Changes in Quality of Life Over 1 Year in Patients With Head and Neck Cancer

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Objectives: To characterize and compare quality of life (QOL) in patients with head and neck cancer shortly before initial treatment and 1 year later and to study the predictors of changes in QOL over 1 year.

Design: Prospective cohort study.

Setting: Three otolaryngology clinics.

Patients: Three hundred sixteen patients having newly diagnosed squamous cell head and neck cancer.

Main Outcome Measure: Health-related QOL was assessed using the 36-item Short-Form Health Survey and a head and neck cancer–specific QOL scale.

Results: Over 1 year, QOL decreased for physical functioning measures and eating but improved for mental health QOL. Depression and smoking were major predictors of poor QOL at baseline. Major predictors of change in QOL from baseline to 1 year were treatment factors, especially feeding tube placement (9 scales), chemotherapy (3 scales), and radiation therapy (3 scales). Baseline smoking and depressive symptoms also remained significant predictors of several QOL scales at 1 year.

Conclusions: Health-related physical QOL tended to decline over 1 year and mental health QOL improved. The major predictors of change in QOL were treatment factors, smoking, and depressive symptoms. Physicians should alert patients to the relative effects on QOL one may experience with different treatments.


IT IS ESTIMATED THAT MORE THAN 40 000 new cases of head and neck cancer are diagnosed each year in the United States. In addition to mortality, head and neck cancer and its treatment produce substantial reductions in health-related quality of life (QOL). The treatments tend to produce pain, disfigurement, eating problems, and communication problems. Many patients become disabled, and about one-third of patients continue to smoke and half are depressed.

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Head and neck cancer is less common; therefore, large sample sizes are difficult to accrue. Consequently, many studies of QOL in patients with head and neck cancer have included sample sizes of fewer than 100 patients and have been limited in the number of predictors that could be placed in models for QOL. Some small studies have examined clinical variables and QOL. For example, a study of 59 patients showed that dysphasia adversely affected QOL, a study of 49 patients showed that low QOL predicted later malnutrition, and a study by our group showed that 21 patients treated with chemotherapy and radiation therapy had better QOL than 25 patients treated with surgery and radiation therapy. Other small studies have examined psychosocial variables and QOL. For example, a prospective study of 35 patients with head and neck cancer showed that depression and pain were associated with QOL, and another cross-sectional study by our group with 81 patients showed that smoking and depression were associated with QOL. Power analyses using the methods and conventions of Cohen indicate that samples of 126 or 128 patients are required to have a power of 80% to detect medium-sized differences between 2 percentages or 2 means. Thus, many previous studies were seriously underpowered for detecting medium-sized effects and were unable to include control variables.

A few larger QOL studies have been conducted in patients with head and neck cancer. Previously, our group reported on the
clinical predictors of QOL in a cross-sectional sample of 570 patients with head and neck cancer, controlling for time since diagnosis. Many previous studies such as this have examined QOL in patients in cross-sectional designs in which larger numbers of patients can be accrued, but the benefits of capturing changes over time are lost in this design. In contrast, 2 larger longitudinal studies (N=357 and N=167) reporting on the same large cohort of patients in Norway and Sweden describe the changes in QOL in patients with head and neck cancer and 1- and 5-year follow-up, but predictors of QOL are not reported. Moreover, 2 larger longitudinal studies by de Graeff et al (N=153 and N=208) discuss psychosocial factors such as depression, cognitive factors, and marital status and QOL in patients with head and neck cancer, and another study by de Graeff et al of 107 patients addresses cancer stage and treatments as predictors of QOL. In a prospective study of 105 patients with head and neck cancer, Gritz et al report on the influence of clinical (ie, treatment) and psychosocial (ie, smoking) variables and QOL, but similar to other smaller studies, the number of control variables in the models are limited. Data collection for these larger studies can be time consuming and tedious, many patients do not survive, and dropout rates are high.

To build on our previous work and the work of others, we prospectively measured pretreatment and posttreatment QOL in 316 patients having newly diagnosed head and neck cancer and collected a comprehensive set of 18 demographic, psychosocial, clinical, and treatment predictor variables. A sample of at least 150 patients is needed to have 80% power for detecting a medium-sized effect in multiple linear regression analyses with 18 predictors (as used in our study). Identification of both clinical and psychosocial risk factors for poor QOL may have some prognostic value because QOL has been shown to predict survival. Closer follow-up and earlier intervention in patients with head and neck cancer with poor QOL may result in improved outcomes.

**METHODS**

**DESIGN**

This was a longitudinal study, specifically, a 2-wave cohort study with the same 316 patients included at baseline (before treatment) and 1 year later. The explanatory variables were time of assessment, demographic data, depressive symptoms, smoking, alcohol problems, clinical measures, and treatment variables. The outcome variables were QOL scales.

**SAMPLE AND SETTING**

The sample for this study is a subsample of patients with head and neck cancer enrolled in the ongoing University of Michigan Head and Neck Cancer Specialized Program of Research Excellence. Patients were recruited from 3 hospital facilities: the University of Michigan Medical Center, Veterans Affairs Ann Arbor Healthcare System, and Henry Ford Hospital. Human subjects’ approval was received from all 3 sites. Patients were included in the Specialized Program of Research Excellence if they had newly diagnosed head and neck squamous cell carcinoma; they were excluded if they were younger than 18 years, pregnant, non-English speaking, or mentally unstable. Of the 854 patients approached to participate in the study, 263 (31%) refused or did not return a completed baseline survey and 150 (18%) were ineligible because they had a diagnosis that was not included in this study.

To be included in analyses for the current study, patients must have survived and provided complete data at baseline and 1-year follow-up; 316 of the 441 eligible patients (72%) met this criterion. Those who did not included 68 (15%) who died, 13 (3%) who were excluded because of missing data, and 44 (10%) who did not return a 1-year survey for other reasons.

**MEASURES**

**Demographic Measures**

Demographic measures consisted of age, sex, race/ethnicity, marital status, and educational achievement level. Because there were few African American and other race participants compared with white participants, race/ethnicity was dichotomized as non-Hispanic white and minority patients. Education was dichotomized as high school or less vs some college or more. Marital status was dichotomized as married or not.

**Clinical Measures**

Comorbidities were measured by chart abstraction using the Adult Comorbidity Evaluation–27 test, a validated comorbidity index designed to evaluate levels of comorbidity for predicting survival and QOL in patients with head and neck cancer. The score on the Adult Comorbidity Evaluation–27 was classified into 2 groups: moderate to severe comorbidity or none to mild comorbidity. Other clinical measures abstracted from the patient medical records included tumor site and stage; date of diagnosis; and types and dates of surgery, chemotherapy, and radiation therapy. Information on whether the patient had a feeding tube in place at the time of the 1-year survey was also recorded. Because studies have indicated that patients with laryngeal cancer have the best prognosis, tumor site was segregated into 3 groups: oral cavity or sinus; oropharynx, hypopharynx, nasopharynx, or unknown; and larynx. Tumor stage was dichotomized as stages 0, 1, and II vs stages III and IV.

**DEPRESSIVE SYMPTOMS, SMOKING, AND ALCOHOL USE MEASURES**

The survey had questions about depression, smoking status, and alcohol use, using previously validated instruments. Probable depression was measured using the 5-item Geriatric Depression Scale–Short Form; a score of 4 or higher on this scale indicates probable depression. Anyone smoking within the...
last month was considered a smoker. The 10-item Alcohol Use Disorders Identification Test was used to assess the amount of alcohol intake and related problems; a score of 8 or higher on this test indicates high risk of alcohol-related disorders.27,28

QOL MEASURES

Quality of life was assessed using the 36-item Short-Form Health Survey (SF-36), a validated general health status measure commonly used to assess physical, social, role, and emotional functioning.29 A 10-point difference on a subscale of the SF-36 is considered practically important. The Head and Neck Quality of Life (HNQoL) instrument30 was used to measure disease-specific QOL and includes 20 items covering 4 domains: eating and swallowing, communication, head and neck pain, and emotional well-being.31 Low scores on the subscales of the SF-36 or the HNQoL indicate low QOL.

ANALYSIS

Descriptive statistics were calculated for all measures, with the choice of statistics depending on the scale of measurement. Frequency and percentage are given for categorical variables, and mean and standard deviation are given for quantitative measures. Tests of changes in QOL across time were calculated using paired t tests. Ordinary least squares multiple linear regression was used to determine significant predictors of QOL at baseline and at 1 year.

RESULTS

Retention of the sample was determined primarily by death. Of 112 patients not retained, 68 died. Comparisons of those retained vs those not retained based on their baseline data are consistent with serious health problems being responsible for loss to follow-up. Those who did not return had significantly lower body mass index and physical activity scores at baseline, had educational achievement at the high school level or lower, and had moderate or severe comorbidities.

Baseline demographic data, baseline health characteristics, and treatment are given in Table 1. At 1 year, most patients had undergone chemotherapy (64.9%), radiation therapy (86.4%), or surgery (50.6%). Most patients (76.9%) had undergone more than 1 of these treatments.

Mean QOL scores for patients at baseline are given in Table 2. Mean scores on the subscales of the SF-36 ranged from 51.8 (vitality) to 72.7 (physical functioning), which are each about 10 points lower than the mean in US general population samples.29 Mean scores on the 4 subscales of the HNQoL ranged from 65.8 (bodily pain) to 80.9 (eating).

Table 2 gives multivariate regression results predicting baseline QOL scores from baseline predictor variables of hospital site; age, sex, race/ethnicity; education, marital status; depressive symptoms, smoking in the last month; alcohol problem, tumor site and tumor stage; and level of comorbidity. Three factors (smoking, depressive symptoms, and moderate to severe comorbidity) were significant predictors of low QOL scores on most of the 12 scales. Smoking was a significant predictor of all but the role-emotional domain on the SF-36 scale; depres-
sion was a significant predictor of lower scores on all of the QOL scales; and moderate or severe comorbidity was significantly associated with lower scores on all of the SF-36 scales and also with pain on the HNQoL. Several of the statistically significant effects given in Table 3 are greater than the minimally important changes estimated by Kosinski et al.31 or the medium-sized changes defined by Samsa et al.32

The kinds of regression analysis used previously to predict baseline QOL scores were repeated predicting 1-year QOL from baseline predictors, treatment, and the baseline QOL scale score. Including the baseline score as a covariate means that other results from these regressions are effectively predicting changes in QOL scores from baseline. Results are given in Table 4.

### Table 2. Mean Quality of Life Scores of Patients With Newly Diagnosed Head and Neck Cancer at Baseline and 1 Year

<table>
<thead>
<tr>
<th>Health Concept</th>
<th>Minimally Important Change, Mean (SD)</th>
<th>Moderate-Sized Change, Mean (SD)</th>
<th>No. of Patients</th>
<th>Mean (SD)</th>
<th>No. of Patients</th>
<th>Mean (SD)</th>
<th>Difference From Baseline at 1 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical functioning</td>
<td>8.4 (1.4)</td>
<td></td>
<td>315</td>
<td>72.7 (28.2)</td>
<td>316</td>
<td>62.7 (29.6)</td>
<td>-9.9&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Role-physical</td>
<td>21.0 (2.7)</td>
<td></td>
<td>314</td>
<td>56.3 (43.8)</td>
<td>314</td>
<td>46.9 (43.7)</td>
<td>-9.2&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Pain index</td>
<td>14.7 (1.3)</td>
<td></td>
<td>316</td>
<td>61.9 (26.5)</td>
<td>314</td>
<td>64.6 (26.3)</td>
<td>2.6</td>
</tr>
<tr>
<td>General health perceptions</td>
<td>4.2 (1.0)</td>
<td></td>
<td>313</td>
<td>60.3 (22.0)</td>
<td>316</td>
<td>58.6 (24.3)</td>
<td>-1.6</td>
</tr>
<tr>
<td>Vitality</td>
<td>11.1 (1.4)</td>
<td></td>
<td>315</td>
<td>51.8 (23.1)</td>
<td>316</td>
<td>50.1 (22.6)</td>
<td>-1.7</td>
</tr>
<tr>
<td>Social functioning</td>
<td>11.7 (1.7)</td>
<td></td>
<td>316</td>
<td>68.5 (28.3)</td>
<td>314</td>
<td>70.6 (28.9)</td>
<td>2.1</td>
</tr>
<tr>
<td>Role-emotional</td>
<td>17.9 (3.0)</td>
<td></td>
<td>314</td>
<td>62.2 (43.6)</td>
<td>313</td>
<td>65.6 (41.8)</td>
<td>3.4</td>
</tr>
<tr>
<td>Mental health index</td>
<td>7.3 (1.0)</td>
<td></td>
<td>316</td>
<td>65.9 (22.0)</td>
<td>316</td>
<td>71.2 (21.1)</td>
<td>5.3&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>HNQoL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating</td>
<td></td>
<td></td>
<td>315</td>
<td>80.9 (22.5)</td>
<td>314</td>
<td>64.6 (25.7)</td>
<td>-16.5&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td>314</td>
<td>72.5 (28.8)</td>
<td>315</td>
<td>71.4 (28.0)</td>
<td>2.4</td>
</tr>
<tr>
<td>Emotional distress</td>
<td></td>
<td></td>
<td>315</td>
<td>66.6 (22.5)</td>
<td>313</td>
<td>75.6 (22.8)</td>
<td>9.2&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Bodily pain</td>
<td></td>
<td></td>
<td>316</td>
<td>66.5 (23.4)</td>
<td>315</td>
<td>68.2 (26.0)</td>
<td>-1.0</td>
</tr>
</tbody>
</table>

Abbreviations: HNQoL, Head and Neck Quality of Life; SF-36, 36-item Short-Form Health Survey; ellipses, not applicable.

a All scales are based on a scale of 0 to 100. For all scales, the higher the score the better the subject’s health-related quality of life in that domain.
b Estimates of minimally important changes taken from Kosinski et al.31
c Estimates of moderate-sized changes defined by Samsa et al.32 based on Cohen.9

### Table 3. Significant Parameter Estimates for Regressions of SF-36 and HNQoL Scale Measurements at Baseline

<table>
<thead>
<tr>
<th>Predictors</th>
<th>SF-36</th>
<th>HNQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physical functioning</td>
<td>Role-physical</td>
</tr>
<tr>
<td>(n=315; R²=0.28)</td>
<td>(n=314; R²=0.19)</td>
<td>(n=316; R²=0.25)</td>
</tr>
<tr>
<td>VA Ann Arbor Healthcare System</td>
<td>-4.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-3.4&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Henry Ford Hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (in decades)</td>
<td>-7.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-12.6&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational achievement, high school or less</td>
<td>-6.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonwhite/Hispanic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharynx</td>
<td>-0.4</td>
<td>-3.5</td>
</tr>
<tr>
<td>Oral cavity/sinus</td>
<td>-11.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-7.3&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Stage III or IV</td>
<td>-8.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-8.4&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Moderate to severe comorbidity</td>
<td>-18.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-15.4&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Smoked in last month</td>
<td>-9.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-10.8&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Alcohol problem</td>
<td>-7.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-21.9&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: HNQoL, Head and Neck Quality of Life; SF-36, 36-item Short-Form Health Survey; VA, Veterans Affairs; ellipses, not significant.

a P<.01.
b P<.05.
The corresponding baseline QOL score was a significant predictor of 11 of the 12 QOL scale scores, failing only in predicting the role-emotional domain. Depressive symptoms and baseline smoking each remained significant predictors of change on 6 of the 12 QOL scales. Most of the prediction (beyond that from the baseline QOL scores) came from 4 indicators of treatment: presence of a feeding tube at 1 year, chemotherapy, radiation therapy, and surgery. Presence of a feeding tube at 1 year was negatively associated with changes in 9 of the 12 QOL scale scores. Chemotherapy and radiation therapy have a more localized effect, at least at 1 year after treatment. To some extent, this may reflect the timing of surgery vs chemotherapy and radiation therapy because radiation therapy and chemotherapy continue later in the year and may have more effect at the 1-year assessment. Typically, how-

The most interesting finding is that the significant predictors of QOL at baseline (before any treatment) and change in QOL scores at 1 year were different. At baseline, psychosocial factors (smoking and depression) were the most consistent predictors of QOL. However, at 1 year (controlling for baseline QOL scores, which were highly correlated with 1-year QOL scores), clinical factors also became predictive of QOL. Baseline smoking and depressive symptoms were also predictive of QOL at 1 year, although less so than having a feeding tube and less so than at baseline.

Treatment factors were significant predictors of change in QOL. In particular, having a feeding tube at 1 year was associated with reductions in speech, eating, vitality, role-physical, social functioning, physical functioning, HNQoL pain, HNQoL emotion, and general health perceptions. This corroborates our previous findings in a different population that demonstrated that presence of a feeding tube had the most negative clinical effect on QOL in patients with head and neck cancer. Radiation treatment was negatively associated with changes in speech, eating, and pain on the HNQoL scale, and chemotherapy was negatively associated with changes in speech, eating, and role-physical.

In contrast, surgical treatment was associated with a negative change in role-physical and bodily pain on the SF-36 but not in any of the disease-specific QOL domains of the HNQoL scale. This suggests that head and neck surgery may affect general QOL, whereas head and neck chemotherapy and radiation therapy have a more localized effect, at least at 1 year after treatment. To some extent, this may reflect the timing of surgery vs chemotherapy and radiation therapy because radiation therapy and chemotherapy continue later in the year and may have more effect at the 1-year assessment. Typically, how-

### Table 4. Significant Parameter Estimates for Regressions of SF-36 and HNQoL Instrument Measurements at 1 Year After Diagnosis

<table>
<thead>
<tr>
<th>Predictors</th>
<th>SF-36</th>
<th>HNQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Functioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=315; $R^2=0.48$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role-Physical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=312; $R^2=0.37$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body Pain Perceptions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=318; $R^2=0.43$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Health Perceptions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=312; $R^2=0.43$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=312; $R^2=0.34$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Functioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=312; $R^2=0.43$)</td>
<td></td>
<td></td>
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<tr>
<td>Role-Emotional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=312; $R^2=0.31$)</td>
<td></td>
<td></td>
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<tr>
<td>Mental Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=312; $R^2=0.21$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=313; $R^2=0.41$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=312; $R^2=0.25$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=312; $R^2=0.32$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=315; $R^2=0.32$)</td>
<td></td>
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</tr>
</tbody>
</table>

**Abbreviations:** HNQoL, Head and Neck Quality of Life; QOL, quality of life; SF-36, 36-item Short-Form Health Survey; ellipses, not significant.

**a** $P<.05$.

**b** $P<.01$.
ever, after 6 months to 1 year, QOL scores remain relatively stable compared with those in the first 6 months after diagnosis or treatment. Each method of therapy is associated with adverse effects on QOL: chemotherapy and radiation therapy have profound effects on speech and eating; surgery and chemotherapy are associated with decrements on more of the physical domains of general health as measured using the SF-36. If 1 or more methods of treatment can be avoided without adverse effects on disease-free survival, better QOL outcomes might be expected. Alternatively, if advances in the fields of imaging, biological markers, genomics, proteomics, sentinel node testing, chemotherapy, or radiation therapy enable safe reduction in the amount of treatment necessary for any patient or if advances in radiotherapy can reduce toxic adverse effects, it could be predicted that QOL outcomes might be improved in the future. The data suggest that modifications in chemotherapy and radiation therapy protocols to improve speech and swallowing may be warranted.

At 1-year follow-up, the most consistent predictor of QOL was baseline QOL score. Each point increase in QOL scores at baseline was associated with a 0.2- to 0.5-point increase in that same domain score at 1 year (Table 4). The only exception was the role-emotional domain of the SF-36, which approached significance (P = .10). The data corroborate the findings of de Graeff et al that a high level of depressive symptoms and low performance status at baseline and combination treatment were significant predictors of increased severity of symptoms and poor functioning after treatment. Likewise, patients with poor QOL scores are likely to have correspondingly lower QOL scores at 1 year after treatment. Thus, special attention to and consideration for rehabilitation should be considered for patients with poor baseline QOL scores. Whether this needs to be assessed clinically or by formally using QOL assessments such as the SF-36 is unknown, but it is likely that clinicians might need to consider a broader assessment of well-being than is currently practiced. Systematized health status measures might be a more time-efficient way of assessing baseline or long-term QOL.

We noted that, at baseline, patients with stage III or IV cancers had worse bodily pain scores after multivariate analysis and worse HNQoL eating and pain scores, but at 1 year, these associations were no longer significant. Vartanian et al found that advanced primary site T and N stages were associated with worse QOL scores on bivariate and multivariate analysis in 344 Brazilian patients with head and neck cancer. Hammerlid and colleagues reported advanced stage as a predictor of poor QOL at 1 year or longer after treatment, but the relationship did not hold up on multivariate analysis. Fang et al found that patients with stage IV cancer had worse QOL scores on univariate analysis but better QOL scores on multivariate analysis. Our research with other large populations has not demonstrated an effect of cancer stage on QOL. Nor have we found that cancer stage predicts QOL at baseline because anxiety and depressive reactions to the diagnosis of cancer are common. Thus, there may be some “floor effect” for mental well-being that occurs near the time of diagnosis, and patients are likely to improve in most cases. Another study has also found decrements in physical functioning but improved sense of mental well-being after treatment.

Nevertheless, the probable effect of depressive symptoms on QOL is evident in strong associations (at the time of diagnosis) between worse depressive symptoms and most of the general health-related QOL scores and the disease-specific scores on the HNQoL. Decrements in scores ranged from 7 to 39 points (on a scale of 100) in patients with depression symptoms. In addition, baseline depression was associated with lower eating, vitality, role-physical, bodily pain, role-emotional, and general health perception scores at 1 year. Clearly, depressive symptoms are associated with the broadest range and highest magnitude of decrements in QOL scores and, thus, may represent one of the greatest opportunities to improve QOL. Others have noted similar findings. Depression needs to be assessed and actively treated.

About 43% of patients having newly diagnosed head and neck cancer had smoked in the last month. Smoking was highly correlated with decreased QOL scores at baseline and at 1-year follow-up. Even after controlling for baseline QOL, smokers at baseline had lower physical functioning, general health perceptions, social functioning, role-emotional, mental health, and HNQoL pain scores. This corroborates previous studies of patients with head and neck cancer and lung cancer that found broad decrements in many domains of QOL in patients who continued to smoke. It is possible that clinicians are not getting the message across that smoking affects QOL. In a study by Oncken et al, premature death was identified as a risk by 95% of smokers, yet only 63.5% reported that disability could also result from smoking. Perhaps emphasizing these
data on QOL, in addition to longevity, might improve our ability to counsel patients to quit smoking. A new diagnosis of head and neck cancer may be a teachable moment during which patients are motivated to quit smoking. Previous studies have shown that smoking cessation interventions are efficacious in patients with head and neck cancer. Efforts to identify and aggressively treat patients with nicotine addiction have tremendous potential to improve QOL and survival.

In summary, smoking and depression were highly predictive of QOL scores at baseline. One year later, patients with head and neck cancer have substantial decrements in eating and physical functioning, as well as mild improvements in mental health. Pretreatment QOL scores, having a feeding tube, chemotherapy and radiation therapy, and baseline smoking and depressive symptoms were strongly associated with QOL scores at 1 year.

It should be acknowledged that patients were not randomly assigned to treatments; thus, comparisons of the outcomes of alternative treatments may reflect pre-existing differences among patients. We statistically controlled for some background differences including cancer site and stage, and comorbidities. However, only a randomized trial can completely overcome this limitation. Despite efforts to add sites and recruit minority patients, only about 12% of the patients were members of minority groups. Thus, generalization of the results to Hispanics and racial/ethnic minorities is limited. These problems will generally be reduced as the study continues to accrue new patients. Another limitation of this study that will be overcome in future years is the follow-up time frame limited to 1 year. Eventually, 2-year follow-up data will be available in sufficient numbers for analyses to see how these relationships hold up over a longer time frame.

Submitted for Publication: November 13, 2006; final revision received August 13, 2007; accepted August 17, 2007.

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Author Contributions: Dr Ronis had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Ronis, Duffy, Fowler, Khan, and Terrell. Acquisition of data: Duffy, Fowler, Khan, and Terrell. Analysis and interpretation of data: Ronis, Duffy, Fowler, Khan, and Terrell. Drafting of the manuscript: Ronis, Duffy, Khan, and Terrell. Critical revision of the manuscript for important intellectual content: Ronis, Duffy, Fowler, Khan, and Terrell. Statistical analysis: Ronis and Fowler. Obtained funding: Duffy and Terrell. Administrative, technical, and material support: Fowler, Khan, and Terrell. Study supervision: Ronis, Duffy, Khan, and Terrell.

Financial Disclosure: None reported.

Funding/Support: This study was supported by grant P50 CA97248 made available by the US National Institutes of Health through the University of Michigan Head and Neck Specialized Program of Research Excellence.

Additional Contributions: Suzan McCormick, BS, Chelsea Hughes, RN, Elizabeth Knight, RN, and the staffs of the University of Michigan Hospital, Ann Arbor Veterans Affairs Medical Center, and Henry Ford Hospital Otolaryngology clinics assisted with recruitment and data collection. We thank the patients who generously participated in this study.

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