Body image and sexuality in head and neck cancer patients
Melissant, H.C.

2021

document version
Publisher's PDF, also known as Version of record

Link to publication in VU Research Portal

citation for published version (APA)
Melissant, H. C. (2021). Body image and sexuality in head and neck cancer patients.

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

• Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
• You may not further distribute the material or use it for any profit-making activity or commercial gain
• You may freely distribute the URL identifying the publication in the public portal

Take down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:
vuresearchportal.ub@vu.nl

Download date: 05. Jul. 2021
Chapter 4

The course of sexual interest and enjoyment in head and neck cancer patients treated with primary (chemo)radiotherapy

Heleen C. Melissant
Femke Jansen
Laura E.R. Schutte
Birgit I. Lissenberg-Witte
Jan Buter
C. René Leemans
Mirjam A. Sprangers
Marije R. Vergeer
Ellen T. Laan
Irma M. Verdonck-de Leeuw

Oral Oncology (2018) 83: 120-126.
ABSTRACT

Introduction
The aim of this prospective study was to investigate the course of sexual interest and enjoyment in relation to sociodemographic and clinical factors, health-related quality of life (HRQOL), and symptoms of psychological distress in head and neck cancer (HNC) patients treated with primary (chemo)radiotherapy.

Methods
HNC patients (n = 354) completed patient-reported outcome measures (PROMs) on HRQOL (EORTC QLQ-C30 and QLQ-H&N35, including the sexuality subscale covering less sexual interest and enjoyment), and psychological distress (HADS) pretreatment, at 6-week follow-up and at 3-, 6-, 12-, 18-, and 24-month follow-up (i.e., after treatment). Linear mixed models were used to analyse the course of sexuality from pretreatment to 24-month follow-up, and to investigate its relation to sociodemographic and clinical factors, HRQOL, and psychological distress as measured at baseline, and to investigate the course of sexuality from 6- to 24-month follow-up in relation to these factors measured at 6-month follow-up.

Results
Before start of treatment, 37% of patients reported having less sexuality, which increased to 60% at 6-week follow-up, and returned to baseline level from 12-month follow-up onwards. Older age (p = 0.037) and trouble with social contact (p < 0.001), weight loss (p = 0.013), and constipation (p = 0.041) before treatment were associated with less sexuality over time. Female gender (p = 0.021) and poor social functioning (p < 0.001) at 6-month follow-up were associated with less sexuality from 6- to 24-month follow-up.

Discussion
Less sexuality is often reported in HNC patients treated with (chemo)radiotherapy. Using PROMs in clinical practice may help identify patients who might benefit from supportive care targeting sexuality.
INTRODUCTION

Sexual issues are often reported in patients with cancer\(^1\) and include changes in sexual function (e.g. decreased sexual desire and arousal, vaginal dryness, erectile and orgasm dysfunctions) and changes in sexual activity. Sexual issues can lead to significant distress and have a negative effect on well-being\(^2,3\) and health-related quality of life (HRQOL)\(^4,6\) of cancer patients. So far, most research on cancer and sexuality has been performed in patients with breast, prostate, or gynecological cancer, who, given the tumor site, are at high risk for developing sexual issues during and/or after treatment. However, head and neck cancer (HNC) patients are also at risk for developing sexual issues during and after cancer treatment, because they often have to deal with appearance changes in the (visible) head and neck area (e.g. facial scars due to surgery, skin problems due to (chemo)radiotherapy, or a stoma in the neck (in laryngectomized patients)), which can have a negative impact on body image and feelings of sexual attractiveness\(^6,7\). Moreover, functional barriers to sexuality may exist (e.g. problematic oral secretions, oral pain, or inability to move one’s neck). A review showed that 24%-100% of HNC patients reported a negative effect on their sexuality, with higher rates reported in women and those without a partner\(^8\). Also, differences in sexuality have been found between subtypes of HNC. For example, at diagnosis, less sexual interest was reported as one of the worst three symptoms in HNC patients, except for patients with a cancer of the tonsil and nasopharynx\(^9\). In addition, a longitudinal study found that patients with oral or oropharyngeal cancer reported more issues with sexuality over time than patients with hypopharyngeal and laryngeal cancer\(^10\).

More information is needed on HNC patients to investigate how often and when sexual issues arise and how it develops over time. Therefore, the first objective of this study was to investigate the course of sexual interest and enjoyment (hereafter referred to as “(less) sexuality”) in HNC patients from pretreatment to 6-week and 3-, 6-, 12-, 18-, and 24-month follow-up (i.e. after treatment). Moreover, understanding who is at risk for developing less sexuality is important in order to adequately detect emerging sexual issues and timely referral to appropriate supportive care. Risk factors before treatment might differ from risk factors at 6-month follow-up, when the acute side effects of the (chemo)radiotherapy have disappeared. The second objective of this study was to examine whether sociodemographic and clinical variables, symptoms of anxiety and depression, and HRQOL, before start of treatment and at 6-month follow-up, are associated with less sexuality over time in HNC patients.
MATERIAL AND METHODS

Participants and procedure
Patients were included at the Department of Otolaryngology – Head and Neck Surgery and at the Department of Radiotherapy of the VU University Medical Center (VUmc), Amsterdam, The Netherlands. From January 2008 to June 2014, 525 newly diagnosed HNC patients were treated with primary (chemo)radiotherapy with curative intent. These patients were asked to fill out patient-reported outcome measures (PROMs) using OncoQuest\textsuperscript{11-13}, a touch screen computer-assisted data collection system which is part of standard clinical practice to enable monitoring of quality of life, or using paper and pencil. Patients were encouraged to complete the PROMs before start of treatment and at every follow-up visit at one of the two departments. Patients were included in this study when they (1) were treated with primary (chemo) radiotherapy with curative intent for cancer of the oral cavity, oropharynx, hypopharynx, or larynx; (2) completed the pretreatment sexuality items of the EORTC QLQ-H&N35; (3) were ≥18 years old; and (4) provided consent to use the collected PROMs for scientific research. According to the Dutch Medical Research Involving Human Subjects Act, ethical approval was not necessary, because patients were not subjected to procedures or required to follow rules of behavior.

Outcome measures
Patients filled out three PROMs: the EORTC QLQ-C30, EORTC QLQ-H&N35, and the Hospital Anxiety and Depression Scale (HADS). We assessed the PROMs before treatment and at 6 weeks, and 3-, 6-, 12-, 18-, and 24-month follow-up (i.e. after treatment).

The EORTC QLQ-C30 is a cancer-specific quality of life questionnaire. It contains a global QOL scale, five functional scales (physical, role, emotional, cognitive, and social), three symptom scales (fatigue, nausea/vomiting, and pain) and 6 single items (dyspnea, insomnia, loss of appetite, constipation, diarrhea, and financial difficulties). The EORTC QLQ-H&N35 is a module specifically designed for HNC patients\textsuperscript{14}. It contains 7 symptom scales: oral pain (4 items), swallowing (5 items), senses (smell and taste) (2 items), speech (3 items), social eating (4 items), social contact (5 items), and sexuality (2 items). There are 11 single items covering problems with teeth, dry mouth, sticky saliva, cough, opening the mouth wide, feeling ill, weight loss or weight gain, use of nutritional supplements, feeding tubes, and use of painkillers. The primary outcome measure in this study was the EORTC QLQ-H&N35 “less sexuality” subscale, covering two questions: “During the last week have you felt less interest in sex?” and “During the last week have you felt less sexual enjoyment?”. The items were scored on a four-point Likert scale ranging from “not at all” (1) and “a little” (2) to “quite a bit” (3) and “very much” (4).
All scales and single items of the EORTC QLQ-C30 and EORTC QLQ-H&N35 are converted into a score from 0 to 100. For functioning scales and global QOL, a higher score indicates a better level of functioning, whereas for the symptom scales (including sexuality), a higher score represents higher levels of symptoms\textsuperscript{14-16}. The EORTC QLQ-C30 and EORTC QLQ-H&N35 have shown good psychometric properties in patients with cancer\textsuperscript{14,16}. There are cut-off scores available for the sexuality subscale (cut-off = 10)\textsuperscript{17} as well as for other scales of the EORTC QLQ-C30 and H&N35\textsuperscript{17,18}.

The Hospital Anxiety and Depression Scale (HADS) is a 14-item scale measuring symptoms of anxiety and depression. This scale is proven to have adequate psychometrical properties to identify psychological distress in cancer patients\textsuperscript{19-21}. A cut-off score of 14 for the total HADS and 7 for each of the anxiety and depression subscales was used\textsuperscript{22,23}.

Sociodemographic characteristics on age and gender were self-reported, and clinical characteristics were extracted from patients’ medical files.

**Statistical analyses**

Descriptive statistics were generated for sociodemographic and clinical characteristics and outcome measures. Independent t-tests and Chi-square tests were used to examine potential differences in sociodemographic and clinical variables between included patients and non-participants.

To describe the longitudinal course of sexuality among HNC patients, linear mixed models were used with fixed effects for time and a random effect for subject. A Bonferroni correction was applied taking into account multiple testing (yielding a corrected $p = 0.01$ and 99\% CI). To analyse potential factors associated with the course of sexuality over time, linear mixed models were used, with fixed effects for time, the potential factor(s), and time*factor, and a random effect for subject. A significant two-way interaction ($p < 0.05$) indicates that the course of sexuality over time differs between the different groups. A forward selection procedure ($p$-value for enter $< 0.05$) was performed to investigate which combination of factors predicted the course of sexuality best. Potential factors included age (dichotomized based on median split), gender (male/female), diagnosis (oral cavity, oropharynx, hypopharynx, larynx), adjuvant chemotherapy (yes/no), TNM stage (I to IV), the EORTC QLQ-C30 and EORTC QLQ-H&N35 subscales and individual items, as well as the HADS anxiety and depression subscale and total score. The EORTC QLQ-C30 and EORTC QLQ-H&N35 subscales and single items, and the HADS subscales and total score were dichotomized with evidence-based cutoff points\textsuperscript{17,18,22,23}. If cut-off points were not available (for senses problems, trouble with social contact, teeth, opening mouth, dry mouth, coughing, feeling ill, pain killer use, nutritional supplement use, feeding tube, weight loss, and weight gain), dichotomization was based on
the median split. We investigated potential factors associated with the course of sexuality over time before treatment as well as factors associated with the course of sexuality over time after treatment beginning at 6-month follow-up. The EORTC QLQ-C30, EORTC QLQ-H&N35, and HADS subscale scores and individual items were fixed at baseline for the first analysis and at 6 months for the second analysis. All analyses were performed according to the intention-to-treat principle. Patients treated for a recurrence, or second primary HNC tumor during follow-up, were excluded from that point of time onwards. Analyses were performed using the IBM Statistical package for the Social Sciences (SPSS) version 22 (IBM Corp., Armonk, NY USA). The significance level was set at 0.05.

RESULTS

Patient characteristics

Of 525 newly diagnosed HNC patients treated with primary (chemo) radiotherapy with curative intent, 12 patients were excluded because a tumor was localized in the nasopharynx, ear, or salivary gland or because of a lymph node metastasis from an unknown primary tumor. Of the 513 patients, 159 did not fill out any PROMs or the sexuality subscale items before start of treatment and were therefore excluded. In total, 354 patients were included in the study. There were no significant differences between the included patients and non-participants (Table 1). For 81% of the included patients at least one follow-up measurement was available, and response at follow-up measurements ranged between 22 and 56%.

| Characteristic          | Included patients | Non-participants | p-value |
|-------------------------|-------------------|-----------------|---------|
| **Mean age (SD)**       | 61 (9)            | 62 (9)          | 0.17    |
| **Gender**              |                   |                 | 0.16    |
| Male                    | 74%               | 68%             |         |
| Female                  | 26%               | 32%             |         |
| **Treatment**           |                   |                 | 0.43    |
| Radiotherapy            | 53%               | 49%             |         |
| Radiotherapy and chemotherapy | 47%          | 51%             |         |
| **Tumor site**          |                   |                 | 0.42    |
| Oral cavity             | 13%               | 12%             |         |
| Oropharynx              | 46%               | 39%             |         |
| Hypopharynx             | 12%               | 16%             |         |
| Larynx                  | 31%               | 33%             |         |
| **Tumor stage**         |                   |                 | 0.43    |
| I                       | 12%               | 9%              |         |
| II                      | 15%               | 15%             |         |
| III                     | 24%               | 20%             |         |
| IV                      | 49%               | 56%             |         |
Table 1 continued.

| Characteristic               | Included patients | Non-participants | p-value |
|------------------------------|-------------------|------------------|---------|
| N \( = 354 \)                 |                   | N \( = 159 \)    |         |
| **Assessment moments** \(^b\) |                   |                  |         |
| Before treatment             | 100%              |                  |         |
| 6-week follow-up             | 54%               |                  |         |
| 3-month follow-up            | 22%               |                  |         |
| 6-month follow-up            | 56%               |                  |         |
| 12-month follow-up           | 56%               |                  |         |
| 18-month follow-up           | 37%               |                  |         |
| 24-month follow-up           | 30%               |                  |         |

\(^a\) Patients with an unknown TNM stage (non-participants \( n = 13 \); included patients \( n = 1 \)) were excluded for this analysis. \(^b\) Patients who died or had a metastasis or second primary tumor between assessments were detracted from the total.

**Course of sexuality**

Before start of treatment, 37% of HNC patients reported less sexuality, based on a cut-off score of \( 10^{17} \) (mean = 17.1, SD = 26.4, range = 0-100), which increased to 60% at 6 week follow-up (mean = 34.7, SD = 35.3), and returned to baseline level over time with 37% at 12-month follow-up (mean = 16.7, SD = 24.9) and 24% at 24-month follow-up (mean = 13.2, SD = 27.8). In Figure 1, the means of the less sexuality subscale over time are presented. Results of the linear mixed models showed that from 12-month follow-up onwards, the difference in sexuality compared to the pretreatment score was no longer statistically significant (Table 2).

![Figure 1. Course of sexuality in HNC patients before treatment, 6-week, and 3-, 6-, 12-, 18-, and 24-month follow-up. A higher score represents less sexual interest and enjoyment.](image-url)


Table 2. Results of descriptives and linear mixed model analysis for the course of sexuality over time before treatment, 6-week, and 3-, 6-, 12-, 18-, and 24-month follow-up. A higher score represents less sexual interest and enjoyment.

|                          | Descriptives | Linear mixed model analysis |
|--------------------------|--------------|-----------------------------|
|                          | Mean (SD)    | Mean change from pretreatment | 99% CI             |
| Pretreatment (n = 354)    | 17.1 (26.4)  | -                           |                    |
| 6-week follow-up (n = 178)| 34.7 (35.3)  | 17.3                        | 12.0 to 22.6       |
| 3-month follow-up (n = 69)| 29.0 (32.2)  | 13.9                        | 6.1 to 21.7        |
| 6-month follow-up (n = 171)| 21.9 (30.8)  | 5.4                         | 0.04 to 10.8       |
| 12-month follow-up (n = 153)| 16.7 (24.9)  | 2.3                         | -3.3 to 7.9        |
| 18-month follow-up (n = 92)| 16.7 (25.3)  | 2.3                         | -4.5 to 9.2        |
| 24-month follow-up (n = 72)| 13.2 (27.8)  | -0.6                        | -7.7 to 7.6        |

Factors associated with the course of sexuality

Linear mixed model analyses showed that factors associated with the entire course of sexuality over time (pretreatment to 24-month follow-up) included the following: receiving chemotherapy, social functioning, appetite loss, constipation, diarrhea, trouble with social eating, trouble with social contact, trouble opening the mouth, dry mouth, and weight loss (Table 3).

Table 3. Results of the univariate linear mixed-model analyses regarding factors associated with the course of sexuality over time.

|                          | Pretreatment to 24-month follow-up (n = 354) | 6- to 24-month follow-up (n = 171) |
|--------------------------|---------------------------------------------|-----------------------------------|
|                          | p-value                                     | p-value                           |
| Demographic variables    |                                             |                                   |
| Time*Gender              | 0.163                                       | 0.099                             |
| Time*Age                 | 0.056 <sup>d</sup>                         | 0.192 <sup>d</sup>               |
| Clinical variables       |                                             |                                   |
| Time*Diagnosis <sup>a</sup> | 0.201                                       | 0.477                             |
| Time*Chemotherapy        | <sup>0.011</sup>                            | 0.956                             |
| Time*TNM stage           | 0.256                                       | 0.563                             |
| EORTC QLQ-C30            |                                             |                                   |
| Time*Global quality of life | 0.121                                       | 0.093                             |
| Time*Physical functioning| 0.066                                       | <sup>0.009</sup>                  |
| Time*Role functioning    | 0.493                                       | <sup>0.001</sup>                  |
| Time*Emotional functioning| 0.095                                       | <sup>0.210</sup>                  |
| Time*Cognitive functioning| 0.091                                       | <sup>0.014</sup>                  |
| Time*Social functioning  | <sup>0.013</sup>                           | <sup>&lt;0.001</sup>              |
| Time*Fatigue             | 0.853                                       | 0.128                             |
| Time*Nausea and vomiting | 0.076                                       | 0.041                             |
| Time*Pain                | 0.165                                       | 0.002                             |
| Time*Dyspnea             | 0.679                                       | 0.689                             |
| Time*Insomnia            | 0.266                                       | 0.994                             |
Factors associated with the post-treatment course of sexuality from 6- to 24-month follow-up were physical-, role-, cognitive-, and social functioning, nausea and vomiting, pain, appetite loss, financial difficulties, difficulty with swallowing, problems with senses, trouble with social eating, trouble with social contact, use of nutritional supplements, having a feeding tube, and psychological distress (HADS total).

The forward selection procedure revealed four factors measured prior to treatment that were associated with the course of sexuality over time (pretreatment to 24-month follow-up). First, HNC patients who reported trouble with social contact before treatment reported...
less sexuality than HNC patients who did not (p < 0.001), especially from 3-month follow-up onwards. Second, HNC patients who reported weight loss before treatment reported less sexuality than HNC patients without weight loss (p = 0.013); this difference declined over time. Third, HNC patients with constipation before treatment reported less sexuality than HNC patients without constipation (p = 0.041); this difference also declined over time. Fourth, HNC patients aged 62 years or older reported less sexuality than HNC patients younger than 62 years old (p = 0.037); this difference remained present over time. Graphical representations are shown in Figure 2 a-d.
Two factors were associated with the post-treatment course of sexuality over time from 6- to 24-month follow-up. HNC patients reporting a low level of social functioning at 6-month follow-up reported less sexuality than patients who did not (p < 0.001); this difference declined over time (Figure 3a). Female HNC patients indicated experiencing less sexuality at 6-month follow-up than male HNC patients (p = 0.021). This difference reversed over time,
showing that male HNC patients experienced less sexuality. In the long term, this difference between women and men disappeared (Figure 3b).

Figure 3 a-b. The course of sexuality at 6-, 12-, 18-, and 24-month follow-up, by the associated factor as measured at 6-month follow-up. All other factors were set at their mean value. A higher score represents less sexual interest and enjoyment.
DISCUSSION

In this study, we investigated the course of sexual interest and enjoyment over time and factors that were associated with it in HNC patients treated with primary (chemo)radiotherapy. Results showed that, prior to treatment, more than one-third of HNC patients reported less sexuality; 6 weeks after treatment, almost two-thirds reported less sexuality. In the long term, sexuality returned to baseline level. The peak in less sexuality 6 weeks after treatment might be explained by side effects resulting from the treatment, such as fatigue, feeling ill, nausea and vomiting, sticky saliva, and a dry mouth, which have previously been shown to peak at 6-week follow-up\(^\text{10}\). These symptoms may negatively impact sexual interest and enjoyment.

Three previous longitudinal studies among HNC patients\(^\text{10,24,25}\) found higher scores of less sexuality prior to treatment\(^\text{10,24}\) as well as at various follow-up times\(^\text{10,24,25}\). An explanation may be that, in the current study, patients were treated with primary (chemo) radiotherapy, whereas in the previous studies, patients treated with surgery were also included\(^\text{24,25}\), or all patients received adjuvant chemotherapy in addition to radiotherapy\(^\text{10}\). It is possible that surgical treatment leads to permanent facial disfigurement (e.g. scars or a tracheostomy) that may interfere with feelings of sexual attractiveness\(^\text{7,26}\) and subsequently may lead to a higher score of less sexuality in the long term. Adjuvant chemotherapy in HNC is associated with symptoms (such as fatigue and adverse effects)\(^\text{27-29}\) that might interfere with sexuality.

In the present study, we found that the course of sexuality over time in HNC patients during the first two years after diagnosis was associated with physical (weight loss, constipation), psychosocial (trouble with social contact, poor social functioning) as well as sociodemographic (age, gender) factors. Patients with weight loss and/or constipation reported less sexuality compared to patients without weight loss or without constipation. These problems are frequently reported consequences of HNC\(^\text{30}\), as the tumor can cause pain and difficulty swallowing while eating. As a consequence, the poor nutritional status and low-fiber intake may induce constipation\(^\text{31}\). It is known that eating problems in cancer patients may lead to weakness, increased complications, and more side effects of the cancer treatment\(^\text{32,33}\). This might also explain why HNC patients who have constipation and weight loss at diagnosis report less sexuality over time.

Trouble with social contact and poor social functioning were also associated with less sexuality over time. This makes sense, given the fact that sex and intimacy generally involve social interaction with another person. In particular, the association with poor social functioning at 6-month follow-up is an interesting finding. The social functioning subscale explores interference with family life and social activities because of the physical condition or
medical treatment. It is possible that some HNC patients become more socially withdrawn, not only from family and friends but also from their partner, which can negatively impact their sexual life.

This study showed that female patients reported less sexuality than men as measured at 6-month follow-up. The literature reported mixed results regarding gender differences in sexuality in HNC patients. It should be noted that the moderating effect of gender in this study was only reported 6 months after treatment and not prior to treatment. Moreover, the results reversed 12 months after treatment, where male HNC patients reported less sexuality. Results of this study also showed that older (> 62 years) HNC patients reported less sexuality over time than younger patients. This is in contrast to other studies that reported less sexuality in younger HNC patients. Further qualitative and quantitative research is needed to gain further insight into age and gender differences regarding sexuality in HNC patients.

In this study, we found no significant association between sexuality and tumor subsite. This is in accordance with the study of Bjordal et al. who also found no differences in sexuality among tumor subsites, as measured prior to the beginning of treatment. However, the results are in contrast with the study of Verdonck-de Leeuw et al. who found less sexuality over time in patients with oral/oropharyngeal cancer compared to hypopharyngeal/laryngeal cancer. An explanation might be that, in our study, four different tumor groups were compared, in contrast to two tumor groups in the other study. Future research should examine whether there are subsite-specific sexual symptoms. For example, surgically treated oral cancer may result in the loss of tongue and lip function and therefore may interfere with oral sex or kissing.

A strength of this study is the longitudinal design and large sample size (n = 354). A limitation of this study was that not all patients filled out the PROMS at every follow-up, which led to a fluctuating amount of data. However, participants did not differ from non-participants regarding sociodemographic and clinical characteristics. Linear mixed model analyses were used to handle the missing data at follow-up times, enabling usage of all collected data. Another limitation was that we used the sexuality subscale of the EORTC QLQ-H&N35, which contains only two items regarding sexual interest and sexual enjoyment. In order to gain a more comprehensive understanding of the impact of HNC on sexual well-being, a tool that specifically measures sexuality in HNC patients needs to be employed in future research. Furthermore, we did not have data on HPV status, which may be of importance in oral/oropharyngeal patients. However, a previous study did not find an association between sexual behavior and HPV status, although both patients with and without HPV showed significant decline in the frequency of sexual behavior at follow-up.
Conclusion
In conclusion, less sexuality is often reported in HNC patients treated with (chemo) radiotherapy. Less sexuality from pretreatment to 24-month follow-up is related to older age, pretreatment weight loss, constipation, and trouble with social contact. Less sexuality from 6- to 24-month follow-up is related to female gender and poor social functioning. Using PROMs in clinical practice may help identify those patients who might benefit from supportive care targeting sexuality.
REFERENCES

1. Schover LR, van der Kaaij M, van Dorst E, et al. Sexual dysfunction and infertility as late effects of cancer treatment. *EJC Suppl* 2014; 12: 41–53.
2. Mercadante S, Vitrano V, Catania V. Sexual issues in early and late stage cancer: a review. *Support Care Cancer* 2010; 18: 659–65.
3. Tierney DK. Sexuality: a quality-of-life issue for cancer survivors. *Semin Oncol Nurs* 2008; 18: 659–65.
4. Psoter WJ, Aguilar ML, Levy A, et al. A preliminary study on the relationships between global health/quality of life and specific head and neck cancer quality of life domains in Puerto Rico. *J Prosthodont* 2012; 21: 460–71.
5. Zwahlen RA, Dannemann C, Grätz KW, et al. Quality of life and psychiatric morbidity in patients successfully treated for oral cavity squamous cell cancer and their wives. *J Oral Maxillofac Surg* 2008; 66: 1125–32.
6. Rhoten BA, Murphy B, Ridner SH. Body image in patients with head and neck cancer: a review of the literature. *Oral Oncol* 2013; 49: 753–60.
7. Hung T-M, Lin C-R, Chi Y-C, et al. Body image in head and neck cancer patients treated with radiotherapy: the impact of surgical procedures. *Health Qual Life Outcomes* 2017; 15: 165.
8. Rhoten BA. Head and Neck Cancer and Sexuality: A Review of the Literature. *Cancer Nurs* 2016; 39: 313–20.
9. Hammerlid E, Bjordal K, Ahlner-Elmqvist M, et al. A prospective study of quality of life in head and neck cancer patients. Part I: at diagnosis. *Laryngoscope* 2001; 111: 669–80.
10. Verdonck-de Leeuw IM, Buffart LM, Heymans MW, et al. The course of health-related quality of life in head and neck cancer patients treated with chemoradiation: a prospective cohort study. *Radiother Oncol* 2014; 110: 422–8.
11. de Bree R, Verdonck-de Leeuw IM, Keizer AL, et al. Touch screen computer-assisted health-related quality of life and distress data collection in head and neck cancer patients. *Clin Otolaryngol* 2008; 33: 138–42.
12. Verdonck-de Leeuw IM, de Bree R, Keizer AL, et al. Computerized prospective screening for high levels of emotional distress in head and neck cancer patients and referral rate to psychosocial care. *Oral Oncol* 2009; 45: e129–33.
13. Cnossen IC, de Bree R, Rinkel RN, et al. Computerized monitoring of patient-reported speech and swallowing problems in head and neck cancer patients in clinical practice. *Support Care Cancer* 2012; 20: 2925–31.
14. Bjordal K, Hammerlid E, Ahlner-Elmqvist M, et al. Quality of life in head and neck cancer patients: validation of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-H&N35. *J Clin Oncol* 1999; 17: 1008–19.
15. Fayers P, Bottomley A. EORTC Quality of Life Group, Unit Q of L. Quality of life research within the EORTC—the EORTC QLQ-C30. *Eur J Cancer* 2002; 38(Suppl 4): S125–33.
16. Aaronson NK, Ahmedzai S, Bergman B, et al. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality of life instrument for use in international clinical trials in oncology. *J Natl Cancer Inst* 1993; 85: 365–76.
17. Jansen F, Snyder CF, Leemans CR, et al. Identifying cutoff scores for the EORTC QLQ-C30 and the head and neck cancer-specific module EORTC QLQ-H&N35 representing unmet supportive care needs in patients with head and neck cancer. *Head Neck* 2016; 38(Suppl 1): E1493–500.
18. van de Poll-Franse LV, Mols F, Gundy CM, et al. Normative data for the EORTC QLQ-C30 and EORTC-sexuality items in the general Dutch population. *Eur J Cancer* 2011; 47: 667–75.
19. Katz MR, Kopel N, Waldron J, et al. Screening for depression in head and neck cancer. *Psychooncology* 2004; 13: 269–80.
20. Walker J, Postma K, McHugh GS, et al. Performance of the hospital anxiety and depression scale as a screening tool for major depressive disorder in cancer patients. *J Psychosom Res* 2007; 101: 1484–88.
21. Vodermaira A, Linden W, Siu C. Screening for emotional distress in cancer patients: a systematic review of assessment instruments. *J Natl Cancer Inst* 2009; 101: 1484–88.
22. Ibbotson T, Maguire P, Selby P, et al. Screening for anxiety and depression in cancer patients: the effects of disease and treatment. *Eur J Cancer* 1994; 30A: 37–40.
23. Zigmond AS, Snalith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983; 67: 361–70.
24. Bjordal K, Ahlner-Elmqvist M, Hammerlid E, et al. A prospective study of quality of life in head and neck cancer patients. Part II: Longitudinal Data. *Laryngoscope* 2001; 111: 1440–52.
25. de Graeff A, de Leeuw JR, Ros WJ, et al. A prospective study on quality of life of patients with cancer of the oral cavity or oropharynx treated with surgery with or without radiotherapy. *Oral Oncol* 1999; 35: 27–32.
THE COURSE OF SEXUAL INTEREST AND ENJOYMENT IN HNC PATIENTS

26. Monga U, Tan G, Ostermann HJ, et al. Sexuality in head and neck cancer patients. *Arch Phys Med Rehabil* 1997; 78: 298–304.
27. Husson O, Mols F, van de Poll-Franse L, et al. Variation in fatigue among 6011 (long-term) cancer survivors and a normative population: a study from the population-based PROFILES registry. *Support Care Cancer* 2015; 23: 2165–74.
28. Cooper JS, Pajak TF, Forastiere AA, et al. Postoperative concurrent radiotherapy and chemotherapy for high-risk squamous cell carcinoma of the head and neck. *N Engl J Med* 2004; 350: 1937–44.
29. Bernier J, Domenge C, Ozsahin M, et al. Postoperative irradiation with or without concomitant chemotherapy for locally advanced head and neck cancer. *N Engl J Med* 2004; 350: 1945–52.
30. Lees J. Incidence of weight loss in head and neck cancer patients on commencing radiotherapy treatment at a regional oncology centre. *Eur J Cancer Care (Engl)* 1999; 8: 133–6.
31. Smith S. Evidence-based management of constipation in the oncology patient. *Eur J Oncol Nurs* 2001; 5: 18–25.
32. Larsson M, Hedelin B, Johansson I, et al. Eating problems and weight loss for patients with head and neck cancer: a chart review from diagnosis until one year after treatment. *Cancer Nurs* 2005; 28: 425–35.
33. Hammerlid E, Wirblad B, Sandin C, et al. Malnutrition and food intake in relation to quality of life in head and neck cancer patients. *Head Neck* 1998; 20: 540–8.
34. Bjorndal K, de Graeff A, Fayers P, et al. A 12 country field study of the EORTC QLQ-C30 (version 3.0) and the head and neck cancer specific module (EORTC QLQ-H&N35) in head and neck patients. *Eur J Cancer* 2000; 36: 1796–807.
35. Rogers SN, Hazeldine P, O’Brien K, et al. How often do head and neck cancer patients raise concerns related to intimacy and sexuality in routine follow-up clinics? *Eur Arch Otorhinolaryngol* 2015; 272: 207–17.
36. Singer S, Danker H, Dietz A, et al. Sexual problems after total or partial laryngectomy. *Laryngoscope* 2008; 118: 2218–24.
37. Moreno KF, Khabbaz E, Gaitonde K, et al. Sexuality after treatment of head and neck cancer: findings based on modification of sexual adjustment questionnaire. *Laryngoscope* 2012; 122: 1526–31
38. Low C, Fullarton M, Parkinson E, et al. Issues of intimacy and sexual dysfunction following major head and neck cancer treatment. *Oral Oncol* 2009; 45: 898–903.
39. O’Brien K, Roe B, Low C, et al. An exploration of the perceived changes in intimacy of patients’ relationships following head and neck cancer. *J Clin Nurs* 2012; 21: 2499–508.
40. Taberna M, Inglehart RC, Pickard RKL, et al. Significant changes in sexual behavior after a diagnosis of human papillomavirus-positive and human papillomavirus-negative oral cancer. *Cancer* 2017; 123: 1156–65.