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British Journal of Nutrition / Volume 101 / Issue 07 / April 2009, pp 950 - 960
DOI: 10.1017/S0007114508207178, Published online: 02 February 2009

Link to this article: http://journals.cambridge.org/abstract_S0007114508207178

How to cite this article:

Carmina Wanden-Berghe, Javier Sanz-Valero, Vicenta Escribà-Agüir, Isabel Castelló-Botia and Rocio Guardiola-Wanden-Berghe (2009). Evaluation of quality of life related to nutritional status. *British Journal of Nutrition*, 101, pp 950-960
doi:10.1017/S0007114508207178

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Systematic Review

Evaluation of quality of life related to nutritional status

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(Received 29 January 2008 – Revised 9 October 2008 – Accepted 10 October 2008 – First published online 2 February 2009)

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⁽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^(2,3), that there is a significant correlation between nutrition and alterations in muscular, immune and cognitive functions⁽⁴⁾ and therefore that an improvement in nutritional status is an influencing factor in the improvement of physiological function^(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^(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⁽⁹⁾.

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 90.00 (95% CI 80.70, 99.30)%; κ 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 Añon; applying the most sensitive search formula) and the experts in nutrition reduced the number of studies to thirty-one⁽¹¹⁾.

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⁽¹²⁻³⁹⁾ (Table 1).

It is worth noting how recent the studies are; the average age is 3.85 (95% CI 2.62, 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^(19,23,29). Another article (3.57%) referred to a possible relationship between HRQoL and nutrition⁽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 1. Summary of the twenty-eight reviewed studies in chronological order according to year of publication

Reference	Study design	QoL questionnaire	Patients included	Follow-up	Relationship between QoL and nutritional status in study results
O'Keefe <i>et al.</i> (2007) ⁽¹²⁾	Prospective	Subjective assessment of QoL (transplantation)	Group 1: transplant patients, <i>n</i> 46, M/W 26/21, age range 22–66 years Group 2: total parenteral nutrition patients, <i>n</i> 13, M/W 10/3, age range 31–80 years	Mean 21 (range 12–36) months	QoL not evaluated in respect of nutritional status
Oates <i>et al.</i> (2007) ⁽¹³⁾	Prospective	EORTC QLQ-C-30 and EORTC QLQ-H&N35	Fourteen patients with nasopharyngeal carcinoma Age range 27–71 years	2 years	These results emphasise the need for early nutritional intervention before commencing chemoradiotherapy
Kalaizakis <i>et al.</i> (2006) ⁽¹⁴⁾	Prospective	SF-36	128 adult patients with cirrhosis Control group: 299 age- and sex-matched reference sample from general population	6 months	Prospective follow-up studies are needed to fully clarify the role of gastrointestinal symptoms in HRQoL and nutritional status in liver cirrhosis
Trabal <i>et al.</i> (2006) ⁽¹⁵⁾	Cross-sectional	EORTC QLQ-C-30	Fifty cancer patients M/W 28/22, mean age 61 (SD 14) years	3 d	The results point out that poor food intakes can affect QoL by themselves
Murawa <i>et al.</i> (2006) ⁽¹⁶⁾	Prospective	Troidl	Thirty-one patients with stomach cancer-related total gastrectomy M/W 20/11, mean age 56.9 (SD 10.05) years	49–127 months after surgery (mean 79.61 (SD 23.41) months)	QoL was independent of the time elapsed from the surgery
Izutsu <i>et al.</i> (2006) ⁽¹⁷⁾	Cross-sectional	WHOQOL-BREF	187 boys and 137 girls from urban non-slum area 157 boys and 121 girls from urban slum area Age range 11–18 years		QoL was not evaluated in respect of nutritional status Living conditions, mental health, nutritional status and QoL of slum adolescents were worse than their non-slum counterparts
Gramignano <i>et al.</i> (2006) ⁽¹⁸⁾	Prospective	QoL-OS and EuroQoL-5D	Twelve patients who had advanced solid tumours and reported fatigue M/W 2/10, age range 42–73 years	4 weeks	QoL was not evaluated in respect of nutritional status Improvement of symptoms with respect to fatigue and QoL in relation to oxidative stress may be explained mainly by an increase in lean body mass
Eriksson <i>et al.</i> (2005) ⁽¹⁹⁾	Cross-sectional	SF-36	128 non-institutionalised individuals M/W 40/88, age range 70–75 years, mean age 72.9 (SD 1.5) years		QoL was not evaluated in respect of nutritional status 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
Allen (2005) ⁽²⁰⁾	Retrospective	OHIP-EDENT	Thirty-five edentulous adults who requested new complete dentures M/W 12/23, age range 52–77 years	Past 3 months	There was no association between diet and oral-related QoL
Ravasco <i>et al.</i> (2005) ⁽²¹⁾	Clinical trial	EORTC QLQ-C-30	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 (<i>n</i> 37): individualised dietary counselling based on regular foods Group 2 (<i>n</i> 37): high-protein liquid supplement in addition to their usual diet Group 3 (<i>n</i> 37): the control group, patients were instructed to maintain their <i>ad libitum</i> intake	3 months	QoL was not evaluated in respect of nutritional status 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 The prevalence of malnutrition at baseline was similar between the three study groups
Scott <i>et al.</i> (2005) ⁽²²⁾	Clinical trial	SF-36	112 adult patients were recruited Intervention group: <i>n</i> 55, mean age 67.4 (SD 17) years Control group: <i>n</i> 57; mean age 68.6 (SD 17) years	12 months after PEG	There was a linear positive association with the improvement in the patients' nutritional status QoL was not evaluated in respect of nutritional status

Table 1. Continued

Reference	Study design	QoL questionnaire	Patients included	Follow-up	Relationship between QoL and nutritional status in study results
Keller (2004) ⁽²³⁾	Cross-sectional	Non-validated author design	367 frail seniors (73.6% women) Age range 54–100 years, mean age 79.3 (sd 7.9) years		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
Gollub & Weddle (2004) ⁽²⁴⁾	Retrospective	Vailas <i>et al.</i>	Two groups Breakfast group: received a home-delivered breakfast and lunch, 5 d per week, <i>n</i> 167, age range 63–100 years, mean age 79.8 (sd 8.1) years Comparison group: received a home-delivered lunch 5 d per week, <i>n</i> 214, age range 60–100 years, mean age 77.7 (sd 9.1) years	Past 6 months	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
Hickson & Frost (2004) ⁽²⁵⁾	Cross-sectional	EuroQoL-5D	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		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
Johansen <i>et al.</i> (2004) ⁽²⁶⁾	Prospective	SF-36	212 patients identified as being nutritionally at risk Group 1: intervention, <i>n</i> 108, M/W 54/54, mean age 62.0 (sd 1.6) years Group 2: control, <i>n</i> 104, M/W 48/56, mean age 62.4 (sd 1.7) years	> 4 d	The SF-36 QoL questionnaire did not reveal any convincing significant effect of nutritional intervention
Kennedy <i>et al.</i> (2004) ⁽²⁷⁾	Prospective	POQOLS	103 children and adolescents with acute lymphoblastic leukaemia Age range 1–18 years, mean age 6.7 years Group 1 (standard risk protocol): <i>n</i> 68, M/W 41/27, mean age 4.7 (sd 2.6) years Group 2 (high-risk protocol): <i>n</i> 35, M/W 19/16, mean age 10.5 (sd 4.6) years	6 months after diagnosis	QoL was not evaluated in respect of nutritional status
Step toe <i>et al.</i> (2004) ⁽²⁸⁾	Prospective	SF-36	271 adults patients Group 1 (behavioural counselling); <i>n</i> 136, M/W 54/82, mean age 43.3 (sd 13.8) years Group 2 (nutritional education counselling): <i>n</i> 135, M/W 51/84, mean age 43.2 (sd 14.0) years	12 months	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
Isenring <i>et al.</i> (2003) ⁽²⁹⁾	Prospective	EORTC QLQ-C-30	Sixty cancer patients M/W 51/9, age range 24–85 years, mean age 61.9 (sd 14.0) years	4 weeks	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
Tomíška <i>et al.</i> (2003) ⁽³⁰⁾	Clinical trial	EORTC QLQ-C-30 and VAS	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	2 months	Significant benefit in appetite was found by VAS and QLQ-C30 questionnaire QoL was not evaluated in respect of nutritional status

Table 1. Continued

Reference	Study design	QoL questionnaire	Patients included	Follow-up	Relationship between QoL and nutritional status in study results
Tidemark (2003) ⁽³¹⁾	Clinical trial	EuroQoL-5D, SF-36 and Nottingham Health Profile	Patients with femoral neck fracture Studies I and II: <i>n</i> 90, > 65 years, M/W 24/66, mean age 89 (SD 7) years Studies III and IV: <i>n</i> 110, \geq 70 years, M/W 13/87, mean age 80 (SD 6) years Studies V and VI: <i>n</i> 24, \geq 70 years, M/W 0/24, mean age 83 (SD 5) years	Study I: 12 months Study II: minimum 24 months Studies III and IV: 24 months Study V: in hospital Study VI: 12 months	QoL was not evaluated in respect of nutritional status
Ohtsuka <i>et al.</i> (2002) ⁽³²⁾	Prospective	Kurihara (modified)	Thirty-one Japanese patients who underwent pylorus-preserving pancreatoduodenectomy M/W 15/16, age range 39–85 years, mean age 62 years Group 1 (Imanaga): <i>n</i> 18, M/W 11/7, mean age 62.2 (SD 2.7) years Group 2 (Traverso): <i>n</i> 13, M/W 4/9, mean age 60.8 (SD 2.7) years	1 year after surgery	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
Ribaldo <i>et al.</i> (2000) ⁽³³⁾	Clinical trial	FAACT and BACRI	213 patients Group 1: <i>n</i> 155 cancer patients, M/W 87/68, mean age 64.1 (SD 12.3) years Group 2: <i>n</i> 58, HIV infected, M/W 57/1, mean age 39.2 (SD 8.7) years	12 weeks	QoL was not evaluated in respect of nutritional status
Laws <i>et al.</i> (2000) ⁽³⁴⁾	Cross-sectional	Not validated	64 patients Group 1 (well nourished): <i>n</i> 41, M/W 21/20, age range 40–85 years, mean age 64.5 years Group 2 (malnourished): <i>n</i> 15, M/W 6/9, age range 37–73 years, mean age 61.8 years Group 3 (severely malnourished): <i>n</i> 8, M/W 4/4, age range 66–84 years, mean age 73.1 years	In haemodialysis for less than 1 month	Malnutrition is associated with poorer QoL when the degree of malnutrition becomes severe
Van Bokhorst-de Van der Schuer <i>et al.</i> (2000) ⁽³⁵⁾	Clinical trial	EORTC QLQ-C-30 and COOP-WONCA	Forty-nine malnourished (weight loss > 10%) head and neck cancer patients (thirty-one patients filled in both questionnaires) Group 1 (no preoperative nutritional support): <i>n</i> 11, M/W 7/4, mean age 56.6 years, age range 42–76 years Group 2 (standard enteral nutrition) <i>n</i> 10, M/W 3/7, mean age 58.6 years, age range 43–69 years Group 3 (isonitrogenous enteral nutrition): <i>n</i> 10, M/W 6/4, mean age 61.4 years, age range 43–83 years	6 months after surgery	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
Callahan <i>et al.</i> (2000) ⁽³⁶⁾	Prospective	Quality of Well Being Scale	150 patients receiving PEG M/W 66/84, age range 60–98 years, mean age 78.9 (SD 8.1) years	Over 14-month period	QoL was not evaluated in respect of nutritional status
Bruera <i>et al.</i> (1998) ⁽³⁷⁾	Clinical trial	FLIC and VAS	Patients with advanced cancer M/W 47/37, mean age 62 (SD 11) years Group 1 (Megestrol group): <i>n</i> 62 Group 2 (placebo): <i>n</i> 60	21 d	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

Table 1. Continued

Reference	Study design	QoL questionnaire	Patients included	Follow-up	Relationship between QoL and nutritional status in study results
Beller <i>et al.</i> (1997) ⁽³⁸⁾	Clinical trial	LASA (using six linear analogue self-assessment scales)	240 cancer patients over 18 years Group 1 (placebo): n 79, MW 54/25 Group 2 (low dose): n 80, MW 52/28 Group 3 (high dose): n 81, MW 53/28	12 weeks	Improvement of appetite, mood and overall QoL in these patients, although not through a direct effect on nutritional status
McLeod <i>et al.</i> (1995) ⁽³⁹⁾	Cross-sectional	Time Trade-off Technique Direct Questioning of Objectives Gastrointestinal Quality of Life Sickness Impact Profile Physician Global Assessment Visick scale	Group 1 (Whipple group): n 50, MW 13/12, mean age 57.7 (sd 14.6) years Group 2 (control group): n 50, MW 13/12, mean age 58.0 (sd 11.1) years		QoL and nutritional status are excellent in patients following a Whipple procedure

QoL, quality of life; MW, men and women; EORTC QLQ-C-30, European Organisation for Research and Treatment of Cancer Quality of Life; WHOQOL-BREF, WHO Quality of Life; EuroQoL-5D, Euro Quality of Life 5 Dimensions; SF-36, Short Form-36 Health Survey; HRQoL, health-related quality of life; WHOQOL-BREF, WHO Quality of Life; BREF, WHO Quality of Life focused on symptoms of oxidative stress; EuroQoL-5D, Euro Quality of Life 5 Dimensions; MNA Mini Nutritional Assessment; OHIP-EDENT, Oral Health Impact Profile – EDENT; PEG, percutaneous endoscopic gastrostomy; SCREEN, Seniors in the Community: Risk Evaluation for Eating and Nutrition; POQOLS, Paediatric Quality of Life Scale; PG-SGA, Patient-Generated Subjective Global Assessment; VAS, visual analogue scale; FAACT, Functional Assessment of Anorexia/Cachexia Therapy; BACRI, Bristol-Myers Anorexia Cachexia Recovery Instrument; COOP-WONCA, Dartmouth Primary Care Cooperative Information Project World Organization of National Colleges, Academies, and Academic Associations of General Practitioners/Family Physicians; FLIC, Functional Living Index-Cancer; LASA, linear analogue scale assessment.

Among the reviewed papers, ten (35.71 %) found no type of relationship between nutritional status, or any type of nutrition, and HRQoL^(12,16–18,20,22,24,27,31,33).

Nine articles (32.14 %) recommended, or considered necessary, future prospective studies in order to completely clarify the correlation between HRQoL and nutritional status^(14,15,19,20,23,26,27,33,34).

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 Isenring *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 Keller⁽²³⁾ showed that the association between nutritional risk and HRQoL is consistent, explaining the 44 % variation Hickson & Frost⁽²⁵⁾ describe, concluding with the necessity for a tool that shows high sensibility 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^(18,22,30,35,37) 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 Assessment (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 Quality of Life (Transplantation); Troldl; 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

Questionnaire	Abbreviation	Times used	Design	Domains
European Organisation for Research and Treatment of Cancer Quality of Life	EORTC QLQ-C-30	6	Cancer	Global quality of life scale Five functional scales: physical, role, emotional, cognitive, social Nine symptom scales: fatigue, pain, nausea/vomiting, dyspnoea, insomnia, appetite loss, constipation, diarrhoea, financial difficulties
Short Form-36 Health Survey	SF-36	6	Generic	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
Euro Quality of Life 5 Dimensions	EuroQoL-5D	3	Generic	Visual analogue scale (quality of life perceived) Change of health perceived Five dimensions: mobility, self-care, usual activity, pain or discomfort, anxiety or depression
Linear analogue scale assessment or visual analogue scale	LASA or VAS	3	Generic	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
Non-validated questionnaire		2	Generic	Author design
Bristol-Myers Anorexia Cachexia Recovery Instrument	BACRI	1	Anorexia and cachexia	An eight-item questionnaire: BACRI 7 (seven items), subjective recovery from symptoms of anorexia or cachexia; BACRI 1 (one item), patient perception of benefit
Dartmouth Primary Care Cooperative Information Project World Organization of National Colleges, Academies, and Academic Associations of General Practitioners/Family Physicians	COOP-WONCA	1	Generic	Six dimensions: physical fitness, mental health, daily activities, social activities, change in health, overall health
Direct Questioning of Objectives	DQO	1	Home parenteral nutrition	A category scale used for three life objectives: working full time, enjoying recreation, travel
European Organisation for Research and Treatment of Cancer Quality of Life – Head and Neck	EORTC QLQ-H&N35	1	Head and neck cancer	Designed to be used together with EORTC QLQ-C-30 Six symptom scales: pain, swallowing, senses (taste/smell), speech, social eating, social contacts Seven single items: sexuality, teeth problems, problems opening mouth, dry mouth, sticky saliva, cough, feeling ill
Functional Assessment of Anorexia/Cachexia Therapy	FAACT	1	Anorexia and cachexia	Four subscales: physical wellbeing, social/family wellbeing, emotional wellbeing, functional wellbeing Also twelve items (additional concerns)
Functional Living Index-Cancer	FLIC	1	Cancer	Five domains (linear analogue scale): physical wellbeing and ability, emotional state, sociability, family situation, nausea
Gastrointestinal Quality of Life Index	GiQLI	1	Gastrointestinal	Five domains: symptoms, physical dysfunction, emotional dysfunction, social dysfunction, effects of the medical treatment carried out
Kurihara questionnaire	Kurihara	1	Cancer	Twenty-three items categorised into two domains: physical and psychosocial aspects
Nottingham Health Profile	NHP	1	Generic	Part 1: energy level, pain, emotional reaction, sleep disturbance, social isolation, physical abilities Part 2: seven items about life affected areas
Oral Health Impact Profile – EDENT	OHIP-EDENT	1	Bucodental health	Nineteen items grouped into seven domains: functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability, handicap
Physician Global Assessment	MD global	1	Generic	Assessment of wellbeing using 10 cm visual analogue scale
Quality of Life focused on symptoms of oxidative stress	QoL-OS	1	Cancer	Five subscales: functional, physical, emotional, social and family, fatigue
Quality of Well Being Scale	QWB	1	Generic	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 (morbidity), preference for observed functional states (utility) and duration of stay in health states (prognosis)
Sickness Impact Profile	SIP	1	Generic	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)

Table 2. Continued

Questionnaire	Abbreviation	Times used	Design	Domains
Subjective assessment of Quality of Life (transplantation)		1	Liver or small-bowel transplant	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
Time Trade-off Technique	TTO	1	Generic	This assumes an individual's reference position is to have an initial endowment of time t 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.
Troidl		1	After gastrectomy	Dimensions: health state, mobility, self-care, usual activities, pain/discomfort, anxiety/depression Fourteen items divided into two groups: specific disease symptoms (eight items) and social-personal complaints (six items)
Vailas <i>et al.</i> Visick scale		1	Generic After gastrectomy	Six domains: global quality of life perceived, health, loneliness, food enjoyment, food security, depression Four grades: Visick I (excellent), no gastrointestinal complaints; Visick II (good), mild gastrointestinal complaints; Visick III (fair), significant gastrointestinal complaints; Visick IV (poor), failure
WHO Quality of Life-BREF	WHOQOL-BREF	1	Generic	Perception of the quality of life Health status Four domains: physical, psychological, social relationship, environment

results given by measuring the obsolescence, and by the excellent result of the Price index. The excellence and the current importance of the research articles are complementary, but nevertheless important factors, in those studies referring to the health sciences.

It must be underlined that the evaluation of HRQoL is circumscribed specifically within the scope of the investigation. Its use in common medical practice would help to obtain validated information about the impact of the illness or the treatment of the patient in daily life, both of which could be useful in decision making⁽⁴⁰⁾. Knowing HRQoL does not substitute the symptomatic, analytic and morphological evaluations, but complements them, introducing something as important as the patient's point of view about their perception of their own health⁽⁴¹⁾. Quality of life assessment measuring the patient's experiences of the impact of disease and therapy, expectations and satisfaction should be the 'gold standard' as an independent end point in clinical trials^(21,42).

The undertaking of prospective studies of HRQoL in clinics improves the information about the patient, which, along with the diagnosis, provides important information about the patient's perception of the effect of treatment^(13,43). Neither must it be forgotten that the objective is also to prioritise resources. Mathematical methods are applied to try to quantify the quality of life in relation to its usefulness (quality-adjusted life years) as a self-profit concept⁽⁴⁴⁾.

The review proves that HRQoL has been studied as a variable in the health-illness process^(45,46), and not only, as is frequently the case, as a covariable in pathological^(14,47-51) or surgical⁽⁵²⁻⁵⁴⁾ process studies, in pharmacological follow-ups⁽⁵⁵⁾, in relation to somatic^(56,57) or social^(58,59) aspects, or to support future recommendations⁽⁶⁰⁻⁶²⁾.

Limitations to the identified studies

The present review exposes the lack of homogeneity of the studies found, produced by certain limitations, namely the different questionnaires used, the diversity of pathologies, sample sizes, methodology and variation in follow-up, all of which do not permit meaningful meta-analysis, thus making direct comparison awkward, especially those studies that apply non-validated HRQoL questionnaires. Furthermore, two studies are retrospective in design and are susceptible to bias.

It is fundamental when designing these studies that possibly confusing variables are controlled, that interaction effects are recognised and that HRQoL is evaluated at different points in the evolution of the illness, the period in which patients are having the treatment or that these are matched up with a control group⁽⁶³⁾.

Limitations due to the questionnaires

No mention of the patient's acceptance of the HRQoL questionnaires used has been found in the studies reviewed. The complexity of these tools or their use can be the cause of disinterestedness, partial fulfilment or desertion on the part of the participants. This conformity is a crucial methodological requisite for avoiding skewed results⁽⁶⁴⁾. It is possible that the structure and appearance of the questionnaires about HRQoL are considered less important than the final results, but if this circumstance is not properly managed, it will never be known

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 sensitivity 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 post-surgical complications^(70,71), shortens the recovery time and the length of hospital stay, improves tolerance to the treatment^(72,73) 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

All the authors had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

This present investigation has been made possible thanks to a Nutricia grant.

All the authors contributed in the study, according to the Vancouver rules. Contributions of the authors were as follows: study concept and design, C. W.-B., J. S.-V. and V. E.-A.; bibliographical previous search, J. S.-V. and C. W.-B.; analysis and interpretation of data, analysis of nutritional contents, C. W.-B.; analysis of documental contents, J. S.-V.; drafting of the manuscript, J. S.-V., I. C.-B., R. G.-W.-B.; elaboration of tables and databases, I. C.-B., R. G.-W.-B.; critical revision of the manuscript for important intellectual content, C. W.-B., V. E.-A.; statistical expertise, J. S.-V.; obtained funding, C. W.-B.; administrative, technical or material support, I. C.-B., R. G.-W.-B.; study supervision, C. W.-B., J. S.-V. and V. E.-A.

None of the authors has financial or other conflicts of interest.

References

- Hendry F & McVittie C (2004) Is quality of life a healthy concept? Measuring and understanding life experiences of older people. *Qual Health Res* **14**, 961–975.
- Rantanen T, Harris T, Leveille SG, *et al.* (2000) Muscle strength and body mass index as long-term predictors of mortality in initially healthy men. *J Gerontol A Biol Sci Med Sci* **55**, M168–M173.
- Cabioglu N, Bilgic S, Deniz G, *et al.* (2002) Decreased cytokine expression in peripheral blood leukocytes of patients with severe sepsis. *Arch Surg* **137**, 1037–1043.
- Pearson JM, Schlettwein-Gsell D, Brzozowska A, *et al.* (2001) Life style characteristics associated with nutritional risk in elderly subjects aged 80–85 years. *J Nutr Health Aging* **5**, 278–283.
- Bourdel-Marchasson I, Joseph PA, Dehail P, *et al.* (2001) Functional and metabolic early changes in calf muscle occurring during nutritional repletion in malnourished elderly patients. *Am J Clin Nutr* **73**, 832–838.
- Magri F, Borza A, del Vecchio S, *et al.* (2003) Nutritional assessment of demented patients: a descriptive study. *Ageing Clin Exp Res* **15**, 148–153.
- O'Reilly D, Rosato M & Patterson C (2005) Self reported health and mortality: ecological analysis based on electoral wards across the United Kingdom. *BMJ* **331**, 938–939.
- Fillenbaum GG, Burchett BM, Kuchibhatla MN, *et al.* (2007) Effect of cancer screening and desirable health behaviours on functional status, self-rated health, health service use and mortality. *J Am Geriatr Soc* **55**, 66–74.
- August DA (2002) An agenda for the clinical science and practice of home parenteral nutrition. *JPEN J Parenter Enteral Nutr* **26**, Suppl. 5, S72–S75.
- Wanden-Berghe C, Sanz-Valero J, Juan-Quilis V, *et al.* (2007) The valuation of the quality of life related to the nutritional state: systematic review. *Nutr Hosp* **22**, Suppl. 1, S94.

11. Wanden-Berghe C, Sanz-Valero J, Juan-Quilis V, *et al.* (2007) Quality of life related to nutritional status: scientific document experts consensus vs. nutrition expert consensus. In *Proceedings of the 29th Congress of the European Society for Clinical Nutrition and Metabolism (ESPEN)*, p. 69. Prague: ESPEN.
12. O'Keefe SJ, Emerling M, Koritsky D, *et al.* (2007) Nutrition and quality of life following small intestinal transplantation. *Am J Gastroenterol* **102**, 1093–1100.
13. Oates JE, Clark JR, Read J, *et al.* (2007) Prospective evaluation of quality of life and nutrition before and after treatment for nasopharyngeal carcinoma. *Arch Otolaryngol Head Neck Surg* **133**, 533–540.
14. Kalaitzakis E, Simrén M, Olsson R, *et al.* (2006) Gastrointestinal symptoms in patients with liver cirrhosis: associations with nutritional status and health-related quality of life. *Scand J Gastroenterol* **41**, 1464–1472.
15. Trabal J, Leyes P, Forga MT, *et al.* (2006) Quality of life, dietary intake and nutritional status assessment in hospital admitted cancer patients. *Nutr Hosp* **21**, 505–510.
16. Murawa D, Murawa P, Oszkini G, *et al.* (2006) Long-term consequences of total gastrectomy: quality of life, nutritional status, bacterial overgrowth and adaptive changes in esophagojejunos-tomic mucosa. *Tumori* **92**, 26–33.
17. Izutsu T, Tsutsumi A, Islam AM, *et al.* (2006) Mental health, quality of life, and nutritional status of adolescents in Dhaka, Bangladesh: comparison between an urban slum and a non-slum area. *Soc Sci Med* **63**, 1477–1488.
18. Gramignano G, Lusso MR, Madeddu C, *et al.* (2006) Efficacy of L-carnitine administration on fatigue, nutritional status, oxidative stress, and related quality of life in 12 advanced cancer patients undergoing anticancer therapy. *Nutrition* **22**, 136–145.
19. Eriksson BG, Dey DK, Hessler RM, *et al.* (2005) Relationship between MNA and SF-36 in a free-living elderly population aged 70 to 75. *J Nutr Health Aging* **9**, 212–220.
20. Allen PF (2005) Association between diet, social resources and oral health related quality of life in edentulous patients. *J Oral Rehabil* **32**, 623–638.
21. Ravasco P, Monteiro-Grillo I, Vidal PM, *et al.* (2005) Dietary counseling improves patient outcomes: a prospective, randomized, controlled trial in colorectal cancer patients undergoing radiotherapy. *J Clin Oncol* **23**, 1431–1438.
22. Scott F, Beech R, Smedley F, *et al.* (2005) Prospective, randomized, controlled, single-blind trial of the costs and consequences of systematic nutrition team follow-up over 12 mo after percutaneous endoscopic gastrostomy. *Nutrition* **21**, 1071–1077.
23. Keller HH (2004) Nutrition and health-related quality of life in frail older adults. *J Nutr Health Aging* **8**, 245–252.
24. Gollub EA & Weddle DO (2004) Improvements in nutritional intake and quality of life among frail homebound older adults receiving home-delivered breakfast and lunch. *J Am Diet Assoc* **104**, 1227–1235.
25. Hickson M & Frost G (2004) An investigation into the relationships between quality of life, nutritional status and physical function. *Clin Nutr* **23**, 213–221.
26. Johansen N, Kondrup J, Plum LM, *et al.* (2004) Effect of nutritional support on clinical outcome in patients at nutritional risk. *Clin Nutr* **23**, 539–550.
27. Kennedy DD, Tucker KL, Ladas ED, *et al.* (2004) Low antioxidant vitamin intakes are associated with increases in adverse effects of chemotherapy in children with acute lymphoblastic leukemia. *Am J Clin Nutr* **79**, 1029–1036.
28. Steptoe A, Perkins-Porras L, Hilton S, *et al.* (2004) Quality of life and self-rated health in relation to changes in fruit and vegetable intake and in plasma vitamins C and E in a randomised trial of behavioural and nutritional education counselling. *Br J Nutr* **92**, 177–184.
29. Isenring E, Bauer J & Capra S (2003) The scored Patient-generated Subjective Global Assessment (PG-SGA) and its association with quality of life in ambulatory patients receiving radiotherapy. *Eur J Clin Nutr* **57**, 305–309.
30. Tomiška M, Tomisková M, Salajka F, *et al.* (2003) Palliative treatment of cancer anorexia with oral suspension of megestrol acetate. *Neoplasma* **50**, 227–233.
31. Tidermark J (2003) Quality of life and femoral neck fractures. *Acta Orthop Scand Suppl* **74**, 1–42.
32. Ohtsuka T, Yamaguchi K, Chijiwa K, *et al.* (2002) Effect of gastrointestinal reconstruction on quality of life and nutritional status after pylorus-preserving pancreatoduodenectomy. *Dig Dis Sci* **47**, 1241–1247.
33. Ribaldo JM, Cella D, Hahn EA, *et al.* (2000) Re-validation and shortening of the Functional Assessment of Anorexia/Cachexia Therapy (FAACT) questionnaire. *Qual Life Res* **9**, 1137–1146.
34. Laws RA, Tapsell LC & Kelly J (2000) Nutritional status and its relationship to quality of life in a sample of chronic hemodialysis patients. *J Ren Nutr* **10**, 139–147.
35. Van Bokhorst-de Van der Schuer MA, Langendoen SI, Vondeling H, *et al.* (2000) Perioperative enteral nutrition and quality of life of severely malnourished head and neck cancer patients: a randomized clinical trial. *Clin Nutr* **19**, 437–444.
36. Callahan CM, Haag KM, Weinberger M, *et al.* (2000) Outcomes of percutaneous endoscopic gastrostomy among older adults in a community setting. *J Am Geriatr Soc* **48**, 1048–1054.
37. Bruera E, Ernst S, Hagen N, *et al.* (1998) Effectiveness of megestrol acetate in patients with advanced cancer: a randomized, double-blind, crossover study. *Cancer Prev Control* **2**, 74–78.
38. Beller E, Tattersall M, Lumley T, *et al.* (1997) Improved quality of life with megestrol acetate in patients with endocrine-insensitive advanced cancer: a randomised placebo-controlled trial. Australasian Megestrol Acetate Cooperative Study Group. *Ann Oncol* **8**, 277–283.
39. McLeod RS, Taylor BR, O'Connor BI, *et al.* (1995) Quality of life, nutritional status, and gastrointestinal hormone profile following the Whipple procedure. *Am J Surg* **169**, 179–185.
40. Lizán Tudela L & Badia Llach X (2003) Quality of life evaluation for osteoporosis. *Aten Primaria* **31**, 126–133.
41. Monés J (2004) Can quality of life be measured? How important is it? *Cir Esp* **76**, 71–77.
42. Testa MA & Simonson DC (1996) Assessment of quality of life outcomes. *N Engl J Med* **334**, 835–840.
43. Detmar SB, Muller MJ, Schornagel JH, *et al.* (2002) Health-related quality-of-life assessments and patient–physician communication: a randomized controlled trial. *JAMA* **288**, 3027–3034.
44. Zaragaza Monzón A, Culebras JM, Gómez Candela C, *et al.* (1998) The evaluation of the quality of life in artificial nutrition. *Nutr Hosp* **13**, 1–7.
45. Bowling A (2007) *Measuring Health: a Review of Quality of Life Measurement Scales*, 3th ed. Buckingham, UK: Open University Press.
46. Milner JA (2002) Functional foods and health: a US perspective. *Br J Nutr* **88**, Suppl. 2, S151–S158.
47. Cabré Gelada E & Gassull Duro MA (1999) Nutrition and chronic liver disease. *Nutr Hosp* **14**, Suppl. 2, S62–S70.
48. Fernández-Bañares F & Gassull Duro MA (1999) Review and consensus in nutritional therapy: nutrition in inflammatory bowel disease. *Nutr Hosp* **14**, Suppl. 2, S71–S80.
49. Gupta D, Lis CG & Grutsch JF (2007) The relationship between cancer-related fatigue and patient satisfaction with quality of life in cancer. *J Pain Symptom Manage* **34**, 40–47.
50. Schmitt JM & Ford DE (2007) Role of depression in quality of life for patients with psoriasis. *Dermatology* **215**, 17–27.

51. Eiser C & Morse R (2001) A review of measures of quality of life for children with chronic illness. *Arch Dis Child* **84**, 205–211.
52. Ammerman DJ, Watters J, Clinch JJ, *et al.* (2007) Exploring quality of life for patients undergoing major surgery: the perspectives of surgeons, other healthcare professionals, and patients. *Surgery* **141**, 100–109.
53. Morris DB, Wilson KG, Clinch JJ, *et al.* (2006) Identification of domains relevant to health-related quality of life in patients undergoing major surgery. *Qual Life Res* **15**, 841–854.
54. Barreto Villela N, Braghrolli Neto O, Lima Curvello K, *et al.* (2004) Quality of life of obese patients submitted to bariatric surgery. *Nutr Hosp* **19**, 367–371.
55. Cuerda C, Cambor M, Bretón I, *et al.* (2002) Long-term follow-up of home parenteral nutrition at a general hospital: complications and quality of life. *Nutr Hosp* **17**, 15–21.
56. Carlsson E, Bosaeus I & Nordgren S (2003) Quality of life and concerns in patients with short bowel syndrome. *Clin Nutr* **22**, 445–452.
57. Huisman-de Waal G, Schoonhoven L, Jansen J, *et al.* (2007) The impact of home parenteral nutrition on daily life – a review. *Clin Nutr* **26**, 275–288.
58. Malone M (2002) Longitudinal assessment of outcome, health status, and changes in lifestyle associated with long-term home parenteral and enteral nutrition. *JPEN J Parenter Enteral Nutr* **26**, 164–168.
59. Úbeda N, Basagoiti M, Alonso-Aperte E, *et al.* (2007) Dietary food habits, nutritional status and lifestyle in menopausal women in Spain. *Nutr Hosp* **22**, 313–321.
60. Sawyer SM, Drew S, Yeo MS, *et al.* (2007) Adolescents with a chronic condition: challenges living, challenges treating. *Lancet* **369**, 1481–1489.
61. Chambers A & Powell-Tuck J (2007) Determinants of quality of life in home parenteral nutrition. *Curr Opin Clin Nutr Metab Care* **10**, 318–323.
62. Baxter JP, Fayers PM & McKinlay AW (2006) A review of the quality of life of adult patients treated with long-term parenteral nutrition. *Clin Nutr* **25**, 543–553.
63. Wanden-Berghe C (2006) Quality of life in patients with home parenteral nutrition. *Fam Hosp* **176**, 57–62.
64. Smith DJ & Huntington J (2006) Choosing the “correct” assessment tool. *Curr Probl Cancer* **30**, 272–282.
65. Bottomley A & Therasse P (2002) Quality of life in patients undergoing systemic therapy for advanced breast cancer. *Lancet Oncol* **3**, 620–628.
66. Marín Caro MM, Laviano A, Pichard C, *et al.* (2007) Relationship between nutritional intervention and quality of life in cancer patients. *Nutr Hosp* **22**, 337–350.
67. García-Luna PP, Parejo Campos J & Pereira Cunill JL (2006) Causes and impact of hyponutrition and cachexia in the oncologic patient. *Nutr Hosp* **21**, Suppl. 3, 10–16.
68. de Miguel Díez J, Izquierdo Alonso JL, Molina París J, *et al.* (2005) Factors affecting drug prescription in patients with stable COPD: results from a multicenter Spanish study (IDENTEPOC). *Arch Bronconeumol* **4**, 63–70.
69. Juan Samper G, Ramón Capilla M, Cantó Armengol A, *et al.* (2004) Four-year results after lung volume reduction surgery for emphysema. *Arch Bronconeumol* **40**, 443–448.
70. Galindo P, Pérez de la Cruz A, Cerezo S, *et al.* (2001) Malnutrition and mortality in haemodialysis patients. *Nutr Hosp* **16**, 27–30.
71. Bozzetti F, Braga M, Gianotti L, *et al.* (2001) Postoperative enteral versus parenteral nutrition in malnourished patients with gastrointestinal cancer: a randomised multicentre trial. *Lancet* **358**, 1487–1492.
72. Fearon KC & Luff R (2003) The nutritional management of surgical patients: enhanced recovery after surgery. *Proc Nutr Soc* **62**, 807–811.
73. Braga M, Gianotti L, Nespoli L, *et al.* (2002) Nutritional approach in malnourished surgical patients: a prospective randomized study. *Arch Surg* **137**, 174–180.
74. Marín Caro MM, Laviano A & Pichard C (2007) Nutritional intervention and quality of life in adult oncology patients. *Clin Nutr* **26**, 289–301.
75. López Varela MV, Anido T & Larrosa M (2006) Functional status and survival in patients with chronic obstructive pulmonary disease following pulmonary rehabilitation. *Arch Bronconeumol* **42**, 434–439.
76. Loeser C, von Herz U, Kuchler T, *et al.* (2003) Quality of life and nutritional state in patients on home enteral tube feeding. *Nutrition* **19**, 605–611.
77. Bozzetti F, Cozzaglio L, Biganzoli E, *et al.* (2003) Quality of life and length of survival in advanced cancer patients on home parenteral nutrition. *Nutr Clin Pract* **18**, 176–177.
78. Schneider SM, Veyres P, Pivot X, *et al.* (2004) Malnutrition is an independent factor associated with nosocomial infections. *Br J Nutr* **92**, 105–111.
79. Farreras N, Artigas V, Cardona D, *et al.* (2005) Effect of early postoperative enteral immunonutrition on wound healing in patients undergoing surgery for gastric cancer. *Clin Nutr* **24**, 55–65.
80. Ravasco P, Monteiro-Grillo I, Vidal PM, *et al.* (2004) Cancer: disease and nutrition are key determinants of patients’ quality of life. *Support Care Cancer* **12**, 246–252.
81. Ravasco P, Monteiro-Grillo I, Marques Vidal P, *et al.* (2005) Impact of nutrition on outcome: a prospective randomized controlled trial in patients with head and neck cancer undergoing radiotherapy. *Head Neck* **27**, 659–668.
82. Marín Caro MM, Laviano A & Pichard C (2007) Impact of nutrition on quality of life during cancer. *Curr Opin Clin Nutr Metab Care* **10**, 480–487.
83. Winkler MF (2007) American Society of Parenteral and Enteral Nutrition Presidential Address: food for thought: it’s more than nutrition. *JPEN J Parenter Enteral Nutr* **31**, 334–340.
84. Tambyraja AL, Fraser SCA, Murie JA, *et al.* (2004) Quality of life after repair of ruptured abdominal aortic aneurysm. *Eur J Vasc Endovasc Surg* **28**, 229–233.
85. Baxter JP, Fayers PM & McKinlay AW (2005) A review of the instruments used to assess the quality of life of adult patients with chronic intestinal failure receiving parenteral nutrition at home. *Br J Nutr* **94**, 633–638.
86. Genton L, van Gemert W, Pichard C, *et al.* (2005) Physiological functions should be considered as true end points of nutritional intervention studies. *Proc Nutr Soc* **64**, 285–296.