THE ADDITION OF MOOD AND ANXIETY DOMAINS TO THE UNIVERSITY OF WASHINGTON QUALITY OF LIFE SCALE

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Accepted 2 January 2002
Published online 8 May 2002 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/hed.10106

Abstract: *Background.* There are numerous head and neck specific quality of life questionnaires, each having its own merits and disadvantages. The University of Washington questionnaire has been widely used and is notable by the inclusion of a shoulder dysfunction domain, domain importance ratings, and patient free text. It is short, simple to process, and provides clinically relevant information. However, it has lacked any psychological dimension of quality of life. The aim of this study was to report the inclusion of two psychological domains (mood, anxiety) to the most recent refinement of the questionnaire (version 3).

Method. A cross-sectional survey was performed in April 2000. Questionnaires were sent to 183 patients alive and disease free after surgery for oral and oro-pharyngeal malignancy. Replies were received from 145 patients (79% response rate).

Results. The new domains (mood and anxiety) correlated significantly with the emotional functioning domains from the EORTC C30 and with the pain and appearance domains of UW-QOL. There were also significant correlations between the "global quality of life" item and the two new domains. Mood (p = .005) and anxiety (p < .001) scores were associated with patient age but with no other clinicodemographic variable.

Conclusion. The addition of mood and anxiety domains makes the UW-QOL version 4 a single broad measure suitable for effective health-related quality of life evaluation in the routine clinical setting. © 2002 Wiley Periodicals, Inc. *Head Neck* **24:** 521–529, 2002

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Ethical approval was given for this study by the South Sefton Ethical Committee. Dr. Yueh is supported by a Career Development Award (#RCD-98318) from the Health Services Research & Development Service of the Veterans Health Administration, Department of Human Affairs. The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

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Keywords: health-related quality of life; head and neck cancer; mood; anxiety; UW-QOL

There is a growing awareness of the importance of health-related quality of life (HRQOL) and the merit of its inclusion as an outcome parameter in patients with head and neck cancer. There are many questionnaires available,[1,2] and in the past they have tended to be used for research rather than routine clinical practice. The benefit of a short questionnaire is that it can be self-completed by the patient. Sadura and coworkers[3] suggest that a self-completed questionnaire needs to be understandable and take less than 10 minutes to complete. Simplicity is paramount, because HRQOL is best measured longitudinally. Thus, each patient will complete a questionnaire on several occasions from baseline (pretreatment) to 1 year and annually thereafter. The administration of questionnaires adds an additional burden to clinical resources[4] (ease of processing is an important feature in questionnaire selection). Despite their brevity, questionnaires can give clinically useful information,[5–7] and their routine inclusion as an outcome measure in head and neck units is to be encouraged.

The University of Washington questionnaire (UW-QOL) has an established place in the evaluation of HRQOL in patients with head and neck cancer.[1,2] One of its most appealing features is its simplicity. In the original description, Hassan and Weymuller[8] stated that "the advantages of the head and neck questionnaire are that (1) it is brief and self-administered, (2) it is multifactorial, allowing sufficient detail to identify subtle change, (3) it provides questions specific to head and neck cancer, and (4) it allows no input from the health provider, thus reflecting the QOL as indicated by the patient". The questionnaire has undergone two major revisions since it was first published. In version 2, each of the nine original domains was followed by an importance-rating scale, and three new single-item "quality-of-life" questions were also added.[9] In version 3, two new domains (taste, saliva) were added, and the employment domain was dropped (Table 1).[10,11] And, rather than asking patients to rank order the importance of each individual domain, version 3 just asks patients to indicate which three domains have been most important in the last 7 days. These changes have served to address several shortcomings,[10] but version 3 still did not include an emotional domain. Because HRQOL refers to the physical, emotional, and social impact of diseases and their treatments on patients' lives,[12,13] the emotional domain is an essential component of a broad quality-of-life outcome measure. Mood was chosen as an appropriate domain to capture depressive morbidity. Previous work by Allen and colleagues[14] has shown that "depressed mood in the last month" had the strongest item-total correlation to a brief depression assessment scale developed for elderly people in medical and surgical inpatients. Anxiety was also selected as an essential additional domain describing the emotional component. Anxiety may independently exist or covary with depressed mood.

Table 1. Summary of development of the UW-QOL.

Domain	Version 1	Version 2	Version 3	Version 4
Pain	X	X	X	X
Appearance	X	X	X	X
Activity	X	X	X	X
Recreation	X	X	X	X
Swallowing	X	X	X	X
Chewing	X	X	X	X
Speech	X	X	X	X
Shoulder	X	X	X	X
Taste			X	X
Saliva			X	X
Mood				X
Anxiety				X
Employment	X	X		
Global QOL items		X	X	X
Free text		X	X	X
Importance rating		X	X	X

The purpose of this cross-sectional study was to report version 3 with its two additional domains of taste and saliva and to report the inclusion of two new domains (mood and anxiety) in version 4. This is the first time that version 3 has been reported in a UK population and the first time version 4 has been described in the literature.

There is considerable value in a HRQOL questionnaire that is widely acceptable to head and neck cancer centers and units. It is possible that the addition of two new psychological domains (UW-QOL version 4) will make the questionnaire a realistic outcome measure in routine practice. It is hoped that this article will help to endorse this proposal.

SUBJECTS AND METHODS

Patients. On the departmental oncology database between 1995–1999, there were 290 previously untreated patients with oral and oropharyngeal squamous cell carcinoma. Patients with a previous malignancy were excluded. All patients were treated by primary surgery with or without adjuvant radiotherapy, sixteen had failed to attend outpatients clinic in the preceding year and were therefore not sent a questionnaire. Of the remaining 274 patients, 84 were known to have died. A further seven were excluded from the study, because they were already completing questionnaires in a study using the UW-QOL v2. Thus on March 15, 2000, version 4 was sent to 183 surviving patients. If a reply had not been received within 3 weeks, one further request was made.

Measures. In version 4, the two new domains are mood and anxiety. Mood has a 5-point Likert scale; My mood is excellent and unaffected by my cancer, My mood is generally good and only occasionally affected by my cancer; I am neither in a good mood nor depressed about my cancer; I am somewhat depressed about my cancer; I am extremely depressed about my cancer. Anxiety has a 4-point Likert scale: I am not anxious about my cancer; I am a little anxious about my cancer. I am anxious about my cancer; I am very anxious about my cancer. The domains are scored on a scale ranging from 0 (worst) to 100 (best), consistent with the existing algorithms of the UW-QOL. The important-rating schema was modified to include mood and anxiety, thus patients were asked to tick up to 3 of 12 boxes.

A UW-QOL composite score from 0 to 100 was obtained by averaging the scores of the domains. When two or more domains were not answered, no composite score was calculated. Scoring is scaled, so that a score of 0 represents the worst quality of life, and a score of 100 represents the best quality of life.

In our study, the employment domain for the UW-QOL v1 was included, so that a composite UW-QOL score from version 1 could be compared. Patients were also sent the emotional functioning subscale from the EORTC C30[13] (Q 21–24) and dry mouth, sticky saliva, sense of smell items from the EORTC H&N35.[15] The EORTC items were included to allow comparison with the taste, saliva, mood, and anxiety domains in the newest version of the UW-QOL.

Statistical Methods. Internal consistency was measured with Cronbach's alpha. If an item fails to correlate well with the other items, we can expect to see the alpha value rise in its absence. Factor analysis was conducted to group individual questions with strong correlation into discrete clusters or constructs. A conventional varimax method of rotation was used.[16] The loading of an item on a factor reflects the correlation of that item to the mathematically derived "latent" factor. Patients were divided into roughly three equal groups on the basis of time from operation, the cut off points being chosen before any QOL analyses took place. The level of statistical significance was taken as $p < .05$, but care should be taken on the interpretation of borderline significance, because many statistical tests were done.

RESULTS

Questionnaires were sent to 183 patients, and replies were received from 145 of these, giving a 79% response rate. The median time from operation was 830 days (2 years 3 months), with an interquartile range (IQR) of 372 days (1 year) to 1239 days (3 years 5 months). Patient characteristics are described in Table 2 for all patients and within each of three survival time periods. Four of 10 patients were aged 65 or older and 65% were men. Three of 10 had oropharyngeal cancers, whereas 4 of 10 had tumors larger than 4 cm. Half had had radiotherapy. Longer-term survivors were less likely to have radiotherapy. Otherwise, there were no obvious

Table 2. Patient characteristics.

	Time from first operation			
	<500 days	500–999 days	1000+ days	All patients
Age 65+	40% (21/53)	39% (22/57)	39% (26/66)	40% (71/178)
Male gender	72% (39/54)	63% (36/57)	64% (42/66)	65% (118/182)
Posterior site	37% (19/51)	21% (13/54)	29% (19/65)	30% (53/174)
Tumor size 3–4	33% (17/51)	46% (26/56)	41% (27/66)	40% (71/177)
Flap surgery	70% (35/50)	80% (44/55)	78% (50/64)	76% (132/173)
Radiotherapy	60% (28/47)	47% (26/55)	43% (28/65)	49% (84/171)

Table gives % (number of cases).

trends of these variables with time from operation. The response rate varied most by type of surgery, with 90% response (37 of 41) from patients having had primary closure, laser or split skin graft (ssg) and 77% response (102 of 132) for those having had flap surgery. There were no other clear differences in response rate by age group, gender, tumor site, tumor size, or radiotherapy.

There was little correlation between length of time from operation and the UW-QOL v4 domain scores (Spearman correlations: median 0.04; IQR, −0.02–0.06; ranges, −0.19–0.17). Subsequent analyses were therefore for the group as a whole. The distributions of domain scores for the UW-QOL v4 are summarized in Table 3. The distributions of scores for taste, saliva, mood, and anxiety show a pattern similar to most of the other domains in that there was no overly strong ceiling or floor effects.

The taste, saliva, mood, and anxiety domains correlated with the relevant items from the EORTC questionnaire (Table 4). The strongest correlations involving taste and saliva were with the UW-QOL domains of swallowing and chewing and with the dry mouth and sense of taste domains from the EORTC. The strongest correlations involving mood and anxiety were with the emotional functioning items and their domain score from the EORTC and with the pain and appearance domains of the UW-QOL. Both HRQOL and overall QOL measures were associated with mood and anxiety. For both these global measures, the strongest correlations were with pain, activity, recreation, and mood (data not shown).

Radiotherapy was strongly associated with taste (MW, $p < .001$), the mean taste score being 55 (SE 4) for patients given treatment and 77 (4) for those not requiring treatment. Best taste

Table 3. Distribution of domain scores.

	UW-QOI scores									
	0	25	30	50	70	75	100	Mean	SE	% Best
UW-QOL										
Pain	3	4		29		45	59	77	2	42
Appearance	1	8		28		71	35	73	2	24
Activity	3	4		59		33	44	69	2	31
Recreation	–	13		33		54	42	72	2	30
Swallowing	8		14		66		55	74	2	38
Chewing	18			83			42	58	3	29
Speech	3		14		71		50	75	2	36
Shoulder	8		15		28		86	80	3	63
Taste	11		35		35		59	67	3	42
Saliva	9		29		37		62	71	3	45
Other										
Mood	3	19		19		50	49	72	2	35
Anxiety	9		12		67		51	73	2	37

For each domain the table gives the number of patients with each score, the mean and SE of patient scores, and the percentage of patients selecting the best response possible (100). The shaded area denotes values that do not exist for that domain.

Table 4. Spearman correlation coefficients involving taste, saliva, mood and anxiety.

	Taste	Saliva	Mood	Anxiety
UW-QOL				
Pain	**0.29**	0.25	**0.45**	**0.41**
Appearance	**0.40**	**0.37**	**0.48**	**0.34**
Activity	**0.38**	**0.40**	**0.41**	0.28
Recreation	**0.39**	**0.45**	**0.39**	0.27
Swallowing	**0.49**	**0.60**	**0.36**	0.24
Chewing	**0.51**	**0.51**	0.23	0.13
Speech	**0.35**	**0.30**	**0.29**	0.15
Shoulder	0.18	0.15	0.12	0.09
Taste		**0.56**	**0.30**	0.19
Saliva	**0.56**		**0.31**	0.16
Mood	**0.30**	**0.31**		**0.53**
Anxiety	0.19	0.16	**0.53**	
HRQOL, compared with month before cancer	0.26	0.28	0.26	0.25
In general, HRQOL during the past 7 days	**0.34**	**0.31**	**0.54**	**0.43**
Overall QOL during past 7 days	**0.30**	0.22	**0.50**	**0.34**
EORTC				
Have you had a dry mouth?	**0.45**	**0.78**	0.19	0.10
Have you had sticky saliva?	**0.35**	**0.36**	0.24	0.14
Have you had problems with sense of taste?	**0.84**	**0.54**	**0.41**	0.28
Did you feel tense?	0.16	0.11	**0.59**	**0.51**
Did you worry?	0.26	0.18	**0.57**	**0.62**
Did you feel irritable?	0.15	0.11	**0.41**	**0.32**
Did you feel depressed?	0.22	0.15	**0.55**	**0.48**
Emotional function (EF)	0.23	0.17	**0.61**	**0.54**

Bold highlighting denotes p < 0.001.
Range of N of patients: UW-QOL v4: 137–143; Mood: 141; Anxiety: 140; EORTC: 123–130.

scores of 100 were reported for 28% (18 of 64) and 57% (39 of 69), respectively, similarly for saliva ($p < .001$), with mean saliva scores of 58 (4) and 81 (3), and best score rates of 27% (17 of 64) and 61% (40 of 66). Weaker associations of taste and saliva with tumor site were also found ($.01 < p < .05$), with posterior tumour patients tending to have the worse scores. Flap surgery also gave greater problems with taste than other types of surgery ($p = .002$). Mood ($p = .005$) and anxiety ($p = .001$) were associated with age group but not with any other variable. Mean mood scores were 67 (3) for those aged less than 65 and 79 (3) for older patients. The percentage of patients indicating maximum mood scores ("best scores") were 24% (20 of 82) and 50% (28 of 56), respectively. Mean anxiety scores were 65 (3) and 84 (3), whereas best anxiety scores were found for 22% (18 of 82) and 58% (32 of 55), respectively.

The 12 domains were considered together in the analysis of internal consistency for the composite score. All the interdomain correlations were positive and are shown for each domain in Figure 1. The shoulder domain correlated least with other domains. Cronbach's alpha coefficient was 0.86 for a composite score. The loss of any single domain did not change the alpha coefficient to any great extent (range, 0.84–0.86). For the 16 UW-QOL v3 domains, the alpha coefficient was 0.85.

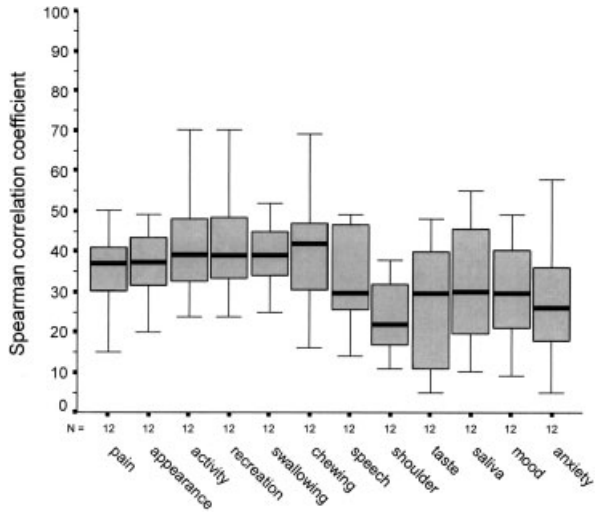

FIGURE 1. Interdomain correlations for the UW-QOL-R, mood, anxiety, employment. Each box and whisker is a summary of 12 correlations of that domain with the other 11 domain.

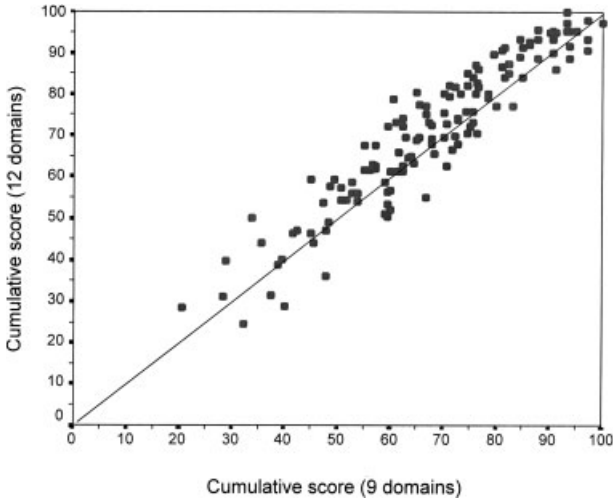

FIGURE 2. Scatterplot of version 4 (12 domain) composite score against version 1 and 2 (9 domain) composite score. The change from 9 to 12 domains was due to the dropping of the employment domain and the addition of the taste, saliva, mood, and anxiety domains.

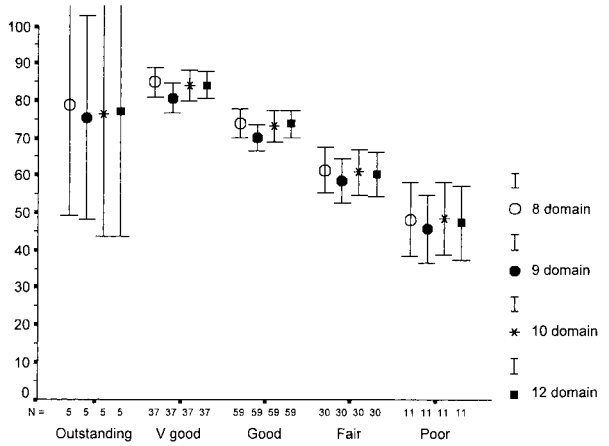

FIGURE 3. 95% confidence intervals for mean composite score, for the different UWQOL versions, respectively, by UW-QOL-R global QOL question.

An exploratory factor analysis on the 12 domains produced one dominant and three other main factors. The analysis explained 71% of total variation, with the first factor accounting for 41% and the other factors 11%, 10%, and 8%, respectively. The UW-QOL domains that loaded more strongly (loadings of 0.40 and above) onto the first factor were appearance (0.45), swallowing (0.65), chewing (0.77), and speech (0.56). Pain (0.30) and taste (0.36) had slightly weaker loadings on this first factor. The second factor was compared of pain (0.45), activity (0.76), recreation (0.69), and shoulder (0.45), with pain (0.39) having a slightly weaker loading. Factor three was made up of mood (0.73), anxiety (0.71), and appearance (0.53), whereas factor four was made up of taste (0.45) and saliva (0.96).

We compared the composite version 4 (12 domain) scores to the version 1 and 2 (9-domain) composite scores. The correlation was very high ($r = .94$) with tight scatter (Figure 2). The version 4 scores tended to be higher than the version 1 scores, because the generally lower employment scores were omitted. The correlations between the composite scores making up 8 domains (versions 1 and 2 excluding employment), 9 domains (versions 1 and 2), 10 domains (version 3), and 12 domains (version 4), were all within the range 0.94–0.99.

The coefficients of correlation between the four composite scores and the HRQOL measure were 0.70, 0.72, 0.66 and 0.69. With the overall QOL measure, the correlations were 0.56, 0.56, 0.54, and 0.58. The relationship between overall QOL and the composite scores is shown in Figure 3. Tumor size, radiotherapy treatment, and type of surgery were strongly associated (all $p < .001$) with the composite scores of versions 1, 3, and 4. For example, the mean (SE) of the version 4 composite score was 65 (2) for those with larger tumor sizes (4+ cm) and 76 (2) for those with smaller tumors: with radiotherapy, 64 (2); without radiotherapy; 78 (2); flap surgery, 69 (2); primary closure or laser, 79 (3).

Chewing, speech, swallowing, and saliva were the issues that were the most important to patients in the previous 7 days (Table 5). Least important was recreation. This importance question was unanswered in 6% (8 of 145) of patients, and for one patient the relevant page was absent from the form. Patients within 500 days of operation and patients more than 1000 days from operation agreed on the same four important issues, with chewing ranked first and swallowing as second. For patients within 500 to 999 days of operation, their appearance (3) and activity (2) were also ranked as high as speech (1) chewing (4th equal) and swallowing (4th equal). Patients less than 65 were less likely to rate taste as important and more likely to rate mood (Table 5). Women rated appearance and taste more highly than men, whereas, men rated activity and speech more highly. Chewing was rated higher by patients with anterior tumors, whereas swallowing was rated higher by those with the larger tumors and by those having had radiotherapy.

Table 5. Most important issues to patient in previous 7 days. Patients were asked to choose up to three domains.*

	N of patients choosing domain	Rank order	Most obvious associations with clinicodemographic variables (age-group, sex, tumor site, tumor size, type of surgery, and radiotherapy)
Pain	23	7=	None
Appearance	29	5	Male: 14% (13/95), female: 31% $p = 0.03$
Activity	27	6	Male: 24% (23/95), female: 6% (3/49), $p = 0.006$
Recreation	15	12	None
Swallowing	39	3	T1–2: 21% (18/86), T3–4: 38% (21/55), $p = 0.03$ Radiotherapy: 40% (27/67), no radiotherapy: 16% (11/69), $p = 0.002$
Chewing	46	1	Posterior: 20% (9/45), anterior: 39% (37/94), $p = 0.03$
Speech	40	2	Male: 34% (32/95), female: 16% (8/49), $p = 0.03$
Shoulder	22	9=	None
Taste	23	7=	<65yrs: 11% (9/84), 65 + yrs: 25% (14/57), $p = 0.04$ Male: 11% (10/95), female: 27% (13/49), $p = 0.02$
Saliva	37	4	None
Mood	22	9=	<65y: 20% (17/84), 65 + y: 7% (4/57), $p = 0.03$
Anxiety	20	11	None

Three patients ticked 4 choices, one patient ticked five. These are included.

The free text question was responded to by 45% (65 of 145) of patients, often at some length, giving unique insights into aspects of their lives not tapped by the specifics of a tick-box questionnaire.

DISCUSSION

HRQOL refers to the physical, emotional, and social impact of diseases and their treatments on patients.[12,13] If the measure is for patient self-completion, it needs to be understandable and ideally should take less than 10 minutes to complete.[3] The UW-QOL questionnaire is a broad questionnaire that has the potential as a routine outcome measure in head and neck cancer centers and units. Criticisms of the earlier version of the UW-QOL were addressed recently by Weymuller and coworkers.[10] The UW-QOL instrument was revised and version 3 published. The authors conclude that the questionnaire meets the following desirable characteristics: short and rapid to complete, reproducible, reliable and valid in a population of head and neck cancer patients, does not require excessive training to administer, easy to interpret, and yields discriminative results (separation by site and stage).

The main deficiency of version 3 is that it lacks an emotional component of HRQOL. Although the psychological impact of disease and its treatment is reflected in the single QOL items of the UW-QOL, it is an imprecise marker of psychological outcome.[10,17] It was for this reason that after the first international head and neck quality of life workshop held in Liverpool in November 1999, consideration was given to the addition of two further domains; mood and anxiety. Care was taken in the wording of the two domains. Single questions of psychological dysfunction are well recognized especially in primary care settings.[18,19] Some items have been designed especially for terminally ill[26] and for elderly patients.[21] The authors wanted to avoid expanding each domain into multiple questions. Therefore, the design of the two additional questions was based previous attempts to assess emotional components with single items and remaining consistent with the terminology and scoring of the rest of the questionnaire.

In this study, version 4 has been compared with the EORTC C30 emotional functional subscale and three items (dry mouth, sticky saliva, sense of smell) from the EORTC H&N35. Because a postal survey was performed, the number of questionnaire items were kept to a minimum to promote an adequate response rate; therefore, full versions of the EORTC C30 and H&N 35 were not used. A more detailed comparison has been reported previously,[17] and it is expected that the correlations reported using version 1 will still stand in the newest version of the UW-QOL. It was not the intention of this study to critically appraise the UW-QOL against other commonly advocated head and neck cancer questionnaires.

The exploratory factor analysis suggests a couple of things: first that the 12 UW-QOL

domains might load onto four distinct subscales (factors) and, second, the clearly dominant first factor, comprising maybe half the UW-QOL domains, justifies the use of the composite score. It may be that both approaches can be adopted, namely subscale and composite score reporting of results. The relatively high Cronbach alpha value for the whole 12-item measure indicates that the scale could be reported as a total score. We very much emphasize the exploratory nature of our analyses to derive hypotheses that can be tested with larger numbers of patients. It will also be important to see whether these factors hold together according to the posttreatment interval.

The UW-QOL is backward compatible. There seems little lost when basing a composite score on the original 8 domains common to all versions or basing it on 9 (version 1) or 10 (version 3). Therefore, historical pooled data based on the original eight domains is still valuable, despite recent modifications to the questionnaire. However, we do expect the 12-domain composite score to add greater sensitivity to the discrimination between clinically distinct groups of patients. The composite score has been shown to be a useful indicator of HRQOL,[6] and expected associations with tumor size, radiotherapy, and type of surgery were confirmed in this study.

Importance weighting adds a very useful dimension to the UW-QOL questionnaire.[22,23] In this study, on average, patients after primary surgery for oral and oropharyngeal cancer seem to rate chewing, speech, and swallowing as most important. Although it may be difficult to include importance rating into an overall HRQOL score,[9] it seems reasonable to ask the patient which domains are most important, because this can act as a focus for treatment intervention. This technique was used by Deleyiannis and coworkers in the analysis of postlaryngectomy QOL.[22]

Several factors require attention when interpreting the findings of this study. The cross-sectional design has allowed for rapid assessment of the characteristics of version 4 but has not allowed us to explore the responsiveness of this version over time. Although a longitudinal study is underway, this study has shown interesting results. There is a clear link between subjective saliva and chewing dysfunction and adjuvant radiotherapy. In addition, this study emphasizes the association between swallowing, chewing, and dry mouth.

The emotional domain is of crucial importance in the evaluation of HRQOL outcome.[24] Hammerlid et al[25] reported that about one third of their 357 patients were possible or probable cases of a major mood disorder at each of six occasions sampled over a 1-year period. New cases of anxiety and depression were identified at each occasion. Longitudinal work suggests that a high level of depressive symptoms at baseline, that is before treatment, is a good predictor of symptom severity and functioning after treatment.[26] The new psychological domains of the UW-QOL correlated very well with the EORTC. To more comprehensively evaluate the two new domains (mood and anxiety), version 4 should be tested against specific psychological questionnaires of distress such as the Hospital Anxiety and Depression Scale (HAD), Centre for Epidemiologic Studies Depression CES-D, or Beck Depression Inventory (BDI). These later scales are well known. Other attempts to assess mood in medically ill patients have been reported that have been designed especially for the older patient (>55 years). These measures may serve as good tests of concurrent validity for the emotional domain included in the version 3 questionnaire.[27]

Free text is a valuable component of the UW-QOL. The hand-written comments gives information on a tremendous range of issues not often included as part of head and neck cancer questionnaires such as clinic waiting times, transport, other medical, or family events. Weymuller and coworkers[9] reported their experience from 549 prospectively evaluated patients. Their findings and those of ours both support the use of open-ended text.

CONCLUSION

This study suggests that the UW-QOL is a suitable questionnaire for HRQOL evaluation after head and neck cancer treatment. In its current form, it provides a broad and rapidly applied measure that provides clinically relevant information in everyday practice. We commend its use in a minimum dataset, because it allows for a simple way of measuring HRQOL in routine head and neck cancer practice and is not limited to research applications.

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