berard (1998) was able to diagnose more patients with depression, especially when compared to results from Akechi (2003). However, it also should be noted that the results from these two studies are not comparable in terms of patient number, the type of cancer in question and the inclusion and exclusion criteria. In general, studies that utilised SCID and the DSM criteria remained in the middle of the diagnostic horizon (Ciaramella and Poli, 2001; Burgess et al, 2005).

When looking at the occurrence of PTSD within the study cohorts, it is evident from Figure 2 (page 7) that the methodology used by Mehnert and Koch (2007) yielded the greatest number of diagnosed cases. However, this result considers patients who had both PTSD stemming from their cancer diagnosis, and lifetime PTSD from other traumatic events. However, Kadan-Lottick (2005) and Matsuoka (2002) considered patients who had PTSD directly related to their cancer diagnosis separately from others producing more realistic results.

Discussion

Common Psychological Disorders within Cancer Patients

Stress can alter the physiological status of a patient and can have both a positive and negative effect. Stress can be either acute or chronic, and it is chronic stress that can have long term effects on patient health leading to conditions such as insomnia, depression, PTSD and anxiety (Breslau, 1991).

Scales and Tests for Diagnosing Psychological Disorders

When conducting the review, it was realised that there is no common scale for screening and diagnosing psychological disorders within cancer patients. Whilst there are scales that are routinely used, such as the Hospital Anxiety and Depression Scale (HADS), they are aimed at the general population, and do not consider cancers (Zigmond and Snaith, 1983). Therefore, whilst many studies employed the use of common scales, they were adapted to suit oncology cohorts. Furthermore, many studies employed more than one type of scale for their sample cohorts. The commonly used scales were HADS, structured clinical interviews for the DSM framework (SCID), the Beck depression inventory (BDI), the schedule for affective disorders and schizophrenia (SADS), research diagnostic criteria (RDC), the brief symptoms inventory (BSI), the brief Edinburgh depression scale (BEDS), the Hamilton rating scale for depression (HAMD) and the schedule of attitudes towards hastened death (SAHD) (American Psychiatric Association, 1994; First et al, 1997; Beck, 1961; Endicott and Spitzer, 1978; Spitzer, 1978; Derogatis and Melisaratos, 1983; Lloyd-Williams et al, 20037; Hamilton, 1960; Breitbart, 2000).

The Hospital Anxiety and Depression Scale (HADS)

This scale was originally developed by Zigmond and Snaith (1983) and is routinely used by physicians to determine the levels of anxiety and depression that a patient is experiencing. It is a 14-item scale, has 14 questions, which generate ordinal data. The scale is split evenly between anxiety and depression and was designed to avoid the reliance on aspects that are common somatic symptoms of illness for the determination of anxiety or depression. Symptoms such as fatigue, hypersomnia and insomnia are avoided; thereby creating a scale that is useful for patients with physical health problems. Each item within

Table 1 Results for the selected papers obtained

Paper	*Comparator*	*Outcome*	*Significance*
Major depression, adjustment disorders and PTSD in terminally ill cancer patients (Akechi *et al*, 2005)	Adjustment Disorder (AD)	Out of 209, 34 at baseline. Of the 34, 16.3% had depressed mood, 11.5% anxious mood and 0.5% mixed emotional features. At follow up 9 diagnosed, 4.7 depressed mood, 3.5 anxious mood and mixed emotional features 2.4%.	Early intervention will treat subclinical anxiety and depression to prevent subsequent psychological distress. In the terminally ill, 30% experience AD or MD. High prevalence of MD and AD in terminally ill. Multidimensional factors, such as physical functioning and social support factors may underlie the psychological distress experienced by terminally ill
	Major Depression (MD)	Out of 209, 14 at baseline and at follow up 11.8% experienced MD	
	Post-Traumatic Stress Disorder (PTSD)	Out of 209, 0% at baseline, not measured at follow up, PSTD assessment was stopped after the first 100 patients	No definitive conclusion PTSD rare in cancer patient populations
The effects of major depression and phobia on stage at diagnosis of breast cancer (Desai et al, 1999)	MD	Fifteen per cent of patients had lifetime history of MD	Over half of the patients who had a lifetime history of MD were diagnosed at late stage The effect of diagnosis did not increase the prevalence of phobias within the cohort. Highlighted the need for specific psych-oncology screening tool.
Depression, hopelessness and desire for hastened death in terminally ill cancer patients (Breitbart et al, 2000a)	Major Depression	Seventeen percent of patients met DSM-IV criteria for MD episode. SCID diagnosis of depression significant associated with hastened death desire (HDD) (p=0.001) Forty-seven percent had desire for hastened death, 53% were not MD increases desire of hastened death by 4 times (47% depressed for HDD vs 12% not depressed for HDD)	Hastened death among terminally ill patients not uncommon Depression and hopelessness strongest predictors of desire for hastened death Hastened death desire significantly associated with diagnosis depression – 4 times 2/3 of patients having both depression and helplessness had HDD For multivariate: No significant association between HDD and pain/pain intensity Depression and Hopelessness predicted desire for hastened death independently Physical functioning and social support added small significant contributions – QoL, physical symptoms, perception of burden on others etc. ¼ of patients with either hopelessness and depression had HDD
Screening for psychiatric morbidity in patients with advanced breast cancer: validation of two self-report questionnaires (Hopwood et al, 1991)	Anxiety/Depressive illness	Seventy-five percent identified suffering from affective disorder Twenty-five percent had depressive illness/anxiety state	The misclassification rate for HADS* and Depression subscale were 12% and 25% respectively.
	Mood Disorder	Fourteen percent patients had borderline mood disorder	
Psychiatric disorders and mental health service use in patients with advanced cancer: a report from the coping with cancer study (Kadan-Lottick et al, 2005)	Major Psychiatric Disorder: Major/Minor Depressive Disorder Generalised Anxiety Disorder Panic Disorder PTSD	Twelve percent met criteria for MPD Twenty-eight percent accessed mental health intervention since cancer diagnosis Ninety percent willing to receive treatment for emotional problems Non-Hispanic white patients and cancer patients who discussed psychological concerns more likely to receive Mental health service (MHS) MDD was the most common and frequent identified condition with 6.8% using DSM-IV criteria Seven-point two percent were fund to have minor depression Only 35% of patients had two or more psychiatric diagnoses -17% of patients with MDD, 23.5% also had GAD, 17.6% had PD and 29.4% PTSD Forty-one percent had history vs 59% who had no history of MDD	Severe symptoms, greater disability and greater resistance to treatment observed in patients with multiple psychiatric conditions. Over half of patients who had major psychiatric disorder not received MHS Oncology team failed to address mental health concerns Many patients vulnerable to mental health problems No excess depression associated with Advance cancer Optimal therapy is needed for psychiatric disorders in cancer patients to enhance QoL at EoL
The development of the Brief Edinburgh Depression Scale (BEDS) to screen	Depressive Symptoms	The brief scale developed gave a sensitivity of seventy-two per cent and a specificity of eighty-three per cent	The six-item scale has been shown to be as effective as the standard EDS scale Depression was accurately diagnosed within the cohort and was shown to find that 72% of patients were accurately diagnosed with either major or

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Table 1 Results for the selected papers obtained (cont'd)

Paper	*Comparator*	*Outcome*	*Significance*
for depression in patients with advanced cancer (Lloyds-Williams et al, 2007)			minor depression
Do rates of mental disorders and existential distress among advanced stage cancer patients increase as death approaches? (Lichtenthall et al, 2009)	Depression/Anxiety	Ten-point eight percent met criteria for at least one of four psychiatric diagnoses Young patients met criteria for one SCID-I diagnosis	Nearing the end of death was not associated with high rates of mental disorders EoL patients who experienced increased distress and physical symptom burden more likely to realise being terminally ill – also increased wish to die Results did not support the increase in prevalence of depressive disorders as death nears The prevalence of psychiatric disorders was similar among early stage and advance breast cancer patients Patients with somatic symptoms, later accessed in their disease course, knowing that they are closer to death were more prone to experience distress
Depression and anxiety in women with early breast cancer: five-year observational cohort study (Burgess et al, 2005)	Depression	Initial results showed that fifty per cent had either depression, anxiety or both following the first year after diagnosis In the second, third and fourth years following diagnosis this reduced to twenty-five per cent In the fifth year following diagnosis the prevalence of depression or anxiety recued to fifteen per cent	This study shows that the prevalence of depression, anxiety and other psychiatric disorders decreases greatly with time following diagnosis Structured interviews are seen as a great tool for accurately diagnosing patients initially screened through other methods
Depressive symptoms in advanced cancer. Part 1. Assessing depression: the mood evaluation questionnaire (Meyer et al, 2003)	Depressive symptoms	Mood Evaluation Questionnaire and SCID had a kappa value of 0.52 – moderate agreement Fifty-eight percent of patients were depressed and 16% were severe when using MEQ Positive responses to feelings of worthlessness, death and harming one's self were strong predictors of depression. MEQ identified more MD than SCID (24% vs 4%) SCID demonstrated fatigue was strongly independent in relation to depression and patients with fatigue were 3.6 times more likely to be depressed	MEQ acceptable assessment tool that can be used on palliative patients by HCP with no psychiatric background
Prevalence of acute and post-traumatic stress disorder and comorbid mental disorders in breast cancer patients during primary cancer care: a prospective study (Mehnert and Koch, 2007)	PTSD	Eighty-seven percent of patients experienced cancer diagnosis as unexpected and overwhelming. Ninety-one percent experienced at least one traumatic event related to breast cancer/treatment Fifty-four percent experienced fear, helplessness or horror Traumatic events, according to patients in the study were diagnosis and uncertainty about the future At six months follow up, patients experienced the cancer disease less threatening than post-surgery	Pre-cancer mental disorders contribute significantly to cancer-related distress Diagnosis of breast cancer and overcoming feelings of uncertainty about the future was perceived as traumatic Responses to stressor greatly depend on subjective experiences of women. Women with emotional distress need psychological counselling and support early in the treatment IES measures diffuse emotional distress and adjustment disorders only, not PTSD
Depressive disorders in an out-patient oncology setting: prevalence, assessment, and management (Berard et al, 1998)	Depressive Disorders	Eighteen per cent of patients were diagnosed as depressed using both HADS and BDI Misclassification occurred within ten per cent of patients	This study highlights the need for improved scales and methods for screening patients This study showed that BDI is a suitable measure and tool for screening patients with cancer and depression
Cancer related intrusive thoughts as an indicator of poor psychological adjustment at 3 or more years after breast surgery: a preliminary study (Matsuoka et al, 2002)	PTSD/Psychological Distress	Forty-six percent of survivors who had breast cancer reported cancer-related intrusive thoughts (CIT's) at three years or more after surgery Low rate (3%) of cancer-related PTSD observed in sample PTSD higher among women with metastasis with 52%	CITs could be associated with psychological adjustment Higher neuroticism score and post-cancer Major depression disorder history, were both assassinated with anxious preoccupation scores
Assessment of depression among	Major Depression	Forty-nine patients diagnosed with current depressive mood using SCID and Twenty-nine	Age and gender could modify prevalence rate of MD, in both cancer and non-cancer patients

Table 1 Results for the selected papers obtained (cont'd)

Paper	*Comparator*	*Outcome*	*Significance*
cancer patients: the role of pain, cancer type and treatment (Ciaramella and Poli, 2001)		patients using Endicott criteria Prevalence of MD in cancer patients was 28% using both assessments Higher prevalence of MD in males than women – not statistically significant Nine percent had lifetime depressive episode Ten patients with suicide ideation but attempts Twelve subjects received corticosteroid, 27 received analgesic therapy and remainder chemotherapy Patients with metastasis – 55% had depression using Endicott and 47% were depressed using DSM-III-R Thirty-seven percent of patients had pain	A small significant Increase rate of prevalence in older patients The increase in prevalence rate of depression and treatment was dependant on the assessment type No relationship between depressed mood and treatment when using both assessments – even though study found an increase in depression in patients taking analgesic (DSM-III) or corticosteroid (Endicott) medications No relationship between the cancer site and single assessment of depression A strong link between prevalence of MD and presence of metastasis High pain intensity increases number of depressed patients using both assessments Suicide depended on severity of depression, presence of pain and metastasis
Gender differences in factors associated with suicidal ideation in major depression among cancer patients (Akechi et al, 2010)	Major Depression	Forty-one percent of males with depression had suicidal ideation as opposed to women with 39% ¼ of patients had serious impairments of physical function The female group had a higher number of cancers that have metastasised with 60% as opposed to males with only 57% Forty percent of the cancer patients in the sample with MD had suicidal ideation	Prevalence of suicidal ideation in patients with MD not influenced by gender differences. Special attention should be paid to patients who have MD with suicidal ideation to prevent suicide Psychical functioning and advance cancer are significantly associated with suicidal ideation in male subjects Culture difference – Japanese males do not want to be a burden on others, so suicide can reflect leaving "like a man" Depression in cancer patients often under-recognised Screening and early detection strongly recommended to prevent suicide in cancer patients Close monitoring and providing strong social support to male cancer patient with advance stage will prevent suicide
Anxiety disorder in cancer patients: their nature, associations, and relation to quality of life (Stark et al, 2002)	Anxiety Depression	Forty-eight percent of patients had a HAD-A score of seven or more Eighteen percent diagnosed with anxiety disorder and fifteen percent were diagnosed with depression by fulfilling ICD-10 criteria Twenty-six patients diagnosed with anxiety had a HAD-A score over seven Panic disorder, GAD and phobia were present in 16, 15 and 24 patients respectively. Thirty-one percent of patients with anxiety had an episode > 6 month before date of cancer diagnosis of which eighty percent of these episodes being over 2 years long. Thirty-eight percent of patients with Anxiety, episode began 6 months before to 6 months after cancer diagnosis Thirty-one percent of patients with anxiety, episode began 6 months after cancer diagnosis Anxiety disorders were found in 18% of the cancer patients in this study	Symptoms of anxiety are common in cancer patients Seventy percent of anxiety diagnosis did not meet criteria for anxiety disorder in ICD-10 and validated semi structured interviews – number of symptoms was insufficient Single type of anxiety was more prevalent in this study Over 2/3 of anxiety disorders, had a point of onset which suggest a relationship to the process of cancer diagnosis/treatment STAI had higher specificity and efficacy at its cut off than HAD-A Anxiety weakly related to demographic parameters

* Hospital anxiety and depression scale

International Journal of Stress Prevention and Wellbeing 2017, 1, Article 11, ISSN 2397-7698

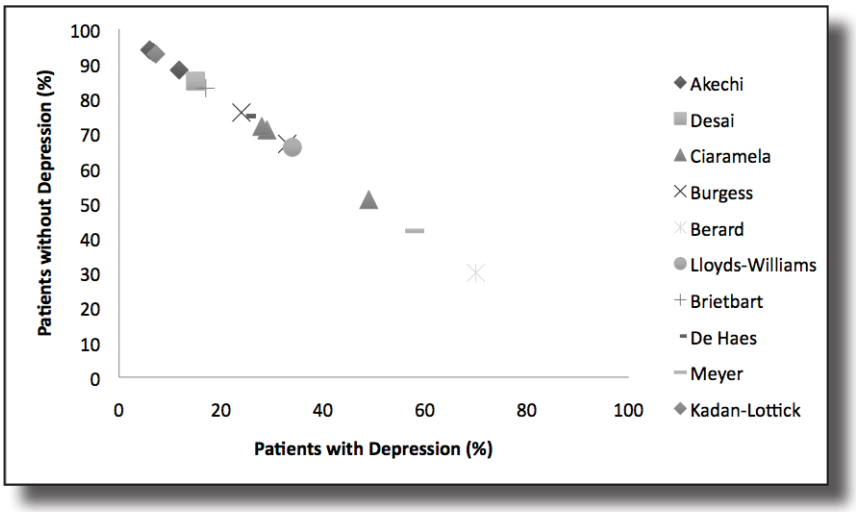

Figure 1: Diagnostic prevalence of depression in cancer patients from various studies discussed in Table 1

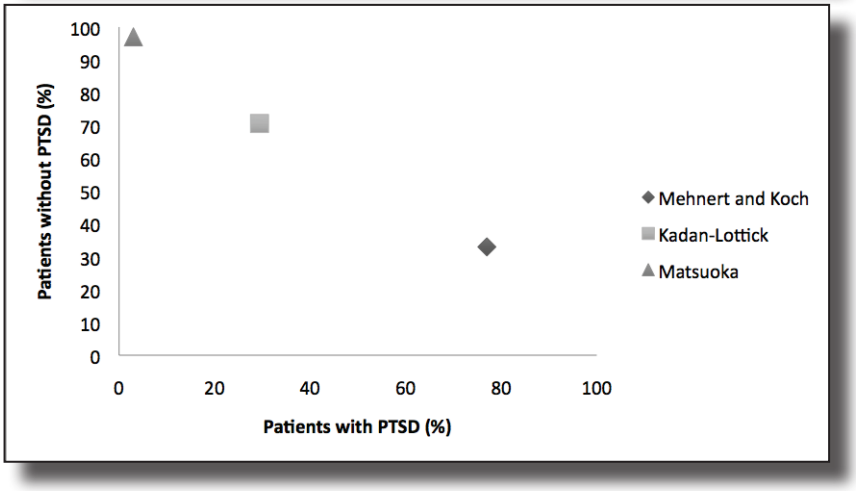

Figure 2: Diagnostic prevalence of PTSD in cancer patients from various studies discussed in Table 1

the scale is scored from 0-3, meaning a patient can get a score between 0-21 for either anxiety or depression. The main aspect of this test is to determine an accurate cut-off for the scales to help diagnose correctly which mental illness the patient is suffering from. For example, research from Bjelland (2002) showed that a cut-off of 8/21 for anxiety or depression gives and specificity of 78% and a sensitivity (the number of non-cases correctly identified) of 90% for anxiety, and a specificity of 79% and a sensitivity of 83% for depression.

A prominent case study that was researched was work from Akechi (2003) who utilised HADS, in combination with a follow-up psychiatric interview, to determine the prevalence of major depression, adjustment disorders and PTSD within terminally ill cancer patients admitted to a palliative care unit (PCU) in Japan. Gurevich (2002) showed between 3-35% of cancer patients experience full syndrome PTSD, confirming that the shock to the patients from realising they are terminally ill with cancer can trigger a severe emotional response. Factors attributable to this include age (younger), gender (females), physical symptoms (pain and nausea) and the therapy (Akechi et al, 2003). Akechi in 2003 took these factors into consideration. Out of 209 patients, 85 completed both the HADS scale and the follow-up MMSE. Since the patients were of Japanese origin, and English is not commonly spoken, the tests required translation into Japanese before they could be administered.

The study used MMSE produced by Folstein (1975), as well as

the DSM criteria for PTSD in the terminally ill, where patients who had a score of 24 or more on the MMSE were re-interviewed within 1 week of admission using HADS (34/209 patients had adjustment disorders and 14/209 had major depression). At the follow-up, where the number of patients had decreased to 85 (from 209), 4.7% had depressed mood, 3.5% had anxious mood and 2.4% had mixed emotions. After their second admission, the number of patients had dropped again to 66, due to factors such as death and emergency admission to other care units. The follow-up interview showed 6/66 of patients had developed adjustment disorders, 4/66 had developed major depression, where 5/10 had no adjustment disorders on follow-up and 1 patient transitioned from having adjustment disorders to having major depression.

Although symptoms for PTSD were screened within the first 100 patients referred to the unit, the HADS scores revealed that none of these patients were suffering from PTSD, and therefore it was not carried on in the remaining 109 patients and it was also not screened in the follow-up interviews for the entire sample (Akechi et al., 2003).

A higher level of education within patients was deemed as a factor for stress, anxiety and depression as it was shown that these patients had greater comprehension of the consequences of a terminal diagnosis and how it would affect not only the rest of their lives, but also the lives of those around them. It was shown that religious beliefs had no effect (Akechi et al., 2003).

There was bias within the study as in the follow-up, mainly female patients agreed to be interviewed. This study found that the use of Fluoxetine in patients was beneficial in reducing symptoms of both adjustment disorders and major depression and could be added to a patient's regimen. This study did reveal however, that the HADS scale is an excellent preliminary test that can accurately diagnose anxiety and depression within patients (Akechi et al., 2003).

The DSM and SCID Frameworks

Whilst the DSM has been used as a standard for many years, it has been criticised for being an unscientific and subjective system (Lane, 2017). It has also been described as relying on the use of superficial symptoms, having an unclear division from what is considered to be normality and having cultural bias (Kendell and Jablensky, 2003). However, when combined with SCID it has been given validity in accurately diagnosing a wide variety of mental illnesses (First et al., 1997). The SCID process can take between 1-2 hours depending on the complexity of the patients' psychiatric history and their ability to clearly describe their past experiences. The interview is designed such that either a psychologist or psychiatrist administers it, however with adequate training many researchers can also utilise this tool.

In another study by Akechi (2010) included one of the largest cohorts from records of psychiatric division of a local hospital. Of the 5431 patients who were referred, 329 males and 399 females were diagnosed with major depression. The study also looked at suicidal ideation within these patients and found that among those that had major depression, 136 males and 157 females also had suicidal thoughts. The results also show that of the patients referred to the unit, 40% has suicidal thoughts, and this did not change greatly with gender. However, it was noticed that a more advanced cancer in males would lead to suicidal ideation, and that females with suicidal ideation are more likely to seek help with their feelings than males.

A larger, multi-site study from Lichtenthal, et al., (2009) looked at the prevalence of mental disorders in palliative patients with advanced cancer. The main criteria for the study were that the patients were diagnosed with advanced cancer, were 20 years or older, had adequate health to complete the questionnaires, were diagnosed at the site this research was conducted and had some level of informal caregiving. This study used modified inventory of complicated grief to diagnose prolonged grief disorder (PGD) in those coping with cancer and the SCID. Interestingly Lichtenthal, et al., (2009) results showed that the prevalence of depression and anxiety does not increase as death nears, as it was concluded by Akechi (2010) which thought to be due to acceptance.

The results were compared to Kadan-Lottick (2005) study of 251 patients with advanced cancer where 12% of patients met the criteria for major psychiatric conditions. This study used patient utilisation of mental health services, as an indicator of their willingness to deal with the issues despite having terminal cancer. It was found that 28% of patients had accessed a mental health intervention for their psychiatric conditions, and that 90% of patients were willing to be treated. A study by Ciaramella and Poli (2001) looked at using SCID in conjunction with the Hamilton depression rating scale (HAMD) to diagnose depression and anxiety in 100 consecutive patients admitted to a palliative care unit. The patients had an even split between males and females, of which 79/100 were on chemotherapy, 37/100 were taking analgesic drugs, 12/100 were on corticosteroids and

International Journal of Stress Prevention and Wellbeing 2017, 1, Article 11, ISSN 2397-7698

28/100 were on multiple treatments. Initial contact with patients involved a structured interview and this was followed up with an assessment with a psychiatrist, pain was assessed using the McGill pain questionnaire, SCID, the Endicott criteria and HAMD were then used (Melzack, 1975).

It was found that 49% of patients had current depression using SCID, 29% were identified using the Endicott criteria and 28% were found using both scales as having major depression associated with cancer. Lifetime depressive disorders were identified in 9 patients and the pain results showed that 37% of patients were experiencing pain with their conditions. In this Ciaramella and Poli (2001) study, depression increased in male patients, which is contrary to other studies by Gurevich and Akechi (2004) where females were more likely to develop major depression, 50% of patients with metastasis were clinically depressed.

One study by Mehnert and Koch (2007) looked at identifying psychiatric conditions such as PTSD and other mental disorders within 127 breast cancer patients. This study utilised SCID and reviewed patients' post-surgery and after 6 months to gauge the long-term effects of mental illness. The interviews focussed on lifetime PTSD, cancer related PTSD, anxiety disorders, major depression and cancer related anxiety. It was found that most patients (87%) found the cancer diagnosis as unexpected and overwhelming and that 23% of patients believed that the diagnosis and surgery were not the most distressing aspects of the disease, and were fearful of the future prognosis. This however improved with time and it was found that in the 6 months follow up patients were more accepting of their conditions and treatment outcomes.

A shortened version of SCID was utilised by Burgess in 2005, who looked at a 5-year observational assessment of females with breast cancer post diagnosis. Of the 222 eligible patients only 70 completed the follow-up interviews up to either five years' post diagnosis or post recurrence. The primary analysis showed that the baseline level of depression in patients was 33% of the sample cohort, however, this decreased after the first follow-up at 3 months to 24%. At a 5-month interview the study looked at the effects of social stress, and it was found that up to 4 months' post diagnosis the levels of stress decreased in patients. The consensus of this study also concluded that depression decreased with time and this was attributed to acceptance by patients, as well as increased level of coping with their diagnosis. It was also found that after remission the levels of stress, depression and anxiety in women who had breast cancer decrease to the levels of that within the general female population. However, it was also noted that on-going treatment is essential, and adequate psychological support may decrease the prevalence of chronic depression and anxiety in women who lack a confiding relationship within their personal lives.

The Beck Depression Inventory (BDI)

Beck and Worthen's (1972) Beck Depression Inventory (BDI) factors in various symptoms of depression such as irritability, hopelessness, cognitions such as guilt or negative thoughts and physical symptoms such as fatigue, weight loss and anhedonia. Whilst the inventory is excellent self-completed questionnaire to diagnose depression, accordingly, the results can be easily affected by the person completing the scale.

A study by Berard (1998) combined the BDI with a structured interview to determine the depressive disorders found in patients with breast cancer, head and neck cancer and lymphoma. The main factor within BDI that was stressed was patient self-loathing and negative attitudes. The BDI scale was then also conjoined with the HADS scale, which focussed on the physically ill who had anhedonia. The cohort who undertook BDI amounted to 245 patients, of which 100 went on to have structured interviews. Patient recruitment occurred within the waiting area of a clinic in South Africa where many patients had to wait for up to two hours to be seen by a clinician. This was seen to be a factor that influenced their negative responses. However, 70% of patients had high score, 24% of patients' low score and only 6% obtained a score of zero for both HADS and BDI. It was noted that although effort was taken to obtain more males for the study, 75% of the patients who agreed to the interview were female, which could increase the results seen. There were 54% of patients in remission.

Although the study results were favourable when compared with other studies, this study used a lover cut-off score for HADS (8 or under), which meant that more patients would be classified as depressed. It was noted that misclassification occurred within less than 10% of patients, indicating that the lower cut-off is generally successful. A total of 18% of patient tested positive on both the HADS and BDI scales, and the results from this study led way to the BDI scale being proposed as a tool for diagnosing patients in hospital and clinic waiting areas. Berard's study did exclude patients who were unable to function due to their disease state, and this would have altered the levels of stress and depression seen. Furthermore, the samples of patients not

interviewed or tested may have shown more cases of depressive disorders as reported by their clinicians. As this was only an outpatient department, there may have been more cases within the inpatients. The study did show however that cancer might not be the sole reason for depression within patients, as other elements such as finances, relationships and social support are all contributing factors.

The Schedule for Affective Disorders and Schizophrenia (SADS)

The schedule for affective disorders and schizophrenia is a collection of psychiatric diagnostic criteria and symptom-rating scales originally founded by Endicott (1978) and Spitzer (1978), and is organised as a semi-structured interview rather than a questionnaire. The interviews look for specific sets of symptoms and screen based on patient positivity towards these symptoms, by looking at the same set of disorders regardless of the patients presenting problem. Unlike full structures interviews, SADS is flexible as it allows the interviewer to rephrase the questions based upon patient understanding and scores are based on clinical judgement. It also can be used with research diagnostic criteria (RDC) to allow for more accurate diagnosis (Spitzer, 1978). Much as the name suggests the interview screens for schizophrenia, but also screens for major depression, anxiety and bipolar disorder. In recent years, however it has been replaced largely by fully structured interviews, but a research paper by Chochinov et al. (2004) used the SADS and RDC structure to help diagnose patients. The study was initialised by a simple yes/no answer to the question 'are you depressed?' This simplicity allowed patients to be quickly screened for the SADS interview, 197 patients were enrolled. Within this cohort 94 patients were males, and the rest were females. The SADS interview process was completed both without and with the RDC criteria to accurately determine the effectives of the SADS interview. The BDI and a visual analogue test were also administered to controls.

Results showed that a total of 24 patients were found to have some form of depression. It was noted that the SADS interview, without the RDC criteria, misdiagnosed 4 patients as not depressed. The analogue test was the worst at diagnosis by misclassifying 7 patients as not depressed and 87 patients that were not depressed as depressed. It was found that results were similar to another study (Lloyd-Williams et al., 2003) who found that SADS is capable of accurately diagnosing patients following a simple initial question of if they were depressed. These studies show that SADS is capable of being a great screening tool, and by combining it with the RDC criteria and BDI it can screen and diagnose patients quickly and effectively.

The Brief Edinburgh Depression Scale (BEDS)

The brief Edinburgh depression scale (BEDS) by Lloyd-Williams et al., (2007) is a 6-item questionnaire that is based off the commonly used Edinburgh depression scale (EDS), however it excludes the somatic symptoms of depression, and focuses mainly on feeling of worthlessness, sadness and suicidal ideation. The brief scale in this study was used for brevity and was tested on patients in a palliative care centre with 6 months or fewer prognoses of their terminal cancer. The only exclusion criteria for this study were patients with cerebral metastases or those with a prognosis of one week or less. Patients who completed the BEDS questionnaire were then interviewed using MMSE to confirm diagnosis.

Initially 246 patients were identified, however after loss due to patient's declination and exclusion due to cognitive impairment, only 180 patients remained (139 female and 41 male). It was found that a valid cut off for the BEDS scale would be scores of 6 or more, and through utilisation of the scale it was found that 34 % of patients were diagnosed with depression. This was analysed against the full 10 item EDS, and it was found that results are similar. The BEDS questionnaire was shown to have great selectivity and specificity within the sample patients, however does require further research to validate findings in other cohorts. The findings from this review indicated that psychological model will better suit this type of studies and that it is important to work with cancer clients to prevent serious mental health disorders. This may be through early psychological, counselling and even in some cases coaching interventions.

Conclusion

The incorporation of a psychiatric screening method for cancer patients has yielded increased diagnosis of mental health issues, and therefore it should be recommended as part of the holistic approach to patient care. It is well understood that the diagnosis and treatment of cancer can be a stressful endeavour, and is it natural to assume that a patient will experience some level of stress throughout their journey. Many of the studies in this review focussed mainly on depression, as it is common within patients with cancer.

When analysing results from various studies, it was found that HADS is effective in diagnosing depression accurately in cancer

International Journal of Stress Prevention and Wellbeing 2017, 1, Article 11, ISSN 2397-7698

patients. Studies that have utilised the DSM criteria have also found great success in accurately diagnosing depression in cancer patients (Desai et al., 1999; Ciaramella and Poli, 2001; Burgess et al., 2005; Breitbart et al., 2012). It is crucial that the correct cut-off criteria and scores are used in order to avoid having bias within results and allow comparison of results. The average cut-off for SCID is around 12 and this was used by most studies (Akechi et al., 2010). When looking at more complex issues such as PTSD it can be hard to differentiate from a previous un-diagnosed issue (Mehnert and Koch, 2007).

It was found that there are very few scales that help to diagnose PTSD within cancer patients. Research from Matsuoka et al. (2002) however found that there were few patients who had PTSD from their cancer diagnosis, and many people who did have confirmed PTSD which was un-diagnosed after traumas occurred many years ago. As the patient progresses throughout their cancer journey they may also go through the stages of grief outlined by Kubler Ross (2015), where acceptance of their fate and cancer diagnosis can also mean that levels of depression may improve with the progression of treatment or the disease. As there are many different types of cancer, each patient journey is different, and therefore mental health can differ from patient to patient. The variation between genders has been recognised, whereby females were more likely to develop a depressed mood and exhibit greater levels of stress, anxiety and depression than males. Patients who were in palliative care also displayed similar levels of depression, anxiety and adjustment disorders than with those with new diagnosis, however, it was found in studies that patients soon come to terms with their terminal status and improvements in their mental health are noticed due to this acceptance. There is a need for adequate screening services specific to oncology patients.

There is one area I would like to have seen more emphasis – and that relates to the prevention aspect/significance of the findings.

The review took medical model throughout, mirroring the approach in the studies reviewed. It would however, needs to be emphasised that a greater focus on how the findings indicated the importance of working preventatively with cancer clients to prevent serious mental health disorders. Early psychological, counselling and even in some cases coaching interventions, could work preventively to help cancer patients more effectively to manage their stress, thereby promoting their greater wellbeing. ■

Study limitations

There were few papers found regarding stress and cancer. The papers analysed were on psychiatric disorders that can stem from stress, such as depression, anxiety and PTSD.

- **Practical implication:** *this review reveals that stress and mental health issues are common in patients diagnosed with cancer. Future studies will be required to develop a screening tools specific to cancer patients. By improving cancer patients' mental state, adherence to treatment including pharmacological therapy may improve leading to better health outcomes.*
- **Conflict of interest:** *We certify this is our own original work, that all authors have contributed and agreed to the submission of this manuscript and that this work has not been submitted for publication elsewhere.*
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References

Matsuoka, Y., Nakano, T., Inagaki, M., Sugawara, Y., Akechi, T., Imoto, S., Murakami, K., & Yamawaki, S. (2002). Cancer-related intrusive thoughts as an indicator of poor psychological adjustment at 3 or more years after breast surgery: A preliminary study. *Breast Cancer Research and Treatment, 76*(2),117-124. doi: 10.1023/A:1020572505095

Akechi, T., Okamura, H., Nakano, T., Akizuki, N., Okamura, M., & Shimizu, K. et al. (2010). Gender differences in factors associated with suicidal ideation in major depression among cancer patients. P*sycho-Oncology, 19*(4), 384-389. doi: 10.1002/pon.1587

Akechi, T., Okuyama, T., Sugawara, Y., Nakano, T., Shima, Y., Uchitomi, Y. (2003). Suicidality in terminally ill Japanese patients with cancer. *Cancer, 100*(1),183-191. doi: 10.1002/cncr.11890

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders: DSM-IV* [Internet]. 4th ed. Washington (DC): American Psychiatric Association; [cited 2017 March 1]. 866. https://doi.org/10.1176/ajp.152.8.1228

Bannister, N., & Poole, J. (2017). *Cancer registration statistics, England - Office for National Statistics.* [cited 25 February 2017]. Retrieved from: https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/cancerregistrationstatisticsengland/firstrelease2015

Beck, A. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, *4*(6),561.

Beck, J. (1972). Precipitating stress, crisis theory, and hospitalization in schizophrenia and depression. *Archives of General Psychiatry* [Internet] [cited 25 February 2017] *26*(2),123.
Available from: http://iv.iiarjournals.org/content/25/1/111.long

Berard, R., Boermeester, F., & Viljoen, G. (1998). Depressive disorders in an outpatient oncology setting: prevalence, assessment, and management. *Psycho-Oncology, 7*(2),112-120. doi: 10.1002/(SICI)1099-1611(199803/04)7:2<112::AID-PON300>3.0.CO;2-W

Bjelland, I., Dahl, A., Haug, T., Neckelmann, D. (2002). The validity of the Hospital Anxiety and Depression Scale. *Journal of Psychosomatic Research, 52*(2), 69-77. doi: 10.1016/S0022-3999(01)00296-3

Breitbart, W. (2000). Depression, hopelessness, and desire for hastened death in terminally ill patients with cancer. *JAMA* [Internet] [cited 1 March 2017] *284*(22), 2907. Available from: http://jamanetwork.com/journals/jama/fullarticle/193350

Breslau, N. (1991). Traumatic events and posttraumatic stress disorder in an urban population of young adults. *Archives of General Psychiatry, 48*(3),216 [Internet] [cited 27 February 2017]. Available from: http://jamanetwork.com/journals/jamapsychiatry/article-abstract/495250

Bringmann, H., Singer, S., Höckel, M., Stolzenburg, J., Krauß; O., & Schwarz, R. (2008). Longitudinal analysis of psychiatric morbidity in cancer patients. *Onkologie, 31*(6), 11-11. doi: 10.1159/000132166

Burgess, C., Cornelius, V., Love, S., Graham J., Richards, M., Ramirez, A. (2005). Depression and anxiety in women with early breast cancer: five year observational cohort study. *BMJ, 330*(7493), 702-710. doi: 10.1136/bmj.38343.670868.D3

Carlsen, K., Høybye, M., Dalton, S., & Tjønneland, A. (2008). Social inequality and incidence of and survival from breast cancer in a population-based study in Denmark, 1994–2003. *European Journal of Cancer, 44*(14),1996-2002.
doi: https://doi.org/10.1016/j.ejca.2008.06.027

Chochinov, H., Wilson, K., Enns, M., & Lander, S. (1997). "Are you depressed?" Screening for depression in the terminally ill. *American Journal of Psychiatry, 154*(5), 674-676.
doi: 10.1176/ajp.154.5.674

Ciaramella, A., & Poli, P. (2001). Assessment of depression among cancer patients: the role of pain, cancer type and treatment. *Psycho-Oncology, 10*(2),156-165. doi: 10.1002/pon.505

Derogatis, L., & Melisaratos, N. (1983). The Brief Symptom Inventory: an introductory report. *Psychological Medicine, 13*(03), 595.

Desai, M., Bruce, M., & Kasl, S. (1999). The effects of major depression and phobia on stage at diagnosis of breast cancer. *The International Journal of Psychiatry in Medicine, 29*(1), 29-45.
doi: 10.2190/0C63-U15V-5NUR-TVXE

Endicott, J., & Spitzer, R. (1978). A Diagnostic Interview. *Archives of General Psychiatry, 35*(7), 837.

First, M.B., Gibbon M., Spitzer R.L., Williams, J.B.W., & Benjamin L.S. (1997). *Structured Clinical Interview for DSM-IV Axis II Personality Disorders, (SCID-II)*. Washington, D.C.: American Psychiatric Press, Inc.

Folstein, M., Folstein, S., & McHugh, P. (1975). *Mini-mental state. Journal of Psychiatric Research*. [Internet][cited 22 February 2017] Available from: http://www.journalofpsychiatricresearch.com/article/0022-3956(75)90026-6/pdf

Gandubert. C., Carrière, I., Escot, C., Soulier, M., Hermès, A., Boulet, P., Ritchie, K., & Chaudieu, I. (2009). Onset and relapse of psychiatric disorders following early breast cancer: a case-control study. *Psycho-Oncology,18*(10), 1029-1037.
doi:10.1002/pon.1469

Gurevich, M., Devins, G., & Rodin, G. (2002). Stress response syndromes and cancer: Conceptual and assessment issues. *Psychosomatics, 43*(4), 259-281. doi: 10.1176/appi.psy.43.4.259

Hamilton, M. (1960). A rating scale for depression [Internet]. *BMJ Journals.* [cited 1 March 2017]. Available from: http://jnnp.bmj.com/content/23/1/56

Jones, R. (2001). Depression and anxiety in oncology: the oncologist's perspective. (Beatson Oncology Center, Glasgow, United Kingdom). *J Clin Psychiatry, 62*,52-55. Pain Practice [Internet]. 2001 [cited 27 February 2017];1(4):385-404.
doi: 10.1046/j.1533-2500.2001.1039_50.x

Kadan-Lottick, N., Vanderwerker, L., Block, S., Zhang, B., & Prigerson, H. (2005). Psychiatric disorders and mental health service use in patients with advanced cancer. *Cancer, 104*(12), 2872-2881.
doi: 10.1002/cncr.21532

Kendell, R., & Jablensky, A. (2003). Distinguishing between the validity and utility of psychiatric diagnoses. *American Journal of Psychiatry* [Internet][cited 17 February 2017] *160*(1),4-12.
Available from: http://ajp.psychiatryonline.org/doi/full/10.1176/appi.ajp.160.1.4

Kubler Ross, E. (2015). [online] Available at: http://Bma.org.uk media/files/ ethics/parental responsibility [Accessed 12 May 2015].

Krauß, O., Ernst, J., Kauschke, M., Stolzenburg, J., Weißflog, G., & Schwarz, R. (2006). Patients after prostatectomy. Psychiatric comorbidity, need for psychoncological treatment and quality of life. *Urologe, 45*(4),482-488.

Lane, C. (2017). The NIMH withdraws support for DSM-5. *Psychology Today.* [Internet][cited 16 February 2017]. Available from: https://www.psychologytoday.com/blog/side-effects/201305/the-nimh-withdraws-support-dsm-5

International Journal of Stress Prevention and Wellbeing 2017, 1, Article 11, ISSN 2397-7698

Levenson, J., & Lesko, L. (1990). Psychiatric aspects of adult leukemia. *Seminars in Oncology Nursing, 6*(1), 76-83. doi: 10.1016/S0749-2081(05)80136-6

Lichtenthal, W., Nilsson, M., Zhang, B., Trice, E., Kissane, D., & Breitbart, W. et al. (2009). Do rates of mental disorders and existential distress among advanced stage cancer patients increase as death approaches? *Psycho-Oncology* [Internet][cited 17 February 2017] 18(1),50-61. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3375836/

Lloyd-Williams, M., Shiels, C., & Dowrick, C. (2007). The development of the Brief Edinburgh Depression Scale (BEDS) to screen for depression in patients with advanced cancer. *Journal of Affective Disorders,* 99(1-3), 259-264. doi: 10.1016/j.jad.2006.09.015

Lloyd-Williams, M., Spiller, J., & Ward, J. (2003). Which depression screening tools should be used in palliative care? *Palliative Medicine, 17*(1), 40-43.

Maddams, J., Utley, M., & Møller, H. (2012). Projections of cancer prevalence in the United Kingdom, 2010–2040. *British Journal of Cancer, 107*(7), 1195-1202. Retrieved from: http://www.nature.com/bjc/journal/v107/n7/full/bjc2012366a.html

Massie, M., Gagnon, P., & Holland, J. (1994). Depression and suicide in patients with cancer. *Journal of Pain and Symptom Management, 9*(5), 325-340. doi: 10.1016/0885-3924(94)90192-9

Mehnert, A., & Koch, U. (2007). Prevalence of acute and post-traumatic stress disorder and comorbid mental disorders in breast cancer patients during primary cancer care: a prospective study. *Psycho-Oncology,16*(3), 181-188. doi: 10.1002/pon.1057

Melzack, R. (1975). The McGill Pain Questionnaire: Major properties and scoring methods. *Pain. 1*(3), 277-299. doi: 10.1016/0304-3959(75)90044-5

Spitzer, R. (1978). Research diagnostic criteria. *Archives of General Psychiatry, 35*(6), 773.

van't Spijker. A., Trijsburg, R., & Duivenvoorden, H. (1997). Psychological sequelae of cancer diagnosis: a meta-analytical review of 58 studies after 1980. *Psychosomatic Medicine, 59*(3), 280-293. Retrieved from: http://journals.lww.com/psychosomaticmedicine/Abstract/1997/05000/Psychological_Sequelae_of_Cancer_Diagnosis__A.11.aspx

Zigmond, A., & Snaith, R. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica, 67*(6), 361-370.

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