Systematic Review

Evaluation of quality of life related to nutritional status

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The way in which the quality of life related to health (HRQoL) is affected by the nutritional status of the patient is a subject of constant interest and permanent debate. The purpose of the present paper is to review those studies that relate HRQoL to nutritional status and examine the tools (questionnaires) that they use to investigate this relationship. A critical review of published studies was carried out via an investigation of the following databases: MEDLINE (via PubMed); EMBASE; The Cochrane Library; Cumulative Index to Nursing and Allied Health Literature (CINAHL); Institute for Scientific Information (ISI) Web of Science; Latin American and Caribbean Health Sciences Literature (LILACS); Spanish Health Sciences Bibliographic Index (IBECS). The search was carried out from the earliest date possible until July 2007. The medical subject heading terms used were ‘quality of life’, ‘nutritional status’ and ‘questionnaires’. The articles had to contain at least one questionnaire that evaluated quality of life. Twenty-eight documents fulfilling the inclusion criteria were accepted, although none of them used a specific questionnaire to evaluate HRQoL related to nutritional status. However, some of them used a combination of generic questionnaires with the intention of evaluating the same. Only three studies selectively addressed the relationship between nutritional status and quality of life, this evaluation being performed not by means of specific questionnaires but by statistical analysis of data obtained via validated questionnaires.

Quality of life: Nutritional status: Nutritional sciences: Questionnaires: Healthcare evaluation mechanisms

The concept of quality of life related to health (HRQoL) is defined with regard to the way in which illness (as a source of pain, physical dysfunction and discomfort) imposes limitations or alterations on everyday behaviour, social activities and psychological wellbeing, as well as in other aspects of personal daily life\textsuperscript{(1)}. The measurement of quality of life brings a holistic dimension to the burden of a clinical state or to the response to an operation. The relationship between quality of life and nutritional status is not well studied. Furthermore, measuring HRQoL is a complex process, being, as it is, a subjective, multifactor construct responsive to individual expectations in different facets of life. The way in which HRQoL is affected by the nutritional status of the patient is a subject of constant interest and permanent debate. It is all too well known that an impoverishment of nutritional status leads to a decrease in physiological function, increasing the risk of complications and septic death\textsuperscript{(2,3)}, that there is a significant correlation between nutrition and alterations in muscular, immune and cognitive functions\textsuperscript{(4)} and therefore that an improvement in nutritional status is an influencing factor in the improvement of physiological function\textsuperscript{(5,6)}.

The necessity and importance of the measurement of HRQoL, both general and specific, tied to a definite concept, can be justified on the basis of studies which show that perceived health is independently associated with medium-term mortality\textsuperscript{(7,8)}. These specific instruments, designed to relate a patient’s HRQoL to a specific pathology, have grown in importance in recent years. They also provide a subset of relevant data which point to a positive causality\textsuperscript{(9)}.

\textbf{Abbreviation:} HRQoL, quality of life related to health.

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Consequently, the purpose and objective of the present study is to bring together those studies that relate HRQoL with nutritional status and examine the tools (questionnaires) that they use to investigate this relationship.

Methods

Bibliographic search

Given the hierarchical structure of medical subject heading (MeSH) terms, the terms ‘quality of life’, ‘nutritional status’ and ‘questionnaires’ were chosen and used in conjunction with the Boolean link ‘AND’.

The search was carried out from the earliest date possible (according to each database) until July 2007, the latest date considered in the present study.

In the only databases that permitted it, MEDLINE and EMBASE, the major (Majr) topic terms were used. These represent the most important concepts of an article and help to eliminate less relevant studies from the results, thereby increasing the sensitivity of the search (‘quality of life’ [Majr] AND ‘nutritional status’ [Majr] AND ‘questionnaires’ [MeSH]).

‘Humans’ was used in all databases as a search limit.

Additionally, as a secondary search, the bibliographies of the selected articles were reviewed in order to identify studies not found by the primary search.

The databases MEDLINE (via PubMed), EMBASE, The Cochrane Library, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Institute for Scientific Information (ISI) Web of Science, Latin American and Caribbean Health Sciences Literature (LILACS) and Spanish Health Sciences Bibliographic Index (IBECS) were consulted.

Selection of the articles

The articles were selected via inclusion and exclusion criteria previously defined in a written protocol\(^{(10,11)}\).

Inclusion criteria were:

1. Use of at least one questionnaire that evaluates quality of life;
2. Nutritional status of the studied individuals is, by whatever means, taken into account;
3. Original articles published in peer-reviewed journals.

Excluded were studies that measured HRQoL using only clinical indicators.

Validity check

The studies, with no indication of the authors, journal or database origin, were checked for relevance by the three experts in nutrition (C. W.-B., J. M. Culebras and J. Alvarez) using a yes/no checklist\(^{(11)}\).

Concordance analysis between the experts in nutrition (gold standard) and the obtained results gave the following results: observed agreement 90\(\%\) (95% CI 80-70, 99.30\%); \(\kappa\) 75 (95% CI 52-98\%); significance test 4-74 (P<0.001); sensitivity 93-10 (95% CI 83-88, 100\%); specificity 81-82 (95% CI 59-03, 100\%). The silent percentage (relevant articles not found) and the noisy percentage (non-relevant articles found) were 5 (95% CI 0, 11-75)\% in both cases.

Special characteristics of the study

Although it is preferable to base a systematic review on prospective studies or studies with adequate follow-up periods, it was decided to include cross-sectional studies or studies with short follow-up periods if HRQoL had been studied using a valid questionnaire and the nutritional status of the observed patients had been taken into account. This limitation will be discussed later.

Results

Twenty-nine papers from MEDLINE, twenty-one from EMBASE, six from the Cochrane Library and thirteen from CINAHL were obtained. All the papers found in the bibliographic database ISI Web of Science had been previously collected. No articles were found in the databases LILACS or IBECS. After eliminating redundant papers, forty documents were obtained.

Agreement between the scientific documentation experts (J. S.-V., V. Juan-Quilis and R Ballester Anón; applying the most sensitive search formula) and the experts in nutrition reduced the number of studies to thirty-nine\(^{(13)}\).

A further study was discarded for measuring user satisfaction with nutrition services, rather than quality of life, and for not using a questionnaire that evaluated quality of life.

Finally, twenty-eight documents on quality of life related to nutritional status were accepted\(^{(12-30)}\) (Table 1).

It is worth noting how recent the studies are; the average age is 3-85 (95% CI 2-46, 5-02) years, and the average obsolescence gives a value of 3 years and a Price index of 75\% (percentage of articles 5 years old or less).

The designs of the studied articles were: eight (28-57\%) clinical trials; eleven (39-29\%) prospective; seven (25-00\%) cross-sectional; two (7-14\%) retrospective. The disparity in design can be seen in the wide diversity of follow-up periods. The number of patients also varied widely, from a minimum of twelve to a maximum of 367.

Quality of life related to health and nutritional status

Although there are a considerable number of published studies on HRQoL, those that truly evaluate quality of life related to nutritional status are scarce. However, it is worth noting that of the articles relating HRQoL to nutritional status, eleven (39-27\%) had cancer as a pathological base\(^{(13,16,17,21,27,29,30,33,35,37,38)}\).

The review found no specific questionnaire that determined a direct link between HRQoL and nutritional status. However, three papers (10-71\%) detailed a significant correlation between nutritional status and HRQoL using a valid method for measuring quality of life\(^{(10,23,29)}\). Another article (3-57\%) referred to a possible relationship between HRQoL and nutritional\(^{(25)}\) but drew attention to other important factors, such as the risk of depression. A different study (3-57\%) mentioned how the ingestion of foodstuffs affects HRQoL\(^{(15)}\), although a further paper\(^{(33)}\) (3-57\%) found no significant effect between the results obtained using The Short Form-36 Health Survey (SF-36) questionnaire and nutritional intervention. In another, an association between a deteriorating HRQoL and severe malnutrition was seen\(^{(34)}\).
<table>
<thead>
<tr>
<th>Reference</th>
<th>Study design</th>
<th>QoL questionnaire</th>
<th>Patients included</th>
<th>Follow-up</th>
<th>Relationship between QoL and nutritional status in study results</th>
</tr>
</thead>
<tbody>
<tr>
<td>O’Keefe et al. (2007)</td>
<td>Prospective</td>
<td>Subjective assessment of QoL (transplantation)</td>
<td>Group 1: transplant patients, n 46, M/W 26/21, age range 22–66 years Group 2: total parenteral nutrition patients, n 13, M/W 10/3, age range 31–80 years</td>
<td>Mean 21 (range 12–36) months</td>
<td>QoL not evaluated in respect of nutritional status</td>
</tr>
<tr>
<td>Oates et al. (2007)</td>
<td>Prospective</td>
<td>EORTC QLQ-C-30 and EORTC QLQ-H&amp;N35</td>
<td>Fourteen patients with nasopharyngeal carcinoma Age range 27–71 years</td>
<td>2 years</td>
<td>These results emphasise the need for early nutritional intervention before commencing chemoradiotherapy</td>
</tr>
<tr>
<td>Kalaitzakis et al. (2006)</td>
<td>Prospective</td>
<td>SF-36</td>
<td>128 adult patients with cirrhosis Control group: 299 age- and sex-matched reference sample from general population</td>
<td>6 months</td>
<td>Prospective follow-up studies are needed to fully clarify the role of gastrointestinal symptoms in HRQoL and nutritional status in liver cirrhosis</td>
</tr>
<tr>
<td>Trabal et al. (2006)</td>
<td>Cross-sectional</td>
<td>EORTC QLQ-C-30</td>
<td>Fifty cancer patients M/W 28/22, mean age 61 (SD 14) years</td>
<td>3 d</td>
<td>The results point out that poor food intakes can affect QoL by themselves</td>
</tr>
<tr>
<td>Murawa et al. (2006)</td>
<td>Prospective</td>
<td>Troidl</td>
<td>Thirty-one patients with stomach cancer-related total gastrectomy M/W 20/11, mean age 56.9 (SD 10.05) years</td>
<td>49–127 months after surgery (mean 79.61 (SD 23.41) months)</td>
<td>QoL was independent of the time elapsed from the surgery</td>
</tr>
<tr>
<td>Izutsu et al. (2006)</td>
<td>Cross-sectional</td>
<td>WHOQOL-BREF</td>
<td>187 boys and 137 girls from urban non-slum area 157 boys and 121 girls from urban slum area Age range 11–18 years</td>
<td>4 weeks</td>
<td>QoL was not evaluated in respect of nutritional status</td>
</tr>
<tr>
<td>Gramignano et al. (2006)</td>
<td>Prospective</td>
<td>QoL-OS and EuroQoL-5D</td>
<td>Twelve patients who had advanced solid tumours and reported fatigue M/W 2/10, age range 42–73 years</td>
<td>4 weeks</td>
<td>QoL was not evaluated in respect of nutritional status</td>
</tr>
<tr>
<td>Eriksson et al. (2005)</td>
<td>Cross-sectional</td>
<td>SF-36</td>
<td>128 non-institutionalised individuals M/W 40/80, age range 70–75 years, mean age 72.9 (SD 1.5) years</td>
<td>Past 3 months</td>
<td>Parts of the MNA can be interpreted as measurements of HRQoL Low values of SF-36 could also be used as predictors of risk of malnutrition</td>
</tr>
<tr>
<td>Allen (2005)</td>
<td>Retrospective</td>
<td>OHIP-EDENT</td>
<td>Thirty-five edentulous adults who requested new complete dentures M/W 12/23, age range 52–77 years</td>
<td>Past 3 months</td>
<td>There was no association between diet and oral-related QoL QoL was not evaluated in respect of nutritional status</td>
</tr>
<tr>
<td>Ravasco et al. (2005)</td>
<td>Clinical trial</td>
<td>EORTC QLQ-C-30</td>
<td>111 colorectal cancer out-patients referred for radiotherapy M/W 66/45, age range 32–88 years, mean age 58 (SD 15) years Group 1 (n 37): individualised dietary counselling based on regular foods Group 2 (n 37): high-protein liquid supplement in addition to their usual diet Group 3 (n 37): the control group, patients were instructed to maintain their ad libitum intake</td>
<td>3 months</td>
<td>Dietary counselling was of similar or higher benefit, whereas even 3 months after radiotherapy, it was the only method to sustain a significant impact on patient outcomes</td>
</tr>
<tr>
<td>Scott et al. (2005)</td>
<td>Clinical trial</td>
<td>SF-36</td>
<td>112 adult patients were recruited Intervention group: n 55, mean age 67-4 (SD 17) years Control group: n 57; mean age 68-6 (SD 17) years</td>
<td>12 months after PEG</td>
<td>The prevalence of malnutrition at baseline was similar between the three study groups There was a linear positive association with the improvement in the patients’ nutritional status</td>
</tr>
</tbody>
</table>
### Table 1. Continued

<table>
<thead>
<tr>
<th>Reference</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Keller (2004)</td>
<td>Cross-sectional</td>
<td>Non-validated</td>
<td>367 frail seniors (73.6% women) Age range 54–100 years, mean age 79.3 (SD 7.9) years</td>
<td></td>
<td>Nutritional risk appears to be a significant and important factor associated with HRQoL. Nutritional risk as measured by SCREEN appears to be a significant covariate in explaining differences in HRQoL among frail older adults.</td>
</tr>
<tr>
<td>Gollub &amp; Weddle (2004)</td>
<td>Retrospective</td>
<td>Vailas et al.</td>
<td>Two groups Breakfast group: received a home-delivered breakfast and lunch, 5d per week, n=167, age range 63–100 years, mean age 79.8 (SD 8.1) years Comparison group: received a home-delivered lunch 5d per week, n=214, age range 60–100 years, mean age 77.7 (SD 9.1) years</td>
<td>Past 6 months</td>
<td>Both study groups rated global QoL and loneliness at average or moderate levels, with no group differences. QoL was not evaluated in respect of nutritional status.</td>
</tr>
<tr>
<td>Hickson &amp; Frost (2004)</td>
<td>Cross-sectional</td>
<td>EuroQoL-5D</td>
<td>233 patients: M/F 104/129, age interquartile range 75–86 years. Two age groups Group 1: 65–74 years Group 2: 75 years and older</td>
<td></td>
<td>Study data suggest that a link exists between QoL and nutrition, but it may not be direct, and is influenced by other factors, especially a high risk of depression.</td>
</tr>
<tr>
<td>Johansen et al. (2004)</td>
<td>Prospective</td>
<td>SF-36</td>
<td>212 patients identified as being nutritionally at risk Group 1: intervention, n=108, M/W 54/54, mean age 62.0 (SD 1.6) years Group 2: control, n=104, M/W 48/56, mean age 62.4 (SD 1.7) years</td>
<td>&gt; 4 d</td>
<td>The SF-36 QoL questionnaire did not reveal any convincing significant effect of nutritional intervention.</td>
</tr>
<tr>
<td>Kennedy et al. (2004)</td>
<td>Prospective</td>
<td>POQOLS</td>
<td>103 children and adolescents with acute lymphoblastic leukaemia Age range 1–18 years, mean age 6.7 years Group 1 (standard risk protocol): n=68, M/W 41/27, mean age 4.7 (SD 2.8) years Group 2 (high-risk protocol): n=35, M/W 19/16, mean age 10.5 (SD 4.6) years</td>
<td>6 months after diagnosis</td>
<td>QoL was not evaluated in respect of nutritional status.</td>
</tr>
<tr>
<td>Steptoe et al. (2004)</td>
<td>Prospective</td>
<td>SF-36</td>
<td>271 adults patients Group 1 (behavioural counselling): n=136, M/W 54/82, mean age 43.3 (SD 13.8) years Group 2 (nutritional education counselling): n=135, M/W 51/84, mean age 43.2 (SD 14.0) years</td>
<td>12 months</td>
<td>Physical health status, mental health status and self-rated health all improved over the course of the study. Few changes were observed in any of the QoL domains.</td>
</tr>
<tr>
<td>Isenring et al. (2003)</td>
<td>Prospective</td>
<td>EORTC QLQ-C-30</td>
<td>Sixty cancer patients M/W 51.9, age range 24–85 years, mean age 61.9 (SD 14.0) years</td>
<td>4 weeks</td>
<td>There was a significant correlation between PG-SGA score and global QoL. A significant correlation was also observed between the change in PG-SGA score and change in global QoL after 4 weeks of radiotherapy.</td>
</tr>
<tr>
<td>Tomiska et al. (2003)</td>
<td>Clinical trial</td>
<td>EORTC QLQ-C-30 and VAS</td>
<td>Nineteen patients with far-advanced cancer suffering from anorexia and more than 5% weight loss M/W 15/4, age range 44–78 years, mean age 59 years</td>
<td>2 months</td>
<td>Significant benefit in appetite was found by VAS and QLQ-C30 questionnaire. QoL was not evaluated in respect of nutritional status.</td>
</tr>
</tbody>
</table>
Table 1. Continued

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<tr>
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<tbody>
<tr>
<td>Tidermark (2003)(31)</td>
<td>Clinical trial</td>
<td>EuroQoL-5D, SF-36 and Nottingham Health Profile</td>
<td>Patients with femoral neck fracture Studies I and II: n 90, &gt; 65 years, M/W 24/66, mean age 89 (so 7) years Studies III and IV: n 110, ≥ 70 years, M/W 13/87, mean age 80 (so 6) years Studies V and VI: n 24, ≥ 70 years, M/W 0/24, mean age 83 (so 5) years</td>
<td>Study I: 12 months Study II: minimum 24 months Studies III and IV: 24 months Study V: in hospital Study VI: 12 months</td>
<td>QoL was not evaluated in respect of nutritional status</td>
</tr>
<tr>
<td>Ohtsuka et al. (2002)(32)</td>
<td>Prospective</td>
<td>Kurihara (modified)</td>
<td>Thirty-one Japanese patients who underwent pylorus-preserving pancreateoduodenectomy M/W 15/16, age range 39–85 years, mean age 62 years Group 1 (Imanaga): n 18, M/W 11/7, mean age 62·2 (so 2·7) years Group 2 (Traverso): n 13, M/W 4/9, mean age 60·8 (so 2·7) years</td>
<td>1 year after surgery</td>
<td>Prospective QoL and nutritional status were not different between Imanaga or Traverso reconstructions The postoperative change was similar in the objective nutritional factors and physical QoL scores</td>
</tr>
<tr>
<td>Ribaudo et al. (2000)(33)</td>
<td>Clinical trial</td>
<td>FAACT and BACRI</td>
<td>213 patients Group 1: n 155 cancer patients, M/W 87/68, mean age 64·1 (so 12·3) years Group 2: n 58, HIV infected, M/W 57/1, mean age 39·2 (so 8·7) years</td>
<td>12 weeks</td>
<td>QoL was not evaluated in respect of nutritional status</td>
</tr>
<tr>
<td>Laws et al. (2000)(34)</td>
<td>Cross-sectional</td>
<td>Not validated</td>
<td>64 patients Group 1 (well nourished): n 41, M/W 21/20, age range 40–85 years, mean age 64-5 years Group 2 (malfournished): n 15, M/W 6/9, age range 37–73 years, mean age 61 8 years Group 3 (severely malnourished): n 8, M/W 4/4, age range 66–84 years, mean age 73·1 years</td>
<td>In haemodialysis for less than 1 month</td>
<td>Malnutrition is associated with poorer QoL when the degree of malnutrition becomes severe</td>
</tr>
<tr>
<td>Van Bokhorst-de Van der Schuer et al. (2000)(35)</td>
<td>Clinical trial</td>
<td>EORTC QLQ-C-30 and COOP-WONCA</td>
<td>Forty-nine malnourished (weight loss &gt; 10%) head and neck cancer patients (thirty-one patients filled in both questionnaires) Group 1 (no preoperative nutritional support): n 11, M/W 7/4, mean age 56–6 years, age range 42–76 years Group 2 (standard enteral nutrition) n 10, M/W 3/7, mean age 58-6 years, age range 43–69 years Group 3 (isonitrogenous enteral nutrition): n 10, M/W 6/4, mean age 61-4 years, age range 43–83 years</td>
<td>6 months after surgery</td>
<td>Enteral nutrition improves QoL of severely malnourished head and neck cancer patients in the period preceding surgery No benefit of preoperative enteral feeding on QoL could be demonstrated 6 months after surgery</td>
</tr>
<tr>
<td>Callahan et al. (2000)(36)</td>
<td>Prospective</td>
<td>Quality of Well Being Scale</td>
<td>150 patients receiving PEG M/W 66/84, age range 60–98 years, mean age 78-9 (so 8-1) years</td>
<td>Over 14-month period</td>
<td>QoL was not evaluated in respect of nutritional status</td>
</tr>
<tr>
<td>Bruera et al. (1998)(37)</td>
<td>Clinical trial</td>
<td>FLIC and VAS</td>
<td>Patients with advanced cancer M/W 47/37, mean age 62 (so 11) years Group 1 (Megestrol group): n 62 Group 2 (placebo): n 60</td>
<td>21 d</td>
<td>No significant difference was observed in any of the values assessed before and after Megestrol or placebo QoL was not evaluated in respect of nutritional status</td>
</tr>
</tbody>
</table>
Among the reviewed papers, ten (35.71%) found no type of relationship between nutritional status, or any type of nutrition, and HRQoL. Among nine articles (32.14%) recommended, or considered necessary, future prospective studies in order to completely clarify the relationship between HRQoL and nutritional status.

It is important to emphasise the study of Ravasco et al. (21) where the existence of a linear association (P<0.05) between an increase in HRQoL and an improvement in nutritional status was demonstrated. The research of Isemring et al. (29) determined that 26% (P<0.001) of the appreciated variation in HRQoL is explained by changes observed in nutritional status measured with the "Patient-Generated Subjective Global Assessment" (PG-SGA). By means of multivariate analysis, Hickson & Frost (23) showed that the association between nutritional risk and HRQoL is consistent, explaining the 44% variation. This shows high sensitivity to alterations of HRQoL and their relationship with nutritional status.

### Questionnaire description and use

The questionnaires that were used in more than one article are: the European Organisation for Research and Treatment of Cancer Quality of Life questionnaire (EORTC-QLQ-C-30) and SF-36 on six occasions each; the Euro Quality of Life 5 Dimensions (EuroQoL-5D) on three occasions; linear analogue scale assessment (LASA) or visual analogue scales (VAS) on three occasions. In two studies, non-validated instruments were used to evaluate quality of life. The rest of the questionnaires were only used once.

It was observed that in one article (3.57%) six different questionnaires were used to measure quality of life (39), in another (3.57%) three questionnaires (31), in five articles (17.86%) two were used (38, 22, 30, 35, 37) and in the rest only one.

Most of the questionnaires described in the studies measured quality of life in a generic way (SF-36; EuroQoL-5D; Dartmouth Primary Care Cooperative Information Project-World Organization of National Colleges, Academies, and Academic Associations of General Practitioners/Family Physicians (COOP-WONCA); LASA or VAS; Nottingham Health Profile; Physician Global Scale (MD global); Quality of Well Being Scale; Sickness Impact Profile; Time-Trade-off Technique; Vailas; WHO Quality of Life-BREF (WHOQOL-BREF)). Several were specific for cancer (EORTC QLQ-C-30; EORTC Head and Neck questionnaire (QLQ-H&N35); Functional Living Index-Cancer; Kurihara; Quality of Life focused on symptoms of oxidative stress) or for gastrointestinal pathology (Subjective Assessment of Objectives (COOP-WONCA); Direct Questioning of Objectives (COOP-WONCA); Functional Assessment of Anorexia/Cachexia Therapy (FAACT); BACRI; Visick scale).

Only three questionnaires that can be related to quality of life could be retrieved, two of them specific for anorexia and cachexia (Bristol-Myers Anorexia Cachexia Recovery Instrument; Functional Assessment of Anorexia/Cachexia Therapy) and one specific for patients with permanent home parenteral nutrition (Direct Questioning of Objectives) (Table 2).

### Discussion

In the documentary study the validity of the articles must be emphasised. The validity was confirmed both by the good
Table 2. Questionnaires used in reviewed articles

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Abbreviation</th>
<th>Times used</th>
<th>Design</th>
<th>Domains</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Organisation for Research and Treatment of Cancer Quality of Life</td>
<td>EORTC QLQ-C-30</td>
<td>6</td>
<td>Cancer</td>
<td>Global quality of life scale</td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td>Five functional scales: physical, role, emotional, cognitive, social</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Nine symptom scales: fatigue, pain, nausea/vomiting, dyspnoea, insomnia, appetite loss, constipation, diarrhoea, financial difficulties</td>
</tr>
<tr>
<td>Short Form-36 Health Survey</td>
<td>SF-36</td>
<td>6</td>
<td>Generic</td>
<td>Thirty-six items organised in eight domains: physical functioning, role limitations caused by physical health problems, bodily pain, general health perceptions, vitality, social functioning, role limitations caused by emotional problems, mental health</td>
</tr>
<tr>
<td>Euro Quality of Life 5 Dimensions</td>
<td>EuroQoL-5D</td>
<td>3</td>
<td>Generic</td>
<td>Visual analogue scale (quality of life perceived)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Change of health perceived</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Five dimensions: mobility, self-care, usual activity, pain or discomfort, anxiety or depression</td>
</tr>
<tr>
<td>Linear analogue scale assessment or visual analogue scale</td>
<td>LASA or VAS</td>
<td>3</td>
<td>Generic</td>
<td>Lines of a standard length (usually 10 cm), with the extremes of a variable. The patient marks the point that corresponds to their perceived status. Sometimes status is images</td>
</tr>
<tr>
<td>Non-validated questionnaire</td>
<td>BACRI</td>
<td>2</td>
<td>Generic</td>
<td>Author design</td>
</tr>
<tr>
<td>Bristol-Myers Anorexia Cachexia Recovery Instrument</td>
<td></td>
<td></td>
<td></td>
<td>An eight-item questionnaire: BACRI 7 (seven items), subjective recovery from symptoms of anorexia or cachexia; BACRI 1 (one item), patient perception of benefit</td>
</tr>
<tr>
<td>Dartmouth Primary Care Cooperative Information Project World Organization of National Colleges, Academies, and Academic Associations of General Practitioners/Family Physicians</td>
<td>COOP-WONCA</td>
<td>1</td>
<td>Generic</td>
<td>Six dimensions: physical fitness, mental health, daily activities, social activities, change in health, overall health</td>
</tr>
<tr>
<td>Direct Questioning of Objectives</td>
<td>DQO</td>
<td>1</td>
<td>Home parenteral nutrition</td>
<td>A category scale used for three life objectives: working full time, enjoying recreation, travel</td>
</tr>
<tr>
<td>European Organisation for Research and Treatment of Cancer Quality of Life – Head and Neck</td>
<td>EORTC QLQ-H&amp;N35</td>
<td>1</td>
<td>Head and neck cancer</td>
<td>Designed to be used together with EORTC QLQ-C-30</td>
</tr>
<tr>
<td>Functional Assessment of Anorexia/Cachexia Therapy</td>
<td>FAACT</td>
<td>1</td>
<td>Anorexia and cachexia</td>
<td>Six symptom scales: pain, swallowing, senses (taste/smell), speech, social eating, social contacts</td>
</tr>
<tr>
<td>Functional Living Index-Cancer</td>
<td>FLIC</td>
<td>1</td>
<td>Cancer</td>
<td>Four subscales: physical wellbeing, social/family wellbeing, emotional wellbeing, functional wellbeing</td>
</tr>
<tr>
<td>Gastrointestinal Quality of Life Index</td>
<td>GIQLI</td>
<td>1</td>
<td>Gastrointestinal</td>
<td>Also twelve items (additional concerns)</td>
</tr>
<tr>
<td>Kurihara questionnaire</td>
<td>Kurihara</td>
<td>1</td>
<td>Cancer</td>
<td>Five domains (linear analogue scale): physical wellbeing and ability, emotional state, sociability, family situation, nausea</td>
</tr>
<tr>
<td>Nottingham Health Profile</td>
<td>NHP</td>
<td>1</td>
<td>Generic</td>
<td>Five domains: symptoms, physical dysfunction, emotional dysfunction, social dysfunction, effects of the medical treatment carried out</td>
</tr>
<tr>
<td>Oral Health Impact Profile – EDENT</td>
<td>OHIP-EDENT</td>
<td>1</td>
<td>Buccodental health</td>
<td>Nineteen items grouped into seven domains: functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability, handicap</td>
</tr>
<tr>
<td>Physician Global Assessment Quality of Life focused on symptoms of oxidative stress</td>
<td>MD global</td>
<td>1</td>
<td>Generic</td>
<td>Assessment of wellbeing using 10 cm visual analogue scale</td>
</tr>
<tr>
<td>Quality of Life Scale</td>
<td>QoL-OS</td>
<td>1</td>
<td>Cancer</td>
<td>Five subscales: functional, physical, emotional, social and family, fatigue</td>
</tr>
<tr>
<td>Quality of Well Being Scale</td>
<td>QWB</td>
<td>1</td>
<td>Generic</td>
<td>Three scales of functioning with a measure of symptoms and problems. The model separates aspects of health status and life quality into distinct components. These are life expectancy (mortality), functioning and symptoms (morbidty), preference for observed functional states (utility) and duration of stay in health states (prognosis)</td>
</tr>
<tr>
<td>Sickness Impact Profile</td>
<td>SIP</td>
<td>1</td>
<td>Generic</td>
<td>Two overall domains (physical and psychosocial). Twelve categories (sleep and rest, eating, work, home management, recreation and pastimes, ambulation, mobility, body care and movement, social interaction, alertness behaviour, emotional behaviour, communication)</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>Abbreviation</td>
<td>Times used</td>
<td>Design Domains</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------------</td>
<td>------------</td>
<td>--------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Subjective assessment of Quality of Life (transplantation)</td>
<td>Liver or small-bowel transplant</td>
<td>1</td>
<td>Twenty-six domains: anxiety, depression, alcohol use, drug use, cognitive emotional style, mental status, physical mobility, appearance, pain and discomfort, stress experience, coping, financial, parenting, marital relationship, sexuality, digestive, urinary, sleep, energy, optimism, control impulsiveness, medical satisfaction, quality of relationship, quality of social relations, leisure recreation, vocational life, transplant.</td>
<td></td>
</tr>
<tr>
<td>Time Trade-off Technique</td>
<td>TTO</td>
<td>1</td>
<td>Generic (assumes an individual's reference position is to have an initial endowment of time and to be in 'less than full health' and gets the respondent to compare this to a shorter period in a state of higher quality of life). Dimensions: health state, mobility, self-care, usual activities, pain/discomfort, anxiety/depression.</td>
<td></td>
</tr>
<tr>
<td>Troidl</td>
<td>After gastrectomy</td>
<td>1</td>
<td>Fourteen items divided into two groups: specific disease symptoms (eight items) and social-personal complaints (six items).</td>
<td></td>
</tr>
<tr>
<td>Vailas et al.</td>
<td>Generic</td>
<td>1</td>
<td>Six domains: global quality of life perceived, health, loneliness, food enjoyment, food security, depression.</td>
<td></td>
</tr>
<tr>
<td>Visick scale</td>
<td>After gastrectomy</td>
<td>1</td>
<td>Four grades: Visick I (excellent), no gastrointestinal complaints; Visick II (good), mild gastrointestinal complaints; Visick III (fair), significant gastrointestinal complaints; Visick IV (poor), failure.</td>
<td></td>
</tr>
<tr>
<td>WHO Quality of Life-BREF</td>
<td>WHOQOL-BREF</td>
<td>1</td>
<td>Perception of the quality of life. Four domains: physical, psychological, social relationship, environment.</td>
<td></td>
</tr>
</tbody>
</table>
if the results are influenced by the tool’s design. On the other hand, it is convenient to limit the number of questionnaires used; some studies recommend not using more than three, if possible, or up to five in extreme cases\(^{65}\).

The use of validated and reliable measurements of HRQoL is essential. Ideally, any generic measurement of HRQoL should be replaced with a specific measurement that reflects the sensibility to the changes produced by the illness or by the influences related to the treatment. These questionnaires should not only have to be sensitive to the changes produced in the desired variable, but should also be acceptable to the patients\(^{64}\).

Quality of life and nutritional status

The relationship existing between nutritional status and HRQoL is becoming an important question not only in the study of oncological patients\(^{66,67}\), but also in other pathologies\(^{68}\) and interventions\(^{69,70}\). The improvement of this correlation, as a consequence of an appropriate nutritional intervention, enables the reduction of the number of postsurgical complications\(^{70,71}\), shortens the recovery time and the length of hospital stay, improves tolerance to the treatment\(^{72}\) and even increases the rate of survival\(^{74–77}\), and with it a general decrease in morbidity\(^{78,79}\).

On the other hand, as has been seen in the reviewed studies, the advice and nutritional follow-up given by professionals is related directly to the improvement in nutritional status, which will be related to the improvement in HRQoL\(^{25,80}\). It has been demonstrated, in head and neck neoplasm, that nutritional advice enables improvements in quality of life greater than those obtained by nutritional supplementation without advice\(^{81}\).

Now, the efficacy of nutritional advice as a positive influence on HRQoL depends on the possibility of adapting intervention to the specific need of each type of patient. Therefore, nutritional advice should be given by dedicated, specialised groups\(^{75,82}\). Of special importance is the need for future studies that clarify the relationship between nutritional status and quality of life. This importance is recognised by studies included in the present review\(^{14,15,19,20,23,26,27,33,34}\) and also in other publications that highlight the need to explore the relationship in greater detail.

Hence, the measurement of HRQoL with generic tools requires large sample sizes in order to demonstrate statistically significant differences and, in the majority of cases, these types of questionnaires are affected by uncontrolled external factors\(^{42,83–86}\). Ultimately, valid HRQoL measurement tools are dependent upon patient perception, the impact of the illness, the treatment, expectations and wellbeing. There should be an independent gold standard for all research projects and everyday medical practice.

A specific tool is needed: one that is sensitive to the measurement of HRQoL and can be self-administered quickly and easily on a regular basis. Nevertheless, it must be recognised that the development of a tool to detect, evaluate and monitor the influence of the pathological base is not an easy task.

Conclusion

Only three studies\(^{19,23,29}\) selectively focused on the relationship between nutritional status and quality of life, this evaluation being performed not by means of specific questionnaires but by statistical analysis of data obtained via validated questionnaires.

Acknowledgements

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References

Quality of life related to nutritional status