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ORIGINAL ARTICLE

The association between malnutrition and psychological distress in patients with advanced head-and-neck cancer

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ABSTRACT

Objective

Malnutrition and psychological distress are often seen in patients with head-and-neck cancer, but little is known about the interrelationships between those two symptoms. The present study examined the relationship between malnutrition and psychological distress in patients with advanced head-and-neck cancer.

Methods

Using the Patient-Generated Subjective Global Assessment, 99 patients with advanced-stage head-and-neck cancer were screened for nutrition status. The patients were also screened for psychosocial distress (using the Distress Thermometer) and for psychosocial issues (using the Problem Checklist). Any relationship between malnutrition and psychosocial distress was determined by regression and correlation analysis. We also used *t*-tests to compare distress levels for patients with and without specific nutrition-related symptoms.

Results

The study group included 80 men and 19 women [mean age: 58.4 ± 10.9 years (range: 23–85 years)]. The correlation between poorer nutrition status and level of psychological distress was significant $r = 0.37$ ($p < 0.001$). Specifically, reduced food intake and symptoms were both positively associated with distress: $r = 0.27$ and $r = 0.29$ respectively, both significant at $p < 0.01$. After controlling for the effects of psychosocial problems and pain, nutrition status remained a significant predictor of distress, explaining 3.8% of the variance in the distress scores of the patients ($p < 0.05$).

Conclusions

Malnutrition and symptoms were strongly related to distress in patients with advanced head-and-neck cancer. Our results suggest the need for further research into the complex relationship between nutrition status and distress and into the management of both nutrition and distress in cancer care.

KEY WORDS

Head-and-neck cancer, late effects, psychological distress, malnutrition, screening, symptoms

1. INTRODUCTION

Head-and-neck cancers are the 6th most prevalent cancers in the world[1]. Developing in the mouth, throat, sinuses, nasal cavity, larynx, base of the skull, and head, these cancers are particularly traumatic for patients, who are often required to undergo highly disfiguring treatments. The subsequent physical disfiguration and dysfunction may lead to problems with mastication and swallowing, and impairments in communication, emotional expression, and social interactions. Those problems often result in social isolation and distress[2,3].

The U.S. National Cancer Comprehensive Network defines distress as "an unpleasant experience of an emotional, psychological, social or spiritual nature, that interferes with the ability to cope with cancer treatment, which extends along a continuum from common normal feelings of vulnerability, sadness and fear, to problems that are disabling such as depression, anxiety, panic and feeling isolated or in a spiritual crisis"[4]. Distress can arise in response to cancer diagnosis, cancer progression, prognosis, treatment side effects, and cancer-related disability or losses, among other factors. Alternatively, patients with cancer may have pre-existing mental health problems or psychosocial factors contributing to increased risk of distress. In general, 35%–40% of

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cancer patients experience distress at some point during their illness experience[5], and yet distress is often unrecognized in cancer patients. Fewer than 10% of distressed patients are referred for appropriate psychosocial support and treatments[6]. Distress is associated with increased health care costs[7], greater physical and social impairments, reduced quality of life, and poorer prognosis[8]. In an effort to address those associations, distress has been recently recognized as the 6th vital sign in cancer care, and specific guidelines are being developed to screen for, assess, and respond to distress in cancer patients[9].

Overall, compared with a general population of cancer patients, those with head-and-neck cancers tend to have the highest prevalence of co-occurring psychiatric disorders such as depression, anxiety, adjustment disorders, and substance dependence or abuse[10,11]. They are also at an elevated risk for suicide[12]. Psychological predictors of distress for patients with head-and-neck cancer include social impairment or lack of support, concerns about body image, fear of disease progression and recurrence, and existential concerns[13]. Distress in patients with head-and-neck cancer can be enduring: follow-ups with survivors showed late effects manifesting up to 11 years after treatment[14]. Patients with advanced disease, who experience longer and more aggressive treatments, are particularly susceptible to long-term effects[8]. Distress is an important symptom to address in all patients affected by cancer, but particularly in patients with head-and-neck cancer because of its potential relationship with malnutrition, a prominent problem and indicator of prognosis in this population.

Malnutrition affects up to 88% of patients with head-and-neck cancer during all phases of treatment and rehabilitation[15,16]. Approximately half these patients have some form of nutrition deficiency at diagnosis because of insufficient food intake secondary to pain and dysphagia caused by the tumour[17]. Early signs of malnutrition include body weight loss and fatigue that may possibly be controlled and even eliminated by early detection and treatment. Failure to provide nutrition support may result in more severe malnutrition, especially when compounded by side effects of chemotherapy and radiotherapy such as mucositis, xerostomia, and nausea and vomiting[18]. A weight loss of just 5% over 6 months is associated with a greater incidence of treatment complications, morbidity, and mortality in this population[19]. Patients experiencing weight loss and other symptoms of malnutrition often report higher levels of psychological distress, which manifest as more severe fatigue, insomnia, anxiety, and depression, further contributing to disease progression[10,20].

Biologic mechanisms linking distress and malnutrition have been identified. For instance, cancer-related anorexia—characterized by marked loss of appetite—appears to be associated with impairment of the neurotransmitter serotonin, a biomarker for depression[21,22], suggesting a link between cancer-related anorexia and depression[21,23]. A metabolic disturbance of serotonin in the hypothalamic–pituitary–adrenal axis is also associated with an increased susceptibility to social stressors and chronic diseases, including cancer[24]. Moreover, a malnutrition-related inflammatory response has now been implicated in the causation of depression among patients with cancer through the hypothalamic–pituitary–adrenal axis[25]. The involvement of the neuroendocrine and immune systems in the development of disorders of nutrition contributes to irreversible malnutrition[26].

The symptoms of malnutrition and psychological distress overlap, and a lack of information about how these two disorders interact may complicate diagnosis. Clinicians may notice some signs and symptoms of malnutrition or distress and ignore others; or they may misattribute some signs and symptoms, with the result that patients do not receive adequate or timely treatments.

The present study examined the relationship between malnutrition and psychological distress in patients with advanced head-and-neck cancer.

2. METHODS

We conducted a retrospective chart review on a consecutive case series of 99 patients with advanced head-and-neck cancer who were referred to oncology and treated at The Ottawa Hospital Cancer Centre from January 1, 2010, to December 14, 2011. The inclusion criteria were a histology-confirmed diagnosis of head-and-neck cancer and completion of screening assessments. The study was approved by The Ottawa Hospital Research Ethics Board.

2.1 Measurement of Nutrition Status and Distress

As part of the clinical assessment by the treating oncologist (MRC), all patients completed measures of nutrition status and psychological distress.

The patient's nutrition status was assessed using the scored Patient-Generated Subjective Global Assessment (PG-SGA), a modified version of the Subjective Global Assessment. The scored PG-SGA has been recommended by the Oncology Nutrition Dietetic Practice Group of the Academy of Nutrition and Dietetics as a comprehensive nutrition assessment tool for cancer patients[27]. We collected patient responses to the first section of the questionnaire, which details subjectively reported weight loss, various symptoms associated with reduced food intake, quality of the respondent's intake, and self-reported performance status. The total score for the first section of the PG-SGA was calculated by totalling the individual scores associated with each symptom or problem reported by the patient. A score between 4 and 8 suggests a problem with nutrition and a need for intervention by a dietitian. Body mass index was calculated based

on the weight and height entered on the PG-SGA. We did not use the physical assessment section of the PG-SGA for this study.

Psychological distress was evaluated using the Distress Thermometer and the Problem Checklist from the U.S. National Comprehensive Cancer Network distress management guideline[28]. These two screening tools are often administered together. The Distress Thermometer is a single visual analogue rating of distress ranging from 0 (no distress) to 10 (extreme distress), as rated by the patient. A cut-off score of 4 has been proposed to distinguish patients with clinically significant distress from those with little or no distress[29]. The Problem Checklist asks patients to identify whether they are being affected by any of a series of factors that contribute to distress. The problems are divided into several categories: practical problems, family problems, emotional problems, spiritual or religious concerns, information concerns, physical problems, and cognitive problems.

Our hypotheses were that malnutrition and psychological distress are significantly positively correlated and that patients who are considered malnourished are much more likely to be distressed. We also predicted that nutrition status would remain a statistically significant predictor of distress after controlling for relevant psychological factors.

2.2 Statistical Analysis

We used the SPSS software application (version 16.0: SPSS, Chicago, IL, U.S.A.) to analyze the data. The data were screened and cleaned using established procedures[30]. We first used correlation analyses to examine the relationship between malnutrition and distress. Then, using the cut-off scores for the PG-SGA and the Distress Thermometer, we allocated patients to groups depending on their nutrition status and distress level. We used a chi-square analysis to test the differences between the proportion of distressed patients who were and were not malnourished. Finally, we conducted a step-wise multiple regression analysis to establish if nutrition status remained a significant predictor of distress after taking into account the effects of various psychosocial and physical problems reported by patients on the Problem Checklist (for example, anxiety, fatigue, pain, swallowing problems, low appetite, and sleeping problems) and of demographic characteristics. For all analyses, we used $\alpha = 0.05$ as a cut-off to determine statistical significance.

3. RESULTS

Of the 99 advanced head-and-neck patients with completed screening assessments in their medical records (Table I), most were men (80%), and mean age was 58.3 ± 10.9 years. In these patients, advanced cancer (75% stage IV, 23% stage III) affected mainly the tongue (23%), tonsils (22%), larynx (17%), and nasopharyngeal cavity (17%). Patients were being or had been treated with a combination of surgery, radiation, and chemotherapy (54%).

TABLE I Characteristics of the study cohort

Characteristic	*Value (n)*
Patients	99
Sex	
Men	80
Women	19
Cancer stage	
II	1
III	23
IV	75
Cancer treatment	
Radiotherapy	12
Chemotherapy	8
Chemoradiotherapy	38
Surgery plus radiotherapy	10
Surgery plus chemotherapy	11
Surgery plus chemoradiotherapy	20
Cancer site	
Lip/oral cavity	14
Pharynx	61
Larynx	15
Nasal cavity or paranasal sinuses	4
Major salivary glands	3
Thyroid	2

3.1 Prevalence of Malnutrition and Distress

On the PG-SGA, 36% of patients scored in the critical range, and 25%, in the moderate range, suggesting that a consultation with a dietitian was necessary to address signs of malnutrition. Age, sex, disease stage, and type of treatment were not associated with nutrition status.

In 39% of the patients, a score of 4 or higher on the Distress Thermometer indicated that they were experiencing significant distress. The items on the Problem Checklist most frequently endorsed by the patients were fatigue (41%), anxiety (36%), swallowing problems (32%), pain (32%), adjustment problems (32%), low appetite (26%), and sleep problems (24%). No statistically significant relationships were observed between any problem and age, sex, disease stage, tumour site, or treatment type.

3.2 Relationship Between Malnutrition and Distress

As expected, poorer nutrition status was positively correlated with higher levels of psychological distress ($r = 0.37$, $p < 0.001$). Chi-square analysis of the

patient groups (determined using the clinical cut-offs for distress and malnutrition) also demonstrated a significant relationship between distress and nutrition status (Table II).

Table III presents the Problem Checklist items reported by the patients and the relationships of those items with nutrition status and distress. Items on the Problem Checklist that were frequently endorsed and significantly correlated with distress included anxiety ($r = 0.42$, $p < 0.001$), adjusting to appearance ($r = 0.34$, $p < 0.01$), pain ($r = 0.26$, $p < 0.05$), and problems with sleep ($r = 0.27$, $p < 0.05$). Depression was reported by 19% of participants, and it was the problem most strongly associated with distress ($r = 49$, $p < 0.01$). Loss of appetite was associated with distress ($r = 0.21$, $p < 0.05$) and was the problem most strongly correlated with nutrition status ($r = 0.50$, $p < 0.01$), followed by mouth sores or swallowing problems ($r = 0.33$, $p < 0.01$). We counted the number of difficulties endorsed by each patient and found that patients who endorsed a greater number of psychosocial difficulties also showed a higher level of distress ($r = 0.50$, $p < 0.001$).

In a hierarchical regression analysis controlled for the effects of pain and of the Problem Checklist items significantly associated with distress, nutrition status remained a significant predictor of distress, explaining 3.8% of the variance (R^2 change) in distress scores [$F(1,85) = 10.22$, $p < 0.05$].

We had intended to examine the relationships between biomarkers of inflammation, distress, and nutrition status, but data on C-reactive protein were available for only 23 patients at the time of screening for distress and nutrition status. That sample size did not provide sufficient power to detect a significant association between the variables of interest. However, the relationships trended in the expected direction ($r = 0.13$ for distress; $r = 0.21$ for nutrition status).

TABLE II Chi-square analyses demonstrating elevated Distress Thermometer scores in patients with poor nutrition status

PG-SGA score	*Pts (n)*	*Distress?*	
		No (or minimal)	*Yes*
<4	63	45	18
≥4	36	15	21
Overall	99	60	39
χ^2		8.66, $p \leq 0.01$	

PG-SGA = Patient-Generated Subjective Global Assessment.

TABLE III Relation of the frequency of endorsed problems on the Problem Checklist with the Patient-Generated Subjective Global Assessment and Distress Thermometer score in 99 patients

Problem	*Frequency of endorsement [% (when ≥15%)]*	*Relationship with*	
		Nutrition status	*Distress*
Fatigue	41	0.26[a]	0.18
Anxiety	36	0.22[a]	0.42[b]
Adjustment to appearance	32	0.14	0.34[b]
Mouth sores or swallowing	32	0.33[b]	0.18
Pain	32	0.29[b]	0.26[a]
Loss of appetite	26	0.50[b]	0.21[a]
Sleep problems	24	0.15	0.27[a]
Skin problems	20	–0.05	0.05
Depression	19	0.14	0.49[b]
Lack information about Dx	19	0.14	0.23[a]
Boredom	15	0.14	0.27[b]
Talking	16	0.19	0.15

[a] $p < 0.05$.
[b] $p < 0.01$.
Dx = diagnosis.

4. DISCUSSION

Head-and-neck cancers and their treatments can adversely affect the nutrition status of patients and also cause considerable distress. Our study examined the relationship between distress and nutrition status in patients with advanced head-and-neck cancers.

Our sample consisted predominantly of men more than 50 years of age, which is representative of the head-and-neck cancer population, although the demographic distribution of these diseases is now changing[31]. Nearly all the patients had advanced cancers, which is also typical, given that the diagnosis is generally made after the disease has substantially progressed[32]. The proportion of patients with malnutrition (61%) was also comparable to that found in a recently published study (62%)[33]. The proportion of patients in our sample showing distress (34.8%) accorded with the results of other studies (37.8%)[34].

The problems most frequently endorsed by patients as contributing to psychological distress were depression (49%) and anxiety (42%), which commonly co-occur[35]. Other problems included changing appearance, boredom, sleep problems, and pain. Patients with reduced food intake or with more pain reported greater distress. Higher endorsement of psychosocial problems was associated with higher distress scores—a finding that is consistent with those in other studies[36,37]. Swallowing difficulties, low appetite, and mouth sores accompanied by pain were commonly endorsed by the 36% of patients with decreased food intake. In our analysis, those problems were severe enough to cause nutrition deficiency, and they were also associated with psychological distress. Patients with a worse nutrition status showed greater distress, an association that remained significant after controlling for pain and for the psychosocial problems already mentioned. Those findings indicate that malnutrition contributes to distress independently of other psychosocial problems.

In facing a diagnosis of cancer, most patients have brief periods of mood swings, fear, anger, hopelessness, worries about uncertain outcomes, and other psychosocial concerns such as employment and financial worries[38]. Change in appearance may be an especially poignant factor because of its tendency to cause social isolation, putting patients at risk for increased symptoms and distress[39]. Most patients will adjust and cope with the psychological and physiologic changes that result from the disease and its treatment[40,41], but many will continue to report fluctuating levels of distress[40]. Deficiencies in nutrition may occur before diagnosis and are often unrecognized and untreated[42]. Without early detection and treatment, nutrition deficiencies can worsen, leading to cachexia[43]. Thus, malnutrition not only contributes to and compounds the impact of distress, it also contributes to poor prognosis[43].

The mechanisms mediating the relationship between malnutrition and distress still have to be elucidated and will likely vary from patient to patient. Those mechanisms might involve biologic processes such as systemic inflammation in addition to psychological factors such as the perception by the patient of disease severity and any concomitant change in behaviour. Although further research is needed to understand these processes, the accumulating evidence highlights the importance of routine screening for malnutrition in cancer care as well as screening for distress to improve clinical outcomes.

5. CLINICAL IMPLICATIONS

Our study emphasizes the need for holistic clinical care. The trajectory from dietary, psychological, and physical difficulties to more severe conditions such as cachexia is imprecise and probably varies from patient to patient. Patients are often dealing with a variety of difficulties in a variety of interacting domains. For some patients, physical problems may be influencing other challenges. For example, patients with swallowing problems may be too ashamed to join their families at mealtime. By missing meals with family, patients may feel excluded from their social supports or just generally isolated. Skipping meals is also likely to worsen their malnutrition. In other patients, psychological difficulties in adjusting to their illness might predominate, and they may withdraw from life, resulting in social isolation, depression, reduced appetite, and decreased activity, which together can contribute to malnutrition, fatigue, and additional physical problems associated with deconditioning.

Interprofessional collaboration such as that which exists in a comprehensive palliative rehabilitation program is important to the care of patients with such diverse and complex needs[44,45]. For example, a dietitian would have great difficulty treating a patient who has malnutrition because of psychological difficulties. Collaboration between disciplines can ease such interventions: a speech–language pathologist can address swallowing problems, thereby improving food intake and reducing the anxiety associated with eating; a social worker can provide counselling about common psychosocial problems and can engage a patient's support system to reduce social isolation; a psychologist or psychiatrist can address more serious problems with adjustment, depression, anxiety, and insomnia.

Patients require patient-centered care that meets their individual needs. Clinicians can use tools such as those discussed here to determine the difficulties that are central for each patient. Clinicians need to be aware of the professional resources that are accessible so that they can develop a patient-centered care plan to revisit as treatment progresses and the priorities and needs of the patient change.

6. SUMMARY

The present study highlights the associations between nutrition status and psychological distress. Supporting patients in managing their psychological distress and identifying malnutrition should be included in the clinical assessment. The main limitation of our study is its cross-sectional nature, which does not allow for an exploration of how nutrition status and distress interact over time. To further elucidate the complex relationship between nutrition status and distress, the next step would be a prospective longitudinal study that pays particular attention to whether and how that relationship might change over the course of treatment and that explores the influence of the inflammatory process as the disease progresses. The results of such a study might help to identify effective interventions that target specific problems.

7. CONFLICT OF INTEREST DISCLOSURES

The authors have no financial conflicts of interest.

8. REFERENCES

1. United States, Department of Health and Human Services, National Institutes of Health, National Cancer Institute (NCI). Home > Statistical Summaries > Cancer Stat Fact Sheets > More Cancer Types > Cancer of All Sites [Web resource]. Bethesda, MD: NCI; n.d. [Available online at: http://seer.cancer.gov/statfacts/html/all.html; cited August 15, 2012]
2. Hammerlid E, Taft C. Health-related quality of life in long-term head and neck cancer survivors: a comparison with general population norms. *Br J Cancer* 2001;84:149–56.
3. Archer J, Hutchison I, Korszun A. Mood and malignancy: head and neck cancer and depression. *J Oral Pathol Med* 2008;37:255–70.
4. National Comprehensive Cancer Network. Distress management. Clinical practice guidelines. *J Natl Compr Canc Netw* 2003;1:344–74.

5. Howell D, Currie S, Mayo S, *et al. A Pan-Canadian Clinical Practice Guideline: Assessment of Psychosocial Health Care Needs of the Adult Cancer Patient.* Toronto, ON: Canadian Partnership Against Cancer (Cancer Journey Action Group) and the Canadian Association of Psychosocial Oncology; 2009.
6. Kadan–Lottick NS, Vanderwerker LC, Block SD, Zhang B, Prigerson HG. Psychiatric disorders and mental health service use in patients with advanced cancer: a report from the coping with cancer study. *Cancer* 2005;104:2872–81.
7. Lebel S, Tomei C, Feldstain A, Beattie S, McCallum M. Does fear of cancer recurrence predict cancer survivors' health care use? *Support Care Cancer* 2013;21:901–6.
8. Singer S, Krauss O, Keszte J, *et al.* Predictors of emotional distress in patients with head and neck cancer. *Head Neck* 2012;34:180–7.
9. Thomas BC, Bultz BD. The future in psychosocial oncology: screening for emotional distress—the sixth vital sign. *Future Oncol* 2008;4:779–84.
10. Holland JC, Alici Y. Management of distress in cancer patient. *J Support Oncol* 2010;8:4–12.
11. Paula JM, Sonobe HM, Nicolussi AC, Zago MM, Sawada NO. Symptoms of depression in patients with cancer of the head and neck undergoing radiotherapy treatment: a prospective study. *Rev Lat Am Enfermagem* 2012;20:362–8.
12. Zeller JL. High suicide risk found for patients with head and neck cancer. *JAMA* 2006;296:1716–17.
13. Devins GM, Payne AY, Lebel S, *et al.* The burden of stress in head and neck cancer. *Psychooncology* 2013;22:668–76.
14. Bjordal K, Kaasa S. Psychological distress in head and neck cancer patients 7–11 years after curative treatment. *Br J Cancer* 1995;71:592–7.
15. Britton B, Clover K, Bateman L, *et al.* Baseline depression predicts malnutrition in head and neck cancer patients undergoing radiotherapy. *Support Care Cancer* 2012;20:335–42.
16. National Alliance for Infusion Therapy and the American Society for Parenteral and Enteral Nutrition Public Policy Committee and Board of Directors. Disease-related malnutrition and enteral nutrition therapy: a significant problem with a cost-effective solution. *Nutr Clin Prac* 2010;25:548–54.
17. Raykher A, Russo L, Schattner M, Schwartz L, Scott B, Shike M. Enteral nutrition support of head and neck cancer patients. *Nutr Clin Pract* 2007;22:68–73.
18. Trucci VM, Veeck EB, Moroso AR. Current strategies for the management of oral mucositis induced by radiotherapy or chemotherapy [Portuguese]. *Rev Odonto Ciênc* 2009;24:309–14.
19. Rudolph D. Appetite stimulants in long term care: a literature review. *Internet J Adv Nurs Pract* 2010;11:n.p. [Available online at: http://ispub.com/IJANP/11/1/9279; cited November 1, 2013]
20. Amdouni S, Gagnon B, Chasen M. Does malnutrition contribute to the cancer patients distress? [slide presentation]. Presented at: ESMO Symposium on Cancer and Nutrition; Zurich, Switzerland; March 20–21, 2009. [Available online at: http://www.esmo.org/content/download/11034/211644/file/ESMO-Cancer-and-Nutrition-2009-Does-malnutrition-contribute-to-the-cance-%20patient-distress.pdf; cited October 28, 2013]
21. Carrera O, Adan RAH, Gutierrez E, *et al.* Hyperactivity in anorexia nervosa: warming up not just burning-off calories. *Plos One* 2012;7:e41851.
22. Walz DA. Cancer-related anorexia–cachexia syndrome. *Clin J Oncol Nurs* 2010;14:283–7.
23. Hopkinson JB, Wright DN, Foster C. Management of weight loss and anorexia. *Ann Oncol* 2008;19(suppl 7):vii289–93.
24. Grabe HJ, Lange M, Wolff B, *et al.* Mental and physical distress is modulated by a polymorphism in the 5-HT transporter gene interacting with social stressors and chronic disease burden. *Mol Psychiatry* 2005;10:220–4.
25. Wilhelm K, Gillis I, Reddy J, *et al.* Association between serotonin transporter promoter polymorphisms and psychological distress in a diabetic population. *Psychiatry Res* 2012;200:343–8.
26. Turnbull AV, Rivier CL. Regulation of the hypothalamic–pituitary–adrenal axis by cytokines: actions and mechanisms of action. *Physiol Rev* 1999;79:1–71.
27. Ottery FD. Patient-generated subjective global assessment. In: McCallum PD, Polisena CG, eds. *The Clinical Guide to Oncology Nutrition*. Chicago, IL: The American Dietetic Association; 2000: 11–23.
28. National Comprehensive Cancer Network (NCCN). *NCCN Clinical Practice Guidelines in Oncology: Distress Management.* Ver. 1.2005. Fort Washington, PA: NCCN; 2005.
29. Mergenthaler U, Heymanns J, Koppler H, *et al.* Evaluation of psychosocial distress in patients treated in a community-based oncology group practice in Germany. *Ann Oncol* 2011;22:931–8.
30. Everhart RS, Fiese BH. Development and initial validation of a pictorial quality of life measure for young children with asthma. *J Pediatr Psychol* 2009;34:966–76.
31. Goon PK, Stanley MA, Ebmeyer J, *et al.* HPV and head and neck cancer: a descriptive update. *Head Neck Oncol* 2009;1:36.
32. Herchenhorn D, Dias Fl. Advances in radiochemotherapy in the treatment of head and neck cancer. *Rev Hosp Clin Fac Med Sao Paulo* 2004;59:39–46.
33. Silander E, Jacobsson I, Bertéus–Forslund H, Hammerlid E. Energy intake and sources of nutritional suport in patients with head and neck cancer—a randomised longitudinal study. *Eur J Clin Nutr* 2013;67:47–52.
34. Carlson LE, Angen M, Cullum J, *et al.* High levels of untreated distress and fatigue in cancer patients. *Br J Cancer* 2004;90:2297–304.
35. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Acad Med* 2006;81:354–73.
36. Lynch J, Goodhart F, Saunders Y, O'Connor SJ. Screening for psychological distress in patients with lung cancer: results of a clinical audit evaluating the use of the patient Distress Thermometer. *Support Care Cancer* 2010;19:193–202.
37. Rosenthal DI, Mendoza TR, Chambers MS, *et al.* Measuring head and neck cancer symptom burden: the development and validation of the MD Anderson symptom inventory, head and neck module. *Head Neck* 2007;29:923–31.
38. Holland JC, Alici Y. Management of distress in cancer patients. *J Support Oncol* 2010;8:4–12.
39. Neilson K, Pollard AC, Boonzaier AM, *et al.* Psychological distress (depression and anxiety) in people with head and neck cancers. *Med J Aust* 2010;193(suppl):S48–51.

40. Vickery LE, Latchford G, Hewison J, Bellew M, Feber T. The impact of head and neck cancer and facial disfigurement on the quality of life of patients and their partners. *Head Neck* 2003;25:289–96.
41. Eades M, Chasen M, Bhargava R. Rehabilitation: long-term physical and functional changes following treatment. *Semin Oncol Nurs* 2009;25:222–30.
42. van Bokhorst–de van der Schuer, van Leeuwen PA, Kuik DJ, *et al.* The impact of nutritional status on the prognoses of patients with advanced head and neck cancer. *Cancer* 1999;86:519–27.
43. Santarpia L, Contaldo F, Pasanisi F. Nutritional screening and early treatment of malnutrition in cancer patients. *J Cachexia Sarcopenia Muscle* 2011;2:27–35.
44. Chasen MR, Dippenaar AP. Cancer nutrition and rehabilitation—its time has come! *Curr Oncol* 2008;15:117–22.
45. Eades M, Murphy J, Carney S, *et al.* Effect of an interdisciplinary rehabilitation program on quality of life in patients with head and neck cancer: review of clinical experience. *Head Neck* 2013;35:343–9.

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