

Prevalence of oncologists in distress: systematic review and meta-analysis

Psycho-Oncology, in press 2017, <http://doi.org/10.1002/pon.4382>

Asta Medisauskaite^a & Caroline Kamau^a

^aBirkbeck, University of London

Author correspondence: Asta Medisauskaite, Birkbeck, University of London, Department of Organizational Psychology, Malet street, London, WC1E 7HX, United Kingdom.

4,473 words, 2 tables, 3 figures, 1 supplementary material

ABSTRACT

Objective: High mortality from cancer and rising patient numbers can trigger distress among oncologists because of a heavy and emotionally demanding workload. This systematic review and meta-analysis assesses the prevalence of high levels of distress among oncologists.

Methods: The PRISMA protocol is registered at the PROSPERO international prospective register (Ref. 2015:CRD42015016325). We categorized data items according to the following distress factors: burnout, psychiatric morbidity, stress, depression, disrupted sleep, stress-induced physical symptoms, and substance use. We meta-analysed the prevalence of burnout and psychiatric morbidity using random effects models with MetaXL software.

Results: The meta-analyses showed that 32% of 4876 oncologists had high burnout (\pm CI 28% to 36%) and 27% of 2384 had high psychiatric morbidity (\pm CI 23% to 32%). Studies also showed that 42 to 69% feel stressed at work, > 12% of oncologists screen positive for depression, many oncologists suffer from sleep deprivation, up to 30% drink alcohol in a problematic way, up to 20% of junior oncologists use hypnotic drugs and some frequently experience stress-induced complaints such as ulcers, gastric problems, headaches and arrhythmia.

Conclusions: Occupational distress reduces career satisfaction, affects patient care and increases the chances of oncologists switching to another area of medicine therefore future research should explore appropriate interventions.

Keywords: stress, burnout, psychiatric morbidity, sleep, meta-analysis, oncology, cancer.

BACKGROUND

High mortality from cancer [1-3] and rising patient numbers [4] can put oncologists at risk of distress because of a heavy workload and the emotional demands of the job. Cancer is one of the biggest causes of premature adult death [5] with an estimated 1,000 people diagnosed with cancer each day [5], making oncology one of the fastest-growing and in-demand medical specialties. At diagnosis, the proportion of terminally ill cancer patients can be as high as 49% for lung cancer, 21.6% for colorectal cancers and 17% for ovarian cancers [6] with low 1-year survival rates (e.g., 14% for lung cancer) [7]; therefore, oncologists experience more frequent patient death than doctors in many other specialties. Studies show that many oncologists experience high levels of distress, e.g. feeling emotionally exhausted or burned-out [8-11], having disturbed sleep [2], feeling depressed [12], using alcohol to cope [13], and experiencing stress-related health problems [9, 14]. For example, up to 44.7% of oncologists present high burnout [11], 27% present psychiatric morbidity [13] and 33% present depression [15]. To date, there has been no review or meta-analysis of the proportion of oncologists affected by occupational distress. Previous reviews [8, 9] either combined oncologists with other cancer staff or, when they focussed on just oncologists, reviewed only burnout and psychiatric morbidity.

Previous research suggests that oncologists experience job stressors that are embedded in their role as physicians within cancer care e.g. being responsible for diagnosing tumours and relaying bad news [16, 17]; managing a patient's cancer care and weighing up the risks or benefits of treatment options such as radiotherapy, hormone therapy, surgery or palliation relative to the type, location and stage of the tumour [15, 16, 18]; supporting cancer patients and helping them make informed decisions [18]; managing patients' expectations about

recovery from cancer [17]; seeing patients suffering [17, 18]; coping with patients' disappointment about treatment outcomes [17]; witnessing anger or blame from patients [17, 18]; grief about a patient's death [10]; and experiencing multiple patient deaths [17, 18]. As well as the stressors embedded within their job roles, oncologists have a heavy workload; most work in excess of 60 hours a week and remain on call outside their formal working hours [12]. Occupational distress has a spill-over effect on the work and personal life of oncologists [10], reduces career satisfaction [11, 12], raises the risk that oncologists will decide to take early retirement [11] or leave oncology for another area of medicine [14] and it has a detrimental effect on the quality of patient care [13]. We therefore systematically reviewed and meta-analysed distress prevalence in studies about oncologists presenting burnout, depression, psychiatric morbidity, sleep deprivation, stress, stress-induced health complaints and substance abuse.

METHODS

The systematic review PRISMA protocol was registered *a priori* at the PROSPERO international prospective register, available online [19].

Eligibility criteria, information sources and searches

We searched the *Thomson Reuters Web of Science* databases with no restrictions on publication period or language. Eligible studies were quantitative and involved individual-level data about the occupational distress of doctors working in specialties with high rates of patient mortality such as palliative medicine, oncology, HIV/AIDS care and other areas of medicine involving patients with life-limiting illnesses. This article reports results about oncologists that emerged from the wider systematic review. We searched the databases using specialty keywords [palliative or end-of-life or hospice or AIDS or HIV or cancer or oncolog*]

or “last stage* of life” or “life-limit*” or terminal] combined with profession keywords [doctor or physician or intern or resident or “house officer*” or registrar or consultant or fellow] and occupational distress keywords [stress or depress* or anxiety or fatigue or “occupational health” or sleep or alcohol or addiction or absence or absenteeism or sick or burnout or exhaust* or mood or grief or emotion].

Study selection and data collection

At the screening stage, we selected articles based on their titles and abstracts, compiling them in an *EndNote* database. In the next stage, we retrieved and reviewed the full text of the selected articles for assessment. Publications in other languages were translated, including Chinese, German, Spanish, Danish, Hungarian, Polish and Russian. In the final stage, we analysed relevant articles and formulated conclusions according to each factor and subset of groups, including oncologists.

Data items and summary measures

The data items that we sought from the publications are as follows and categorised by distress factor. We systematically reviewed all distress indicators and, where a uniform method of measuring distress was used by publications in each category, we meta-analysed distress prevalence.

1. *Burnout*: We systematically reviewed burnout studies and then meta-analysed the prevalence of high burnout among oncologists from publications that used the same psychometric test (the *Maslach Burnout Inventory*, MBI) [20]. In this article, we focus on one sub-type of burnout called emotional exhaustion because previous research shows that it psychometrically best represents overall burnout [20]. Example

items measuring emotional exhaustion are “*I feel emotionally drained from my work*” and “*I feel used up by the end of the workday.*”

2. *Psychiatric morbidity*: We systematically reviewed and meta-analysed the prevalence of high psychiatric morbidity among oncologists from publications that used the *General Health Questionnaire-12 (GHQ)* [21]. Example items are: “*Have you recently lost much sleep over worry?*” and “*Have you recently been able to face up to problems*”
3. *Stress*: We systematically reviewed publications about the mean stress levels of oncologists, the proportion of oncologists with high stress levels, and causes of stress related to patient care. The stress inventories are listed within the tables in the results.
4. *Depression*: We systematically reviewed publications about mean depression levels and the proportion of oncologists with depression as assessed by depression symptom checklists or other depression inventories.
5. *Disrupted sleep*: We systematically reviewed publications about the mean sleep disruption levels of oncologists, as assessed by sleep deprivation inventories and sleepiness scales.
6. *Stress-related complaints*: We systematically reviewed publications about specific stress-related health complaints (e.g. gastric illnesses) and the mean scores on symptom checklists, listed within the results table.
7. *Alcohol/substance use*: We systematically reviewed publications about alcohol and substance use by oncologists relative to recommended levels.

Results synthesis, meta-analyses and assessing the risk of bias

During data extraction, we assessed the risk of bias by assessing the quality of each publication. We used a 10-point quality checklist built on existing quality assessment methods

in systematic reviews [22-24]. In the checklist, items scored yes=1/no=0 for an appropriate sample size for the chosen data collection tools and study design; participants were likely to be representative of the target population; relevant confounders were controlled for; and appropriate statistical methods were used. Items scored from 1 to 3: the quality of the study design; and the validity and reliability of the data collection tools. Overall, a sum quality score lower than 4 showed low quality, a score between 5 and 7 showed moderate quality and a score equal to or higher than 8 showed high quality. We meta-analysed prevalence for burnout and psychiatric morbidity using random effects models (double arcsine transformation) with MetaXL software in Microsoft Excel [25]. Sensitivity analysis was performed for heterogeneity analysis [26]. The bias was analysed with funnel plots [26, 27]. The most popular tests for publication bias, Egger's regression and Begg's and Mazumdar correlation rank, were not used because of the small number of studies [28]. Instead, the results of the Luis Furuya-Kanamori (LFK) index of asymmetry are presented [25].

RESULTS

Study selection and characteristics

The search revealed 14763 hits with 663 publications eligible for full text analysis. Seventy-one articles were randomly selected for double assessment and the inter-observer agreement showed a high strength of agreement: Cohen's kappa was statistically significant ($p < 0.000$) and equal to 0.812 (95% CI 0.634 - 0.990). Following the full text assessment forty-three publications were eligible for further analysis because they measured the level of distress experienced by oncologists (see the PRISMA diagram in Figure 1). The publications comprised of: 17 studies that measured burnout [11-13, 16, 29-41]; 11 studies that measured psychiatric morbidity [13, 16, 29, 30, 36-38, 41-44]; 27 studies that measured stress [2, 17,

18, 33, 35-37, 41-43, 45-61]; six studies that measured depression [12, 31, 42, 62-64]; five studies that measured sleep deprivation [2, 42, 47, 56, 63]; four studies that measured stress-related conditions or symptoms [2, 17, 47, 51]; and five studies that measured substance use [12, 13, 32, 38, 47].

Study characteristics

The Forty-three eligible studies were published from 1990 to 2014 in more than 14 different countries: 12 studies from the USA [11, 12, 13, 31, 35, 48, 49, 51, 54, 60, 62, 64]; six from the UK [16, 36, 37, 41, 42, 59]; four from Canada [44, 50, 57-58]; three from Belgium [28, 46, 52]; two from Brazil [34, 40]; two from Germany [17, 18]; two from Denmark [45, 61], two from Italy [43, 47]; one each from Australia [38], Switzerland [29], Japan [30], France [32], Greece [53] and Turkey [2]; one study covering three European countries (Italy, Spain, and Portugal) [39]; one study covering two countries (Germany and Australia) [55]; one study from several European countries [63]; and one study covering three North American countries (USA, Canada, and Mexico) [56].

Synthesis and analyses

1. How many oncologists are highly burned out?

We meta-analysed 17 studies that used an identical measurement method, the 22-item MBI [20]. The percentage of oncologists with high emotional exhaustion varied from 23% to 48% (Table 1). The forest plot (Figure 2a) showed that on average 32% oncologists (95% CI 28-36) had high burnout, defined as high emotional exhaustion. Heterogeneity was observed ($p < 0.0001$; $Q = 141.83$) with inconsistency (I^2) of 89% (95% CI 84-92). However, sensitivity analysis did not reveal any outliers: exclusion of any given study did not change the pooled prevalence by more than 0.01 points and it did not improve heterogeneity measures (the p

value for Q remained smaller than 0.0001 and inconsistency dropped to just 83%). To assess publication bias, we funnel plotted prevalence (Figure 2b). There was no asymmetry and no concentration, showing a low bias risk. The LFK index also showed no asymmetry (LFK=-0.72).

2. How many oncologists have high psychiatric morbidity?

We meta-analysed 11 studies that used the GHQ-12 scale and calculated the proportion of oncologists with psychiatric morbidity in the same way (≥ 4) [21]. The proportion of oncologists with high psychiatric morbidity varied from 12% to 36% (Figure 3a). The forest plot (Figure 3b) showed that an average of 27% oncologists (95% CI 23-32) suffered from psychiatric morbidity. Analysis showed heterogeneity ($p < 0.0001$; $Q = 47.33$) with inconsistency (I^2) of 79% (95% CI 63-88). After excluding the study with the largest weight [41], inconsistency measures improved ($I^2 = 64\%$). However, 95% CI became wider (95% CI 30-81) and pooled prevalence dropped just 1%. The funnel plot (Figure 3b) showed minor asymmetry and the LFK index showed major asymmetry (LFK=-2.08). Opposite to the general tendency, this analysis showed that smaller studies less often presented results with large sizes.

3. How severe is work stress in oncology and what are the causes?

The publications that we reviewed in Table 2 reported mean stress or the proportion of oncologists who had high stress. Between 42% and 69% of oncologists felt stressed at work. We also looked at the stress levels linked to patients care and present these studies in a supplementary file. Oncologists report finding the following patient care situations stressful:

- (a) Coping with patient deaths occurrences [17, 18, 42, 43, 53, 54, 56].
- (b) Working with distressed or blaming relatives of cancer patients [35, 41, 42, 53, 59].

(c) Coping with a patient's suffering during cancer treatment [17, 18, 36, 37, 41, 43, 49, 53-56].

(d) Feeling disappointed about cancer treatment options and questioning the meaning of job [17, 18, 42, 54-56].

(e) Coping with patients' unrealistic expectations about cancer treatment [17, 18].

(f) Delivering bad news (about patient's death; reoccurrence of cancer) [17, 18, 56].

(g) Worrying about a patient outside work [17, 18].

(h) Worries about withdrawal or inappropriate continuation of cancer treatment [17, 18, 42, 54].

(i) Communicating with crying or distressed cancer patients [17, 18, 46, 59].

(k) Death anxiety [48].

For example, up to 58% of oncologists were stressed because of dealing with distressed relatives of dying patients [35, 41]. In addition, between 14% and 43% of oncologists felt stressed because of patient suffering [36, 37, 41, 43, 49] and 78% of paediatric oncologists named caring for a suffering dying child as the most stressful situation for them [53].

4. How many oncologists have depression?

Between 27% of 1740 oncologists [62] and 34% of 334 oncologists [64] suffered from depression as a characteristic of burnout. Other studies showed that between 24% of 407 surgical oncologists [31] and 31% of 549 surgical oncologists [12] had depression, as assessed by the *Primary Care Evaluation of Mental Disorders* scale. High depression levels were observed among junior oncologists using the same scale: 51% screened positive for depression; 35.2% felt down, depressed or hopeless and 42% felt little interest or pleasure in doing things [63]. Much lower rates of depression (12%) were presented by 155 clinical oncologists (previously known as radiotherapists) and 130 medical oncologists using the

Symptom Checklist for Depression [42]. Another study showed that 5% of 407 surgical oncologists had suicide intentions [31]. The mean score of quality assessment for these studies was 7.5 (moderate).

5. Do oncologists have disrupted sleep?

One study [47] found that of 112 radiation oncologists at resident/young specialist level, 17% complained about having a sleep disorder often. Other studies showed that of 125 surgical oncologists at resident and fellow level, 44% were evaluated as having abnormal sleep scores, with scores of > 9 on the *Epworth Sleepiness Scale* [63], and 37% of 52 oncologists had sleep disorders [2]. Another study [42] reported that sleep deprivation (measured with one item) among 130 medical oncologists (M=4.3) was significantly higher than that among 155 clinical oncologists (M=3.5). Another study found that 238 medical oncologists felt somewhat stressed because of sleep deprivation, with a mean response of 4.5 on a scale from 0-10 [56]. The mean score of quality assessment for these studies was 7 (moderate).

6. Do oncologists have stress-induced health complaints?

Two studies presented mean scores for oncologists presenting physical symptoms [17, 51] but not norms to enable interpretation. One study found that, of 112 radiation oncologists at resident/young specialist level, 42% said that they often or occasionally had a gastrointestinal/colonic transit illness, 56% had gastric illnesses or gastroesophageal reflux and 37% had irregular heart rhythm [47]. Another study showed that, out of 52 oncologists, 62% reported having headaches, 60% had excessive nervousness, and 48% had an ulcer/gastritis [2]. The mean score of quality assessment for these studies was 7 (moderate).

7. Is alcohol/substance use a problem for oncologists?

One study [32] found that few (8%) of 204 oncology residents drank alcohol ≥ 4 times a week whereas 20% took hypnotic drugs. Another study found that, of 112 junior radiation oncologists, 10% took alcohol daily and 13% ≥ 4 times a week whereas only 5% took hypnotic drugs [47]. Another study showed that, of 71 oncology surgeons, 30% used alcohol in a problematic way, defined as having ≥ 3 drinks on a drinking day (12%) or ≥ 6 drinks on one occasion (27%) [13]. Another study found that, of 29 gynaecologic oncologists, 41% drank alcohol ≥ 4 times a week and 10% had received a recommendation to reduce their alcohol intake within the past year [38]. An additional study [12] found that 7% of 549 surgical oncologists were at risk because of their level of alcohol use. The mean score of quality assessment for these articles was 6.8 (moderate).

CONCLUSIONS

This review showed that many oncologists have a high level of distress e.g. 32% of oncologists have high emotional exhaustion, 27% have high psychiatric morbidity, between 42 and 69% feel stressed at work, more than 12% of oncologists have depression (with 51% of junior oncologists screening positive), many suffer from sleep deprivation, and stress-induced health complaints such as frequent ulcers, gastric problems, headaches and arrhythmia, up to 30% drink alcohol in a problematic way and up to 20% of junior oncologists use hypnotic drugs. We meta-analysed studies that used identical measurements and therefore draw conclusions about pooled prevalence for burnout and psychiatric morbidity. We predict that the proportion of oncologists in distress will increase in future because rising cancer incidences will increase their workload. For example, there is understaffing in clinical oncology [65, 66] that is rising every year. Recognizing the prevalence of distress in oncology is one step toward accepting that distress is a normal reaction to external

factors such as a higher workload [37, 45, 56]. This review has shown the range of factors that instigate distress in oncology practice e.g. patient death [17, 18, 42, 43, 53, 54, 56] and delivering bad news to cancer patients or their relatives [17, 18, 54]. Oncologists struggle with ‘meaning’ and disappointment about the limits of medicine in treating cancer [17, 18, 42, 54-56] and the high mortality rate from cancer makes oncologists worry about their own death [48].

It is our hope that recognizing the prevalence of distress will encourage oncologists to confide in their colleagues and mentors for social support. A *Lancet* world report about doctors in distress highlighted the problem of stigmatisation [67] that compels doctors to fear admitting to their colleagues about being in distress. In some countries, e.g. Australia, this fear is made worse by mandatory reporting laws that compel other doctors to report a doctor who confesses distress for professional ‘impairment’ [68]. We argue that this sort of system is unhelpful in making doctors fearful of being reported or struck off for what is actually a normal, human reaction to external factors such as working with severely ill or dying patients. Job-related distress is not a sign of impairment or lack of fitness to practice. The DSM-V aptly warns against misdiagnosing mental symptoms when there are logical, external causes. Rather than stigmatizing distress in medical practice, supportive interventions that draw on peer/mentor support are helpful [69-71].

Future research and limitations

In future research, we recommend that researchers measure distress using published inventories with good psychometric features (construct/concurrent validity and internal/external reliability), and using a standardized reporting method. We found the studies that did meet these criteria beneficial in allowing a meta-analysis. We also call for researchers

in under-represented regions (e.g., Africa, South America, Middle East and Asia) to measure distress among oncologists there because we noticed a striking absence of studies from these regions.

The main limitation of the current systematic review and meta-analysis is that the search covered different sub-specialties of oncology and experience levels, reflected in the observed heterogeneity and inconsistency. However, we were not able to systematically compare junior and senior oncologists because some studies combined data about them whereas other studies provided separate data. The lack of separate subgroup data is one of the main reasons why not many meta-analytic studies perform a subgroup analysis [72]. Even so we believe that this study serves as a good overview of trends in the prevalence of occupational distress among oncologists. We also encourage future researchers to analyse the underlying factors for high inconsistency between studies. Second, the results about stressful situations in oncology practice were limited to those explored by the studies in our search results, which mainly centred on patient care. Future studies about other job stressors in oncology can reveal additional sources of distress.

CONTRIBUTIONS

AM and CK devised the research questions. AM conducted the literature searches and analyses under supervision from CK. AM and CK participated in data interpretation and write-up and approved the final version before submission

CONFLICT OF INTEREST

No conflict of interest

REFERENCES

1. Balbay OA, Isikhan V, Balbay EG, et al. Burnout status of health care personnel working in oncology and their coping methods. *Healthmed*. 2011;5(4):730-40.
2. Isikhan V, Comez T, Danis MZ. Job stress and coping strategies in health care professionals working with cancer patients. *Eur J Oncol Nurs*. 2004;8(3):234-44.
3. Slaby AE. Cancer's impact on caregivers. *Adv Psychosom Med*. 1988;18:135-53.
4. Maddams J, Utley M, Moller H. Projections of cancer prevalence in the United Kingdom, 2010–2040. *Brit J Cancer*. 2012;107:1195-202.
5. Heron M. Deaths: Leading causes for 2012. *Natl Vital Stat Rep*. 2015;64(10):1-92.
6. McPhail S, Johnson S, Greenberg D, et al. Stage at diagnosis and early mortality from cancer in England. *Brit J Cancer*. 2015;112:S108-15.
7. Cancer Research UK. *Lung cancer incidence statistics*. Available from: <http://www.cancerresearchuk.org/health-professional/lung-cancer-incidence-statistics>. [Accessed 10th February 2016]
8. Trufelli DC, Bensi CG, Garcia JB, et al. Burnout in cancer professionals: a systematic review and meta-analysis. *Eur J Cancer Care*. 2008;17(6):524-31.
9. Sherman AC, Edwards D, Simonton S, et al. Caregiver stress and burnout in an oncology unit. *Palliat Support Care*. 2006;4(1):65-80.
10. Granek L, Tozer R, Mazzotta P, et al. Nature and impact of grief over patient loss on oncologists' personal and professional lives. *Arch Intern Med*. 2012;172(12):964-6.
11. Shanafelt TD, Gradishar WJ, Kosty M, et al. Burnout and career satisfaction among US oncologists. *J Clin Oncol*. 2014;32(7):678-86.

12. Kuerer HM, Eberlein TJ, Pollock RE, et al. Career satisfaction, practice patterns and burnout among surgical oncologists: Report on the quality of life of members of the society of surgical oncology. *Ann Surg Oncol.* 2007;14(11):3043-53.
13. Guest RS, Baser R, Li Y, et al. Cancer surgeons' distress and well-being, I: The tension between a culture of productivity and the need for self-care. *Ann Surg Oncol.* 2011;18(5):1229-35.
14. Grunfeld E, Whelan TJ, Zitzelsberger L, et al. Cancer care workers in Ontario: prevalence of burnout, job stress and job satisfaction. *Can Med Assoc J.* 2000;163(2):166-9.
15. Rath KS, Huffman LB, Phillips GS, et al. Burnout and associated factors among members of the Society of Gynecologic Oncology. *Am J Obstet Gynecol.* 2015;213(6):824 e1-9.
16. Catt S, Fallowfield L, Jenkins V, et al. The informational roles and psychological health of members of 10 oncology multidisciplinary teams in the UK. *Brit J Cancer.* 2005;93(10):1092-7.
17. Herschbach P. Work-related stress specific to physicians and nurses working with cancer patients. *J Psychosoc Oncol.* 1992;10(2):79-99.
18. Ullrich A, Fitzgerald P. Stress experienced by physicians and nurses in the cancer ward. *Soc Sci Med.* 1990;31(9):1013-22.
19. Medisauskaite A, Kamau C. Systematic review of the occupational health of doctors in palliative medicine. *PROSPERO 2015:CRD42015016325.* Available from: http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015016325 [Accessed 10th January 2016].

20. Maslach C, Jackson SE. The measure of experienced burnout. *J Organ Behav.* 1981;2:99-113
21. Goldberg DP, Gater R, Sartorius N, et al. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol Med.* 1997;27:191–197.
22. Thomas BH, Ciliska D, Dobbins M, et al. A process for systematically reviewing the literature: providing the research evidence for public health nursing interventions. *Worldviews Evid Based Nurs.* 2004;1(3):176-84.
23. Petticrew M, Roberts H. *Systematic Reviews in the Social Sciences: A PRACTICAL GUIDE.* Blackwell publishing: Malden, USA; 2006.
24. Effective Public Health Practice Project. *Quality Assessment Tool for Quantitative Studies.* Available from: <http://www.ehphp.ca/tools.html> [Accessed 11th June 2015].
25. Barendregt JJ, Doi SA, Lee YY, et al. Meta-analysis of prevalence. *J Epidemiol Commun H.* 2013;67(11):974-78.
26. Egger M, Smith GD, Schneider M, et al. Bias in meta-analysis detected by a simple, graphical test. *Brit Med J.* 1997;315:629-634.
27. Barendregt JJ, Doi, S. *MetaXL User Guidelines.* EpiGear International: Australia; 2015.
28. Sterne JAC, Gavaghan D, Egger M. Publication and related bias in meta-analysis: Power of statistical tests and prevalence in the literature. *J Clin Epidemiol.* 2000;53:1119–1129.
29. Arigoni F, Bovier PA, Mermillod B, et al. Prevalence of burnout among Swiss cancer clinicians, paediatricians and general practitioners: who are most at risk? *Support Care Cancer.* 2009;17(1):75-81.

30. Asai M, Morita T, Akechi T, et al. Burnout and psychiatric morbidity among physicians engaged in end-of-life care for cancer patients: A cross-sectional nationwide survey in Japan. *Psycho-Oncol.* 2007;16(5):421-8.
31. Balch CM, Shanafelt TD, Sloan J, et al. Burnout and career satisfaction among surgical oncologists compared with other surgical specialties. *Ann Surg Oncol.* 2011;18(1):16-25.
32. Blanchard P, Truchot D, Albiges-Sauvin L, et al. Prevalence and causes of burnout amongst oncology residents: A comprehensive nationwide cross-sectional study. *Eur J Cancer.* 2010;46(15):2708-15.
33. Bragard I, Dupuis G, Razavi D, et al. Quality of work life in doctors working with cancer patients. *Occup Med-Oxford.* 2012;62(1):34-40.
34. Glasberg J, Horiuti L, Novais MA, et al. Prevalence of the burnout syndrome among Brazilian medical oncologists. *Rev Assoc Med Bras.* 2007;53:85–9.
35. Mougalian SS, Lessen DS, Levine RL, et al. Palliative care training and associations with burnout in oncology fellows. *J Support Oncol.* 2013;11(2):95-102.
36. Ramirez AJ, Graham J, Richards MA, et al. Burnout and psychiatric-disorder among cancer clinician. *Brit J Cancer.* 1995;71(6):1263-9.
37. Ramirez AJ, Graham J, Richards MA, et al. Mental health of hospital consultants: The effects of stress and satisfaction at work. *Lancet.* 1996;347(9003):724-8.
38. Stafford L, Judd F. Mental health and occupational wellbeing of Australian gynaecologic oncologists. *Gynecol Oncol.* 2010;116(3):526-32.

39. Travado L, Grassi L, Gil F, et al. Physician-patient communication among Southern European cancer physicians: The influence of psychosocial orientation and burnout. *Psycho-Oncol.* 2005;14(8):661-70.
40. Tucunduva LT, Garcia AP, Prudente FVB, et al. Incidence of the burnout syndrome among Brazilian cancer physicians. *Rev Assoc Med Bras.* 2006;52(2):108-12.
41. Taylor C, Graham J, Potts HW, et al. Changes in mental health of UK hospitals consultants since the mid-1990s. *Lancet.* 2005;366:742-4.
42. Berman R, Campbell M, Makin W, et al. Occupational stress in palliative medicine, medical oncology and clinical oncology specialist registrars. *Clin Med.* 2007;7(3):235-42.
43. Bressi C, Manenti S, Porcellana M, et al. Haemato-oncology and burnout: an Italian survey. *Brit J Cancer.* 2008;98(6):1046-52.
44. Elit L, Trim K, Mand-Bains IH, et al. Job satisfaction, stress, and burnout among Canadian gynecologic oncologists. *Gynecol Oncol.* 2004;94(1):134-9.
45. Andreassen CN, Eriksen JG. The psychosocial work environment among physicians employed at Danish oncology departments in 2009. A nationwide cross-sectional study. *Acta Oncol.* 2013;52(1):138-46.
46. Bragard I, Etienne AM, Merckaert I, et al. Efficacy of a communication and stress management training on medical residents' self-efficacy, stress to communicate and burnout a randomized controlled study. *J Health Psychol.* 2010;15(7):1075-81.
47. Ciammella P, De Bari B, Fiorentino A, et al. The "BUONGIORNO" Project: Burnout syndrome among young Italian radiation oncologists. *Cancer Invest.* 2013;31(8):522-8.

48. Cochrane JB, Levy MR, Fryer JE, et al. Death anxiety, disclosure behaviors, and attitudes of oncologists toward terminal care. *Omega-J Death Dying*. 1991;22(1):1-12.
49. Guest RS, Baser R, Li Y, et al. Cancer surgeons' distress and well-being, II: Modifiable factors and the potential for organizational interventions. *Ann Surg Oncol*. 2011;18(5):1236-42.
50. Grunfeld E, Zitzelsberger L, Whelan TJ, et al. Job stress and job satisfaction of cancer care workers. *Psycho-Oncol*. 2005;14(1):61-9.
51. Kash KM, Holland JC, Breitbart W, et al. Stress and burnout in oncology. *Oncology-NY*. 2000;14(11):1621-+.
52. Meunier J, Merckaert I, Libert Y, et al. The effect of communication skills training on residents' physiological arousal in a breaking bad news simulated task. *Patient Educ Couns*. 2013;93(1):40-7.
53. Papadatou D, Bellali T, Papazoglou I, et al. Greek nurse and physician grief as a result of caring for children dying of cancer. *Paediatr Nurs*. 2002;28(4):345-53.
54. Sands SA, Stanley P, Charon R. Pediatric narrative oncology: interprofessional training to promote empathy, build teams, and prevent burnout. *J Support Oncol*. 2008;6(7):307-12.
55. Sehlen S, Vordermark D, Schaefer C, et al. Job stress and job satisfaction of physicians, radiographers, nurses and physicists working in radiotherapy: a multicenter analysis by the DEGRO Quality of Life Work Group. *Radiat Oncol*. 2009;4:1-9.

56. Shanafelt TD, Novotny P, Johnson ME, et al. The well-being and personal wellness promotion strategies of medical oncologists in the North Central Cancer Treatment Group. *Oncology*. 2005;68(1):23-32.
57. Stewart W, Barling J. Daily work stress, mood and interpersonal job performance: A mediational model. *Work Stress*. 1996;10(4):336-51.
58. Szumacher E, Warner E, Zhang L, et al. Ontario radiation oncology residents' needs in the first postgraduate year-residents' perspective survey. *Int J Radiat Oncol*. 2007;69(2):512-7.
59. Taylor C, Sippitt JM, Collins G, et al. A pre-post test evaluation of the impact of the PELICAN MDT-TME Development Programme on the working lives of colorectal cancer team members. *BMC Health Serv Res*. 2010;10:1-10.
60. White J, Toy P, Gibbs P, et al. The current practice of orthopaedic oncology in North America. *Clin Orthop Relat R*. 2010;468(11):2840-53.
61. Wieclaw J, Paludan M, Rosenkilde M, et al. The psychosocial work environment of junior physicians in Danish oncology departments. A questionnaire-based cross-sectional study. *Ugeskr Laeger*. 2008;170(7):536-40.
62. Allegra CJ, Hall R, Yothers G. Prevalence of burnout in the US Oncology community: results of a 2003 survey. *J Oncol Pract*. 2005;1(4):140-7.
63. Mordant P, Deneuve S, Rivera C, et al. Quality of life of surgical oncology residents and fellows across Europe. *J Surg Educ*. 2014;71(2):222-8.
64. Whippen DA, Canellos GP. Burnout syndrome in the practice of oncology - results of a random survey of 1,000 oncologists. *J Clin Oncol*. 1991;9(10):1916-20.

65. Faculty of Clinical Oncology. *Clinical oncology –the future shape of the specialty*. London: The Royal College of Radiologists 2014. Available from:
<https://www.rcr.ac.uk/clinical-oncology/faculty-structure/future-shape-specialty>
[Accessed 10th February 2016]
66. Faculty of Clinical Oncology. *Clinical oncology workforce: The case for expansion*. The Royal College of Radiologists 2014: BFCO(14)5. Available from:
https://www.rcr.ac.uk/sites/default/files/publication/bfco145_co_workforce.pdf
[Accessed 10th February 2016]
67. Devi S. Doctors in distress. *Lancet*. 2011;377(9764):454–5.
68. ABC. *Doctors in distress*. [Television Programme]. ABC 2015 Sunday 15 February 8 AM. <http://www.abc.net.au/radionational/programs/backgroundbriefing/2015-02-15/6083558>
69. Kamau C, Medisaukaite A, Lopes B. Orientations can avert psychosocial risks to palliative staff. *Psycho-Oncol*. 2014;23(6):716-8.
70. Medisaukaite A, Kamau C. Are we preparing GP trainees for patient death? *Brit J Gen Pract*. 2015;65(634):248.
71. Medisaukaite A., Kamau, C. Guiding trainee pediatricians about how to cope with grief. *J Dev Behav Pediatr*, 2016;37(6):523.
72. Deeks JJ. Issues in the selection of a summary statistic for meta-analysis of clinical trials with binary outcomes. *Statist Med*, 2002;21:1575–1600.

1 **Table 1. Publications meta-analysed for prevalence of high burnout and psychiatric morbidity**

Authors	Country	Count (N)	Results	Quality
Arigoni et al., 2009 [29]	Switzerland	113 oncologists	Burnout 27% (30) Psychiatric morbidity 34% (38)	High
Asai et al., 2007 [30]	Japan	560 oncologists	Burnout 23% (130 ^a) Psychiatric morbidity 21% (118 ^a)	High
Balch et al., 2011 [31]	USA	405 surgical oncologists	Burnout 32% (128)	High
Berman et al., 2007 [42]	UK	277 medical and clinical oncology specialist registrars	Psychiatric morbidity 29% ^a (80)	High
Blanchard et al., 2010 [327]	France	204 residents working with cancer patients	Burnout 26% ^a (53)	Moderate
Bragard et al., 2012 [33]	Belgium	113 residents working in cancer care	Burnout 48% (54)	Moderate
Bressi et al., 2008 [40]	Italy	121 haemato-oncologists	Psychiatric morbidity 36% (44)	High
Catt et al., 2005 [16]	UK	44 cancer surgeons and oncologists	Burnout 25% ^a (11) Psychiatric morbidity 14% ^a (6)	High
Elit et al., 2004 [41]	Canada	35 gynaecologic oncologists	Psychiatric morbidity 26% (9 ^a)	Moderate
Glasberg et al., 2007 [34]	Brazil	102 oncologists	Burnout 39% (40)	High
Guest et al., 2011 [13]	USA	70 surgical oncologists	Burnout 41% (29) Psychiatric morbidity 27% (19)	Moderate
Kuerer et al., 2007 [12]	USA	519 surgical oncologists	Burnout 24% (125)	High
Mougalian et al., 2013 [35]	USA	254 medical oncology and haematology/ medical oncology fellows	Burnout 24% (61 ^a)	Moderate
Ramirez et al., 1995 [36]	UK	266 oncologists	Burnout 35% ^a (94) Psychiatric morbidity 29% (77 ^a)	Moderate
Ramirez et al., 1996 [37]	UK	161 surgical oncologists	Burnout 27% (43 ^a)	Moderate
Shanafelt et al., 2014 [11]	USA	1079 oncologists	Burnout 38% (413)	Moderate
Stafford et al., 2010 [38]	Australia	28 gynaecologic oncologists	Burnout 36% (10)	Moderate

			Psychiatric morbidity 17% (5)	
Taylor et al., 2005 [42]	UK	708 ^a oncologists	Burnout 45% ^a (318) Psychiatric morbidity 35% ^a (250)	High
Travado et al., 2005 [39]	Italy, Spain, Portugal	121 cancer physicians	Burnout 26% (31)	Moderate
Tucunduva et al., 2006 [40]	Brazil	129 medical oncologists	Burnout 34% (44)	Moderate

1 Note. ^a Calculated manually for two or more groups of oncologists

1 Table 2. Average stress and the proportion of oncologists with high stress

Authors	Country	Count	Measurement method	Stress (mean; %)	Conclusion	Quality
Andreassen et al., 2013 [45]	Denmark	220 oncologists: 76 residents 28 senior resident 29 senior registrars 87 consultants	Copenhagen Psychosocial Questionnaire: Stress scale	Overall M=3.2 Residents M=3.3 Senior resident M=3.4 Senior registrars M=3.4 Consultants M=2.9	Oncologists have higher stress on average than stress in general working population (norm for this scale is M=2.3).	High
Bragard et al., 2012 [46]	Belgium	113 residents in cancer care	Job Stress Survey	M=83.3	Oncologists have higher stress level compared to stress in general working population (reported median in other studies 59-64).	Moderate
Bressi et al., 2008 [43]	Italy	121 haemato-oncologists	Proportion with work stress: "stressed by work"	65%	Most oncologists have work stress.	High
Ciammella et al., 2013 [47]	Italy	112 radiation oncologists (residents and young specialists)	Proportion with work stress: "stressed by work"	69%	Most oncologists have work stress.	Moderate
Grunfeld et al., 2005 [50]	Canada	97 medical oncologists	Proportion with high stress	46%	Many oncologists have high stress.	Moderate
Isikhan et al., 2004 [2]	Turkey	52 oncologists	Job Stress Inventory	M=30.53	Oncologists have a 'dangerous' level of stress (stress reached dangerous dimension if score is more than 30)	High

Szumacher et al., 2007 [58]	Canada	43 radiation oncology residents	Often feel tired and overworked - Strongly agree Agree Often feel stressed out or depressed	7% 54% 42%	Most oncologists agree or strongly agree that they feel tired and overworked. Under half feel stressed out or depressed.	Moderate
Shanafelt et al., 2005 [56]	USA, Canada and Mexico	238 medical oncologists	Stress level Internship/residency Fellowship Current practice	M=7.0 M=5.8 M=6.3	Oncologists have higher than medium stress levels (scale 0-10). Stress is highest at the start of their career.	Moderate
Wieslaw et al., 2008 [61]	Denmark	103 junior oncologists	Copenhagen Psychosocial Questionnaire: Stress scale	M=3.6	Oncologists have higher stress on average than stress in general working population (norm for this scale is M=2.3).	Moderate
White et al., 2010 [609]	USA	104 orthopaedic oncologists	Proportion who feels that emotional stress is important or very important as a significant challenge in their oncology practice.	43%	Many oncologists rate emotional stress as an important challenge in practice.	Low

1 *Note. M - mean scores*

2 Footnote: Two publications are excluded from table 3 because the measurement methods used in these publications have no norm score therefore we could make no conclusion about stress proportions and how
3 oncologists compare with other professions. (1) Kash et al. 2000, USA, 102 oncologists and 76 house staff from a cancer center were assessed for stress using the Psychiatric Epidemiology Research Interview (PERI):
4 distress; house staff distress M=30.10, oncologists distress M=21.63. (2) Stewart & Barling, 1996, Canada, 17 cancer physicians were assessed using a measure of subjective work stress devised by the authors,
5 M=97.17.

FIGURES

Figure 1. PRISMA flow-diagram

Figure 2. a. Forest plot of the prevalence of high burnout among oncologists (upper and lower confidence intervals in brackets) and the publication weights. Across all publications, 32% of oncologists have high burnout (\pm CI 28% to 36%).

b. Funnel plot showing that there is relative symmetry in the results from different publications about the proportion of oncologists with high burnout.

Figure 3. a. Forest plot of the prevalence of high psychiatric morbidity among oncologists (upper and lower confidence intervals in brackets) and the publication weights. Across all publications, 27% of oncologists have high psychiatric morbidity (\pm CI 23% to 32%).

b. Funnel plot showing that there is asymmetry in the results from different publications about the proportion of oncologists with high psychiatric morbidity.

Figure 1

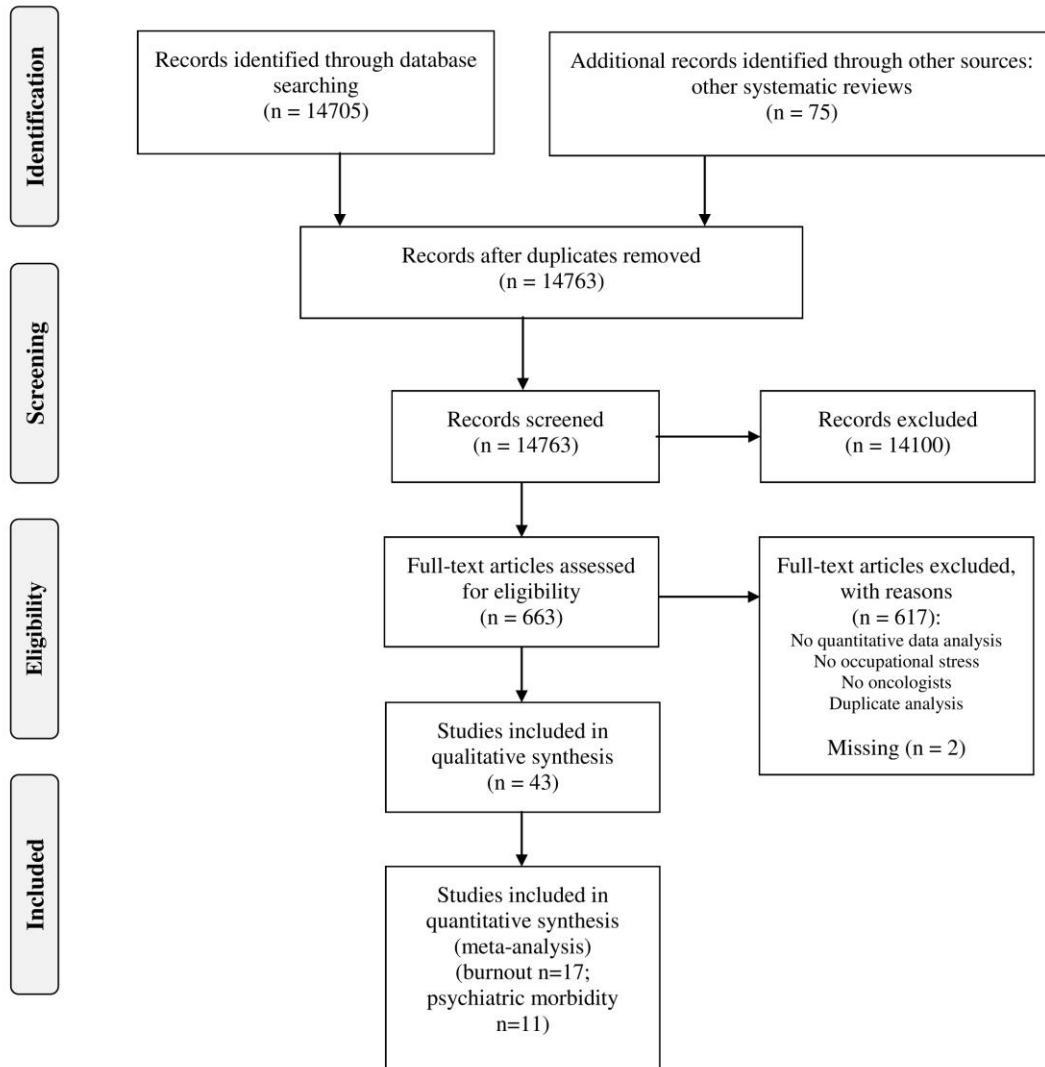


Figure 2a/b

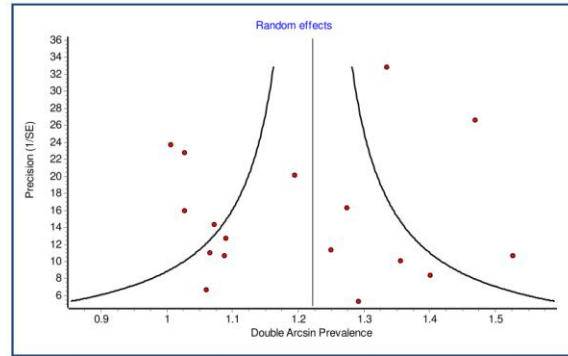
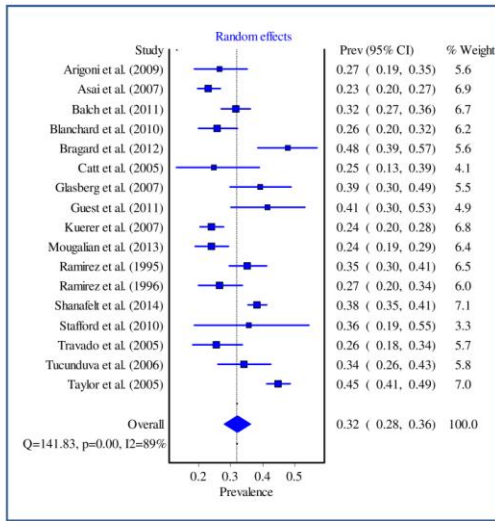
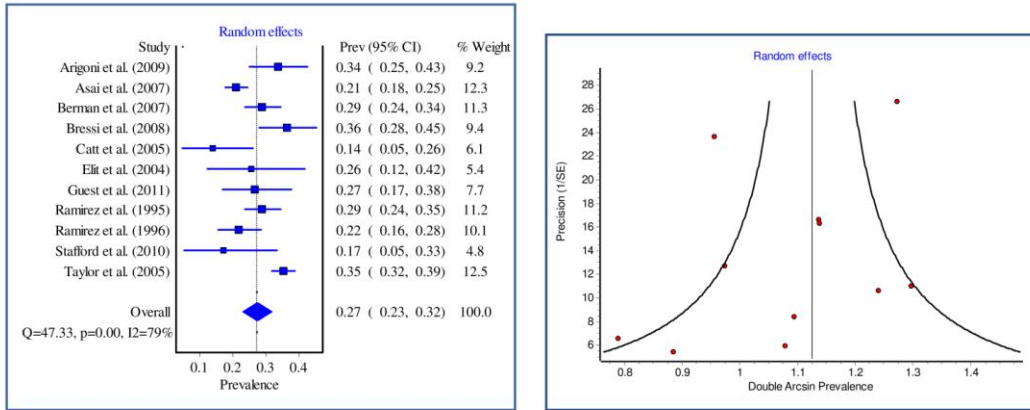


Figure 3 a/b



Supplementary Material: Review of stressful situations in oncology

Author	Country	Participants	Results	Quality
Berman et al. (2007)	UK	277 specialist registrars: 127 medical oncologists 150 clinical oncologists	Talking with distressed relatives Medical oncology M=6.7 (SD=2.5) Clinical oncology M=6.5 (SD=2.7) Failure of treatment Medical oncology M=6.4 (SD=2.6) Clinical oncology M=5.9 (SD=2.6) Treatment withdrawal Medical oncology M=5.8 (SD=2.5) Clinical oncology M=5.6 (SD=2.4) Dealing with death Medical oncology M=5.8 (SD=2.5) Clinical oncology M=5.5 (SD=2.5)	High
Bragard et al. (2010)	Belgium	47 residents working in cancer care	Stress to communicate with cancer patient M=53.6 (SD=18)	High
Bressi et al. (2008)	Italy	121 haemato-oncologists	Work with patients with life-threatening diseases 34% Work with terminally ill patients 46% Losing patients 33% Work with suffering patients 43%	High
Cochrane et al. (1991)	USA	81 oncologists: 51 medical oncologists 28 surgical oncologists 2 paediatric oncologists	Medical oncologists M=6.76 (SD=2.91) Surgical oncologists M=6.43(SD=2.81) Paediatric oncologists M=5.5 (SD=3.54)	High
Guest et al. (2011b)	USA	70 surgical oncologists	Stress/burnout related to patients' suffering and death M=4.36 (SD=2.51)	Moderate

			High 14%	
Herschbach (1992)	Germany	299 oncologists	<p>Informing relatives of a patient's death M=2.7</p> <p>Giving diagnosis of recurrence M=3.2</p> <p>Death of several patients at the same time M=2.5</p> <p>Experiencing protracted illness M=3.3</p> <p>Death of a patient during my absence M=2.3</p> <p>Patients dying before my eyes M=2</p> <p>Crying patients M=0.8</p> <p>Clinging patients M=2.4</p> <p>Aggressive patients M=2.2</p> <p>Being upset by crying patients M=2.4</p> <p>Patients unrealistic expectations of recovery M=2.7</p> <p>Patient suffering under doctor's therapy M=2.7</p> <p>Inappropriate prolongation of life M=1.6</p> <p>Withdrawal patients M=1.6</p> <p>Questioning the point of ones work M=2.2</p> <p>Disappointment in the powers of medicine M=1.7</p> <p>Being unsure if have helped the patient M=2.9</p> <p>Thinking of the children of incurable patients M=2.5</p> <p>Having to think about patients while falling asleep M=2.5</p>	Moderate
Mougalian et al. (2013)	USA	224 medical oncology/haematology/medical oncology fellows	<p>Dread having to deal with the emotional distress of family members of a patient:</p> <p>Generally/completely agree 31%^a</p>	Moderate

Papadatou et al. (2002)	Greece	14 paediatric oncologists	<p>Provide support to parents during the terminal period Most stressful 0% least stressful 64%</p> <p>Provide support to parents who grieve over the death of their child Most stressful 0% least stressful 64%</p> <p>Be present at the moment of death Most stressful 29% least stressful 21%</p> <p>Provide care to a dying child who is in a coma Most stressful 7 % least stressful 43%</p> <p>Provide care to a child who dies unexpectedly Most stressful 64% least stressful 7.1%</p> <p>Provide care to a dying child you know for a long time Most stressful 14% least stressful 21%</p> <p>Provide care to a dying child whom you do not know Most stressful 50% least stressful 21%</p> <p>Provide care to a dying child who is in pain and is suffering Most stressful 79% least stressful 0%</p>	Low
Ramirez et al. (1995)	UK	266 cancer clinicians: 59 medical oncologists 207 clinical oncologists	Dealing with patient's suffering contributes to the overall stress quite a bit or a lot for Medical oncologists 22% Clinical oncologists 29%	Moderate
Ramirez et al. (1996)	UK	161 surgical oncologists	Dealing with patient's suffering contributes to the	High

			overall stress quite a bit or a lot for 31%	
Sands et al. (2008) ⁵²	USA	6 paediatric oncologists	The Stressor Scale for Paediatric Oncology Nurses (SSPON) inventory: Knowing What Is Ahead: M=562.5 (SD=174.31) Limits of Care M=696.11 (SD= 135.36) Death Without Grace M=567.92 (SD=260.63) Emotional Demands M=564.05 (SD=206.28)	Moderate
Sehlen et al. (2009)	Germany and Austria	82 oncologists	Against conviction patients were kept alive with all resorts M=1.37 (SD=1.62) Patients suffering of doctor's therapy M=1.93 (SD=2.23) Stress due to patient's disease progression M=2.71 (SD=1.35)	Moderate
Shanafelt et al. (2005)	US, Canada and Mexico	238 medical oncologists	Delivering bad news to patients M=5.5 (SD=2.44) Dealing with death/suffering of patients M=5.8 (SD=2.36) Finding meaning in your work M=3.1 (SD=2.84)	Moderate
Ullrich & Fitzgerald (1990)	Germany	57 oncologists	Tell relatives of the death of a patient M=2.6 Patient dies in hands M=1.9 Experience with some patients the long-drawn-out advance of the illness M=3.5 Several patients lie dying at the same time M=2.9 A patient whom doctor very much liked dies during his absence M=2.9 Patients are sometimes reproachful because their therapy shows no real signs of success M=2.7 Have to cope with patients	Moderate

			<p>who are aggressive M=2.2</p> <p>The sight of crying patients upsets doctor M=2.7</p> <p>Dealing with patients who have totally closed themselves off M=2.5</p> <p>The sight of patients who lose their hair during therapy upsets doctor M=2.2</p> <p>Forced to see how badly patients suffer from the chemotherapy doctor prescribe M=3.2</p> <p>Against doctor's conviction, many patients are kept alive by all possible methods M=3.3</p> <p>Phases in which asking what purpose the work serves M=3.5</p> <p>Disappointment by the limited power of medicine M=2.7</p> <p>Asking oneself if helped the patient with the therapy or operation doctor ordered M=3.5</p> <p>Worry about the children of incurably ill patients M=3.1</p> <p>Before falling asleep or on waking up, worry about the problems of individual patients M=2.6</p>	
Taylor et al. (2010)	UK	129 colorectal cancer teams: 94 surgeons 35 oncologists	<p>The Hospital Consultants' Job Stress inventory:</p> <p>Dealing with angry or blaming patients/relatives Surgeons M=44 Oncologists M=55</p> <p>Having distressed patients Surgeons M=31 Oncologists M=28</p>	High
Taylor et al.	UK	724 oncologists:	Dealing with distressed,	High

(2005)		287 surgical oncologists 309 clinical oncologists 128 medical oncologists	angry or blaming relatives Surgical oncologists 54% Clinical oncologists 58% Medical oncologist 42% Dealing with patients' suffering Surgical oncologists 31% Clinical oncologists 40% Medical oncologists 28%	
--------	--	---	---	--

Note. M-mean scores; SD- standard deviation;

^aCalculated manually

Footnote: One publication is excluded from appendix because the measurement methods used in these publications have no norm score therefore we could make no conclusion about anxiety proportions and how oncologists compare with other professions: Meunier et al. 2013, Belgium, 98 residents working in cancer care were assessed for anxiety with State Trait Anxiety Inventory – State form Ya (STAI-Ya)

Medisauskaite, A. and Kamau, C. (2017). Prevalence of oncologists in distress: systematic review and meta-analysis. *Psycho-Oncology*, in press, <http://doi.org/10.1002/pon.4382>