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Depression and anxiety in prostate cancer: a systematic review and meta-analysis of prevalence rates

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ABSTRACT

Objectives: To systematically review the literature pertaining to the prevalence of depression and anxiety in patients with prostate cancer as a function of treatment stage.

Design: Systematic review and meta-analysis.

Participants: 4494 patients with prostate cancer from primary research investigations.

Primary outcome measure: The prevalence of clinical depression and anxiety in patients with prostate cancer as a function of treatment stage.

Results: We identified 27 full journal articles that met the inclusion criteria for entry into the meta-analysis resulting in a pooled sample size of 4494 patients. The meta-analysis of prevalence rates identified pretreatment, on-treatment and post-treatment depression prevalences of 17.27% (95% CI 15.06% to 19.72%), 14.70% (95% CI 11.92% to 17.99%) and 18.44% (95% CI 15.18% to 22.22%), respectively. Pretreatment, on-treatment and post-treatment anxiety prevalences were 27.04% (95% CI 24.26% to 30.01%), 15.09% (95% CI 12.15% to 18.60%) and 18.49% (95% CI 13.81% to 24.31%), respectively.

Conclusions: Our findings suggest that the prevalence of depression and anxiety in men with prostate cancer, across the treatment spectrum, is relatively high. In light of the growing emphasis placed on cancer survivorship, we consider that further research within this area is warranted to ensure that psychological distress in patients with prostate cancer is not underdiagnosed and undertreated.

Strengths and limitations of this study

- This is the first meta-analysis to define depression and anxiety prevalence specifically within prostate cancer.
- Limited data are available for patients on active surveillance and with metastatic disease.
- Cross-sectional methodologies make it difficult to draw definitive conclusions about the history and progression of anxiety and depression over the cancer journey in this population.

INTRODUCTION

Prostate cancer (PCa) represents the most common form of non-cutaneous malignancy diagnosed in British men.[1] Over 36 000 new cases were diagnosed in 2007, accounting for almost 25% of the total yearly number of male cancer diagnoses.[1] With an ageing UK population and increasing utilisation of PCa screening in asymptomatic men,[2] the incidence rates of PCa are predicted to continue increasing year on year.[1]

In light of such a substantial and sustained disease burden, the management of survivorship issues within PCa assumes paramount importance. Such issues revolve around the effective maintenance of quality of life (QoL) throughout the cancer journey, from initial diagnosis through to post-treatment survivorship. In addition, the National Cancer Survivorship Initiative (NCSI) established five key goals of improved, personalised and patient-centred care in the UK.[3] One goal was the need to better address the specific psychological concerns associated with the diagnosis and treatment of cancer.

Depression and anxiety are two of the most commonly experienced psychological conditions experienced by patients with cancer[4] and are associated with unique psychophysiological side effects that importantly encompass poorer treatment outcomes,[5] increased periods of hospitalisation[6] and higher mortality rates.[7] With the advances in treatment efficacy, cancer is being increasingly viewed and treated as a chronic disease that can be effectively managed for many years. Given the longevity associated with the trajectory of PCa (over 70% of patients with PCa can expect to live for 10 years or more from the time of diagnosis), it is possible that the onset of psychological distress within this population of men is not an acute threat that passes quickly but a chronic one with peaks and troughs of severity that occur at key stages of the cancer journey.

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The research base evaluating the prevalence of depression and anxiety within PCa is growing steadily and a sizeable body of clinically relevant research exists currently. Unfortunately, much of the data is very heterogeneous and of poor methodological quality and has yet to be subjected to rigorous systematic review and meta-analysis. This lack of synthesis makes it very difficult for physicians and allied healthcare professionals working with PCa to access, interpret and apply the key research findings to their clinical practice.

It is as yet unclear what stages of the PCa cancer journey patients find most distressing. Were this known, or at least better understood, it would allow healthcare professionals to be more proactive and aware of what stages of treatment patients are most likely to experience depression and anxiety. This would allow healthcare teams to risk adapting their psychological screening and support processes.

The current meta-analysis was undertaken to address this issue and provide an initial baseline estimate of the prevalence of clinical depression and anxiety in patients with PCa during each of the three key stages of cancer treatment: pretreatment, on-treatment and post-treatment.

METHOD

Eligibility criteria

Studies that investigated the specific prevalence of depression and anxiety in patients with PCa in full journal articles were included. Studies published in conference proceedings, qualitative research, commentaries and discussions, letters, books, book chapters or research not published in the English language were excluded.

Eligible studies were restricted to research focusing on individuals with a biopsy confirmed diagnosis of PCa. If patients with PCa were included within an investigation that recruited mixed cancer populations, the study was required to have reported data about the patients with PCa as a distinct subsample. The primary outcome for the current meta-analysis was the prevalence of depression and anxiety. Thus, inclusion into the meta-analysis was restricted to those studies that reported PCa-specific prevalence data for depression and anxiety separately.

To be eligible for inclusion, each study was required to provide a clear definition of the PCa treatments undertaken by the study participants and when such treatments took place (ie, treatment that was yet to be undertaken, was being undertaken at the time of the study or had already been completed. For the latter category, it was a requirement that the authors specified the time lapse since the cessation of treatment).

Questionnaire analysis

Entry into the meta-analysis was also restricted to data that were collected from questionnaires that provided specific, valid and reliable measurements of depression and anxiety. To enable this, a series of questionnaire specific inclusion criteria were created against which all of the questionnaires utilised in the studies could be assessed; each questionnaire must:

- Allow for the specific and independent measurement of depression and anxiety;
- Have available established threshold information (measurements) for the diagnosis of depression and anxiety;
- The validity of each questionnaire must have been assessed in comparison to established 'gold standard' questionnaires;
- The internal validity and reliability of each questionnaire must have been assessed and deemed acceptable (test–retest).

Twelve questionnaires meeting the criteria were identified which included the Hospital Anxiety and Depression Scale, Stait-Trait Anxiety Scale, Centre for Epidemiologic Studies Depression Scale, Symptom Checklist, Beck Depression Inventory, Self-Rating Anxiety Scale, Self-Rating Depression Scale, Brief Symptom Inventory, Composite International Diagnostic Interview, Memorial Anxiety Scale for Prostate Cancer and the Effects of Prostate Cancer on Lifestyle Questionnaire.

Identifying research evidence

Data searches were conducted between June and August 2011. The search protocol was subsequently rerun in June 2013 to ensure that no additional data were identified. We searched six electronic databases (OVID MEDLINE, EMBASE, AMED, PsycINFO, CINAHL and Web of Science) for articles that met the previously discussed criteria using prespecified MESH terms that included Prostate Neoplasm (EXP)' OR 'Prostate Cancer' AND 'Depression (EXP)' or 'Anxiety (EXP)' or 'Psychological distress (EXP' or 'Stress (EXP)' or 'Distress (EXP)'. No restrictions on publication dates were imposed.

To supplement the electronic searches, we also conducted searches of the reference lists of previous reviews, key papers and other relevant articles identified by the electronic search. We also conducted systematic searches of the content lists of key journals to identify any additional studies missed by the electronic search.

Study selection

Titles and abstracts were initially assessed for eligibility. If it was possible to confirm that an article met the inclusion criteria from the abstract alone, the full text article was retrieved. If it was clear from the abstract that an article was not eligible, it was rejected immediately. If it was not possible to determine the eligibility of an article from the abstract, the full text article was retrieved. If any key information was missing, we contacted the authors for the missing data. If this was not possible or ineffective, the study was rejected, (see figure 1).

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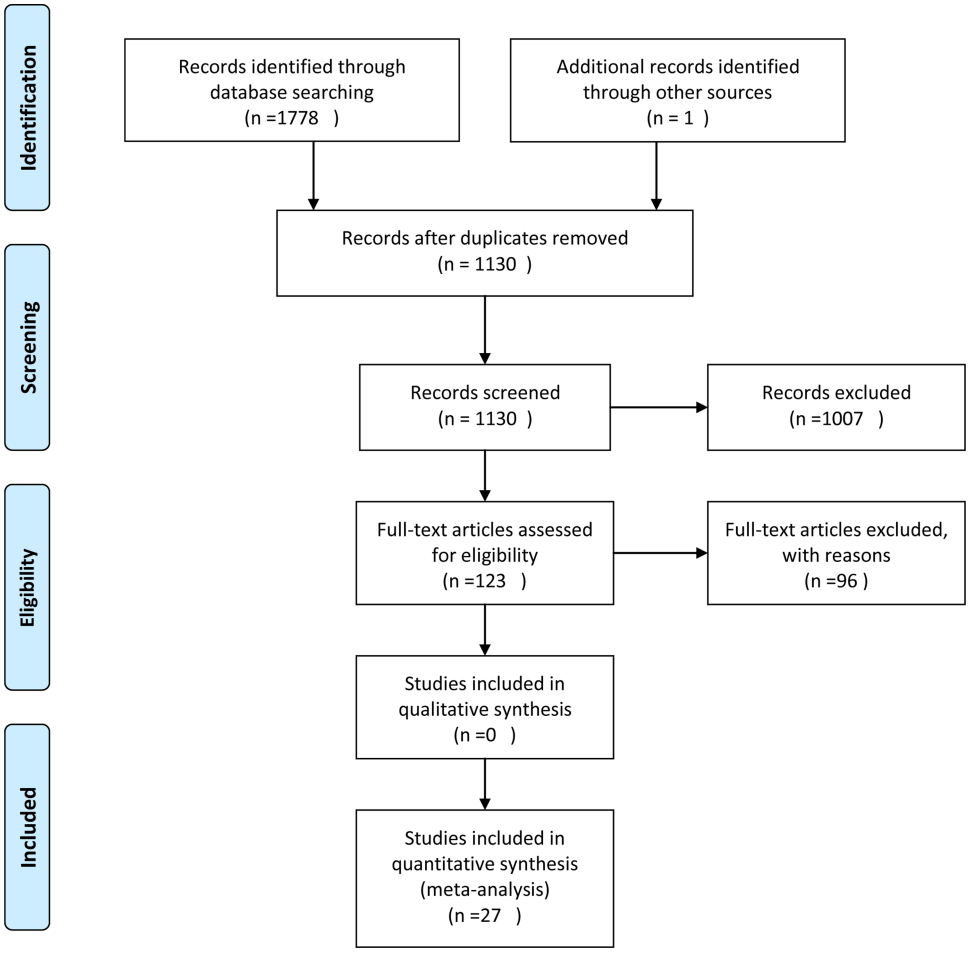

Figure 1 PRISMA flow diagram.

Data extraction

The following specific information relating to data collection and results was extracted individually from each identified article and entered into a predesigned Excel spreadsheet: date and geographical location of data collection; aims and objectives of the investigation; study design; participant inclusion and exclusion criteria; recruitment procedures; sample size; disease stage; sociodemographic status (age, ethnicity and relationship, educational and employment status); time since diagnosis; additional comorbidity; stage of treatment (pretreatment, on-treatment or post-treatment); treatments undertaken (surgery, radiotherapy, hormone therapy, chemotherapy, active surveillance (AS)/watchful waiting (WW)); questionnaires utilised; statistical analyses performed; depression prevalence (%) and anxiety prevalence (%).

To test the consistency of data extraction across the studies, three researchers (SW, LL, SE) extracted data from the same six randomly selected articles, then compared the results of their extraction. A points system was utilised to allow for the objective assessment of consistency. One point was allocated for variables with identical data extraction and 0 points for variables with differences. Across all ratings, consistency ranged from 92% to 96% (median: 94%).

Meta-analysis procedure

Given the range of the estimated proportions expected within the extracted data, the logits of proportions method of conducting the statistical analysis was employed, rather than one utilising normal approximations of binomial distributions.

Cochran's Q test was applied to the logits to test the hypothesis of homogeneity of the within-study estimates of the proportions, with larger Q values suggesting that the estimates are not homogeneous. Initial analyses highlighted Q values between Q=15.2 and 215, with some of the larger values suggesting a degree of heterogeneity, the result in some cases of only one or two studies being out of line with the others. For completeness, meta-analysis results have been provided even for those cases where heterogeneity is evident.

RESULTS

Search results

The electronic database searches initially yielded 1778 journal article references. Of these, 1655 were subsequently removed due to either duplication or a failure to meet the inclusion criteria. Full text articles were then retrieved and critically appraised for the remaining

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123 journal references. Of these 123 articles, 97 did not meet the inclusion criteria. The remaining 26 articles were entered into the meta-analysis.

Hand searches of the key journals identified by the electronic database search revealed no additional journal articles. Searching the reference lists of articles identified through the electronic database search identified two journal article references of interest that had otherwise been missed. Full text articles were retrieved for both of these references, one of which was subsequently entered into the current review, making the total number of included studies 27 (figure 1).

Study locations

Of the 27 studies entered into the review, 9 were conducted within America,[6–15] 4 in Australia[16–19] and Holland,[20–23] 3 in the UK,[24–26] 2 each in Sweden,[27 28] Germany[29 30] and Canada[31 32] and 1 in Finland.[33] An overview of the key features of each of the included studies can be seen in table 1.

Study sample sizes

The sample sizes of the studies entered into the review varied widely from 36 to 861. The total sample size across all 27 studies was 4494 with a mean sample size of 158. The sample sizes of the individual treatment stage groups (pretreatment, on-treatment and post-treatment) can be seen in table 2.

Participant age

Data on participant age was reported by 24 of the 27 studies, and in all 24 cases, mean age was reported. The range of mean ages across the 24 studies varied from 57.5 to 73.2 years. The mean age of all participants across the 24 studies was 66.3 years (3.3). Three studies failed to report participant age in any format. The mean age of the participants in each of the three treatment groups can be seen in table 2.

Cancer staging

Data regarding participant cancer stage were reported by 23 of the 27 studies. There was a general lack of consistency regarding reporting methods. Several studies utilised the clinical T-staging system of T1 (localised) to T4

Table 1 Key features of the included studies

Author	Year	Location	Sample size	Participant age	Cancer stage	Treatment stage
Ene	2006	Sweden	123	63.1	No data provided	Pretreatment to Post-treatment
Pirl	2008	USA	50	62	Advanced	Pre and On-treatment
Sharpley	2007	Australia	195	69.2	Localised	Post-treatment
Bisson	2002	Wales	83	64.5	Mixed	Pretreatment
Dirkson	2009	USA	51	73.4	Mixed	On-treatment
Dale	2009	USA	67	67.9	No data provided	Pretreatment (but all participants had received prior primary therapy)
Gabershagen	2007	Germany	115	64.1	Localised	Pretreatment
Gabershagen	2009	Germany	84	62.8	Mixed	Pretreatment to post-treatment
Hervouet	2005	Canada	861	67.9	Mixed	Post-treatment
Monga	1999	USA	36	66	Localised	Pretreatment to On-treatment to Post-treatment
Monga	2005	USA	40	67.8	Localised	Pretreatment to On-treatment to Post-treatment
Pirl	2002	USA	45	69.4	Localised and Metastatic	On-treatment
Savard	2005	Canada	327	66	localised	Post-treatment
Stone	2000	England	62	69	Mixed	On-treatment
Soloway	2004	USA	103	62	No data provided	Pretreatment
Steineck	2002	Finland	326	64.5	Localised	Post-treatment
Symon	2006	USA	50	59.9	Localised	Pretreatment to Post-treatment
Sharpley	2007	Australia	183	69.2	Localised	Post-treatment
Sharpley	2009	Australia	150	69.8	Localised	Post-treatment
van Tol-Geerdink	2006	Holland	118	70	Localised	Pretreatment
Van den Berg	2009	Holland	129	64.9	Localised	On-treatment (active surveillance)
Van den Berg	2010	Holland	129	64.6	Localised	On-treatment (active surveillance)
Monga	2001	USA	40	67.6	Localised	Pretreatment to Post-treatment
Korfage	2006	Holland	299	65.4	Mixed	Pretreatment Post-treatment
Bitsika	2009	Australia	381	No data	Localised	Post-treatment
Nordin	2001	Sweden	118	No data	Localised & Advanced	Pretreatment
Burnet	2007	England	329	68.8	Localised	On-treatment and post-treatment

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Table 2 Overview of study characteristics

	All studies	Pretreatment studies	On-treatment studies	Post-treatment studies
Study samples (patient numbers)	4494	1707	723	3087
Participant ages	66.3 (3.3)	64.8 (2.9)	67.6 (3.3)	66.9 (2.4)
Number of patients with localised PCa	3270	1299	563	2236
Number of patients with advanced PCa	513	162	72	441
Number of patients with metastatic PCa	87	58	40	7

PCa, prostate cancer.

(metastatic) while the majority simply graded PCa as localised, advanced or metastatic. No study reported the patient disease stage using the recommended tumour-nodes-metastasis (TNM). The majority of patients had been diagnosed with localised disease (n=3270), followed by advanced (513) and metastatic PCa (87), as shown in table 2.

Cancer treatments undertaken

Table 3 provides an overview of the number of participants undergoing each PCa treatment. Unfortunately, it was not possible to stratify the treatments undertaken as a function of either disease stage (localised, advanced or metastatic) or treatment stage (on-treatment or post-treatment). This was because in many instances patients with different disease staging or who were at different treatment stages were recruited into the same cohort. Consequently, while the number of patients completing each type of treatment was clearly highlighted, it was not possible to determine whether the patients with localised, advanced or metastatic disease, or those who were either currently undergoing treatment or had finished treatment, had completed them. Thus, the data in table 3 provide a collective overview of the treatments undertaken by all of the patients, irrespective of disease or treatment stage. In addition, several of the pretreatment studies recruited participants who had yet to decide on treatment. Such patients are listed in table 3 as 'newly diagnosed'.

Questionnaires analysis

Of the 12 questionnaires meeting the questionnaire inclusion criteria as listed in the method section, only 7 were utilised by the 27 studies entered into this meta-analysis. Table 4 lists the seven questionnaires, the frequency with which they were used and the clinical cut-off scores utilised to determine caseness.

Meta-analysis of depression and anxiety prevalence

Number of studies reporting depression

Twenty-six of the 27 studies entered into the review reported data on depression prevalence. Of these 26, 13 reported depression in pretreatment patients, 9 in on-treatment patients and 13 in post-treatment patients. The number of total studies from the 3 groups exceeded 27 as several longitudinal studies reported depression in multiple treatment groups (ie, in pretreatment and on-treatment groups).

Number of studies reporting anxiety

Twenty of the 26 studies entered into the review reported data on anxiety prevalence. Of these 20, 9 reported anxiety in pretreatment patients, 4 in on-treatment patients and 11 in post-treatment patients.

Number of patients measured for depression

Collectively, measures of depression were recorded from 5139 participants across the 26 studies. In terms of the individual treatment groups, 1259 participants provided measures of depression in the pretreatment group, 723 in the on-treatment group and 3157 in the post-treatment group.

Number of patients measured for anxiety

Collectively, measures of anxiety were recorded from 4635 participants across the 20 studies. In terms of the individual treatment groups, 1057 participants provided measures of anxiety in the pretreatment group, 501 in the on-treatment group and 3077 in the post-treatment group.

Pretreatment depression and anxiety prevalence

Depression: within the 13 studies that provided measures of depression in patients with PCa prior to undergoing

Table 3 The number of prostate cancer patients being treated and undertaking each treatment modality

Radical prostatectomy	Radiotherapy (EBRT & brachytherapy)	Hormone Therapy (orchiectomy and ADT)	Chemotherapy	Active surveillance or watchful waiting	Newly diagnosed (no treatment yet selected)
924	1578	264	24	418	304

ADT, androgen deprivation therapy; EBRT, external beam radiotherapy.

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Table 4 Questionnaires utilised, frequency of use and cut-off scores utilised

Questionnaire name	Frequency of use	Clinical cut-off scores utilised
Hospital anxiety and depression scale (HADS)	13	HADS-A: ≥8 HADS-D: ≥8
Beck depression inventory (BDI)	6	≥10
Self rating anxiety scale (SAS)	4	≥36
Self rating depression scale (SDS)	4	≥40
Centre for epidemiologic studies depression scale (CES-D)	4	≥15
Stait-Trait Anxiety Scale (STAI)	4	≥44
Memorial anxiety scale for prostate cancer (MAX-PC)	3	≥27

treatment (see figure 2), the prevalence of depression was 17.27% (CI 15.06% to 19.72%).

Anxiety: Within the nine studies that provided measures of anxiety in patients with PCa prior to undergoing treatment (see figure 2), the prevalence of anxiety was 27.04% (CI 24.26% to 30.01%).

On-treatment depression and anxiety prevalence

Depression: Within the nine studies that provided measures of depression in patients with PCa currently undergoing treatment (see figure 3), the prevalence of depression was 14.70% (CI 11.92% to 17.99%).

Anxiety: within the four studies that provided measures of anxiety in patients with PCa currently undergoing treatment (see figure 3), the prevalence of anxiety was 15.09% (CI 12.15% to 18.60%).

Post-treatment depression and anxiety prevalence

Depression: within the 13 studies that provided measures of depression in patients with PCa who had completed treatment (see figure 4), the prevalence of depression was 18.44% (CI 15.18% to 22.22%).

Anxiety: within the 11 studies that provided measures of anxiety in patients with PCa who had completed treatment (see figure 4), the prevalence of anxiety was 18.49% (CI 13.81% to 24.31%).

Depression and anxiety prevalence across and within treatment groups

Figure 5 provides a pictorial representation of the prevalence of depression and anxiety both within and across each of the three treatment groups.

DISCUSSION

There is a real need within clinical oncology, particularly as the burden of disease is escalating with improved diagnosis and treatment, for an increased awareness about the issue of psychological distress among men diagnosed with, being treated for and surviving through/living with a PCa diagnosis. The results of the current meta-analysis go some way in addressing this issue by providing those working within the field of PCa with a rigorous overview of the likely prevalence of depression and anxiety in the patients they treat.

Our findings suggest that over the trajectory of the PCa journey, depression and anxiety prevalence are highest in patients who have yet to undergo treatment (17.27% and 27.4%, respectively), lowest in patients who are currently undertaking treatment (14.70% and 15.90%, respectively) before rising again in patients who have completed treatment (18.44% and 18.49%, respectively). The relatively small variation observed within these prevalence rates across the different treatment stages, along with the large collective sample size of the meta-analysis (4494), suggests that these conclusions are valid, powerful and robust summaries of the data available. The prevalence of clinical depression and anxiety in British men aged over 65 years is estimated to be less than 9% and 6%, respectively.[34] Such data are in stark contrast to the prevalence reported in patients with PCa of the same age in this study.

The current meta-analysis is the first of its kind to specifically assess the prevalence of clinical depression and anxiety in patients with PCa over their treatment spectrum, from pretreatment, through treatment to post-treatment follow-up. Until now, the lack of synthesis of the available data relating to depression and anxiety in PCa has meant that clinical decisions have been based

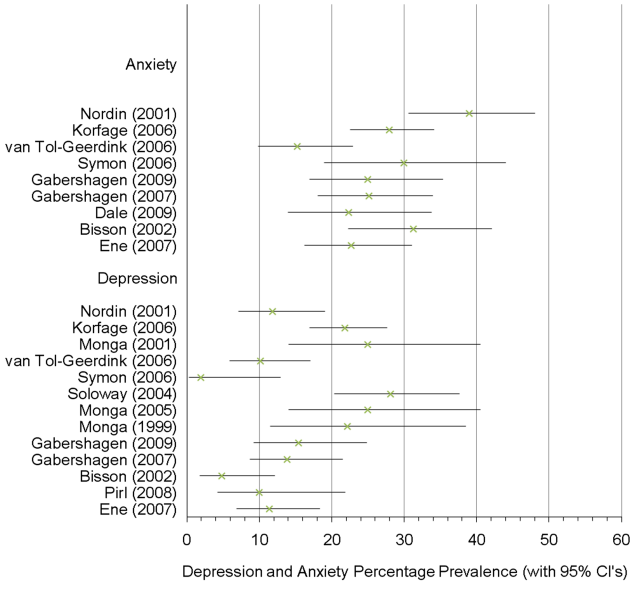

Figure 2 Pretreatment depression and anxiety % prevalence.

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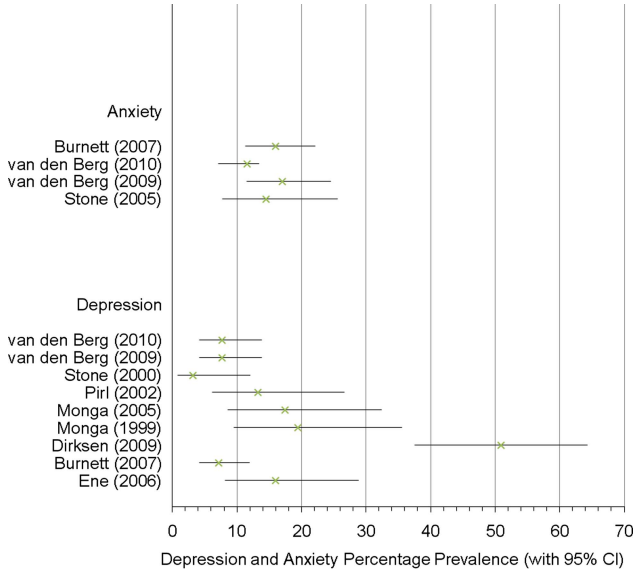

Figure 3 On-treatment depression and anxiety % prevalence.

on isolated research trials that lack sufficient power and depth in terms of sample sizes, treatment protocols and treatment stages. Consequently, the true prevalence of psychological morbidity experienced by patients with PCa across the treatment spectrum is poorly understood and described and this may result in patients being left untreated.

We hope that with additional epidemiological investigation we will be able to offer a more risk adapted approach with more intensive screening and support being offered to individuals who are most at risk of psychological morbidity, which may in part be related to their current stage of treatment. This is important as research suggests that patients with cancer who are suffering from clinical depression and anxiety are less likely to adhere to their treatment plan and are more likely to experience adverse reactions to their treatment.[4 5] Indeed, recently published research has specifically highlighted the negative impacts of PCa specific anxiety on post-treatment survivorship in the form of poorer sexual function and increased depressive symptomology, further supporting the need for effective and timely intervention.[35]

Consequently, the identification, treatment and management of concurrent psychological distress should be a key clinical objective as a means of enhancing clinical outcomes and patient QoL. Identifying which stage of treatment patients with PCa are most likely to experience such conditions is an important first step to achieving this.

There are several limitations to the results generated by this review that need to be noted when interpreting the findings. There is a noticeable dearth of research into the prevalence of depression and anxiety in patients with PCa with metastatic disease; we identified only 87 patients with metastatic PCa out of the pooled sample size of 4494. Given the increased physical symptomology, and significantly lowered life expectancy, associated with metastatic PCa, it is possible that the prevalence of psychological morbidity within this patient cohort will probably be substantially higher. Unfortunately, it was not possible to generate depression and anxiety prevalence data specifically for men with metastatic disease, as the studies that recruited patients with PCa with metastatic disease did so as part of larger collective samples of patients that included those with localised and/or advanced PCa. In the majority of cases, no individual depression and anxiety data were provided specifically for those with metastatic disease. Consequently, it was not possible to describe these patients separately.

We do not know the overall proportion of men who suffer from some psychological distress during their PCa cancer journey from these largely cross-sectional studies.

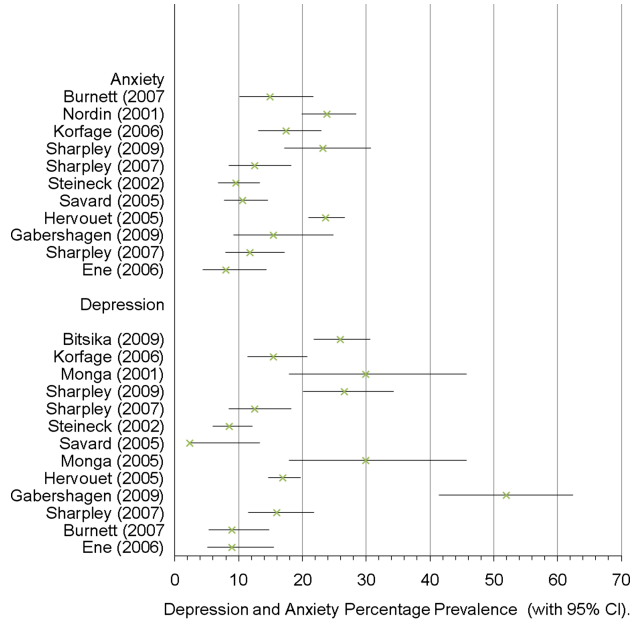

Figure 4 Post-treatment depression and anxiety % prevalence.

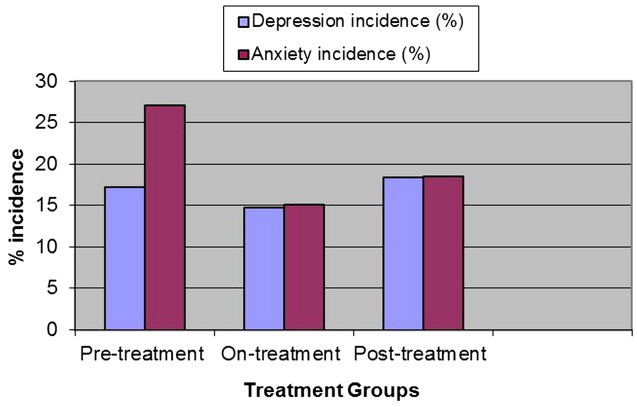

Figure 5 Depression and anxiety % prevalence across treatments.

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We suspect that a number of individuals become depressed and anxious at various stages of their cancer journey and then may improve, so overall the numbers of people affected at some stage may be higher than we are able to identify from this analysis. We would need to conduct a sustained longitudinal cohort study to resolve this question. Likewise, none of the included studies provided any form of data relating to the patients' history of depression and anxiety. Consequently, it was not possible to determine whether a history of depression and anxiety acted as a significant predictor of current depression and anxiety.

Furthermore, this study did not compare the depression and anxiety prevalence rates generated directly to that observed in a cohort to healthy men or men with other cancers. As a consequence, we were unable to specifically determine how PCa and its treatment impacted on the prevalence of psychological distress observed. The essentially descriptive nature of this study therefore needs to be noted.

It is also important to note the wide variability in the point prevalence estimates of anxiety and depression and the 95% CIs associated with them. There are likely to be many reasons for this variability, which include sample size, the differing instruments that have been used to measure depression and anxiety, selective populations and post-treatment outcomes. For example, it is possible that depression and anxiety prevalence in post-prostatectomy patients would vary substantially depending on factors such as positive or negative margin status. Unfortunately, it was not possible to formally investigate the properties of the populations to determine whether there were any such differences that would explain this variability. This represents an important limitation to the findings of this study. It is important that future studies into the assessment of depression and anxiety in this patient group carefully identify the characteristics of their populations to address this issue.

We were also not able to determine whether the prevalence of depression and anxiety was a factor influencing the type of PCa treatments provided to individuals. The associated side effects of PCa treatment include debilitating urinary, sexual and bowel dysfunction as well as the potentially negative psychological side effects of passive treatment options such as AS and WW, in which the patient faces living with a diagnosed but untreated cancer. This is an important clinical issue as it may provide a novel avenue in which to streamline the screening of depression and anxiety by offering patients undertaking treatments that have been shown to induce higher rates of distress with early, preventive support during their cancer journey.

Burnet *et al*[27] reports that the prevalence of depression among AS/WW patients is just 4% (in a sample of 100 patients recruited from a single cancer centre of international excellence), leading the authors to conclude that AS does not predispose patients to higher levels of distress in comparison to those undergoing radical treatment. However, our data identified that the prevalence of depression is almost three times higher than that reported by Burnet *et al*[27] at 11% (within this specific population, suggesting that psychological distress may indeed be a substantial risk associated with AS/WW.

The utilisation and uptake of AS/WW within the UK is increasing,[36] yet our results clearly highlight that the issue of psychological morbidity among these patients with PCa is poorly described and defined, with only 4 of the 27 studies entered into this review obtaining measures of depression and anxiety from this patient population.[21 22 26 33] Consequently, we suggest that patients being treated with AS/WW should be investigated in more detail to better understand the psychological ramifications of this form of management. Such research should ideally involve the recruitment of larger sample sizes (>200) from multiple sites to provide a more generalisable estimate of psychological distress from this patient cohort.

In conclusion, across the treatment spectrum, patients with PCa appear to experience a moderate to high degree of psychological morbidity ranging from 15% to 27%. Most acute prevalences of depression and anxiety occur prior to and after the completion of treatment, the consequences of which may go on to negatively impact on treatment compliance,[6] increased periods of hospitalisation[5] and overall functional QoL.[37] Based on our findings, we conclude that the assessment, diagnosis and treatment of depression and anxiety should be a key priority for any clinical oncology team working with PCa to enable them to optimise their patients' QoL and clinical treatment outcomes.

Contributors SW was involved in protocol development, data searching, extraction and analysis. PP was involved in statistical analysis. LL and SE were involved in data extraction.

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