Quality of life in gastric cancer

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Abstract

**AIM:** To summarize the empirical research on assessing quality of life (QOL) in patients with gastric carcinoma.

**METHODS:** Literature searches were conducted in MedLine from 1966 to February 2004.

**RESULTS:** Twenty-six studies were identified. QOL was used as an outcome measure in virtually all identified studies, such as those examining the effects of gastric cancer and various medical or surgical treatments in the patients. QOL was assessed mainly with generic measures; the social dimensions of QOL were largely neglected. The lack of gastric cancer-specific QOL measures hampers QOL research up to now. The gastric cancer-specific EORTC-QLQ-STO22 and the FACT-Ga are important additions to the arsenal of disease-specific QOL measures. In most of the studies, the label QOL is used for questionnaires, which only assess symptoms or performance status, or are physician-reported rather than patient-reported outcomes.

**CONCLUSION:** QOL in patients with gastric cancer deserves more systematic studies, especially as one of the outcome measures in randomized clinical trials. Results of studies that include QOL in patients with gastric cancer should be applied in clinical care, which aims at improving QOL in patients. QOL was assessed mainly with generic measures; only assess symptoms or performance status, or are physician-reported rather than patient-reported outcomes.

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**Key words:** Quality of life; Gastric cancer

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**INTRODUCTION**

'So, Dormidont Tikhonovich, I came to ask you to come down and give me a gastrointestinal examination. Any day that suits you, we'll arrange it.' She looked grey and her voice faltered. Oreshchenkov watched her steadily, his glance never wavering and his angular eyebrows expressing not one millimetre of surprise. 'Of course, Ludmila Afanasyevna. We shall arrange the day. However, I should like you to explain what your symptoms are, and what you think about them yourself.' 'I'll tell you my symptoms right away, but as for what I think about them-well, you know, I try not to think about them. That is to say, I think about them all too much, and now I've begun not sleeping at nights. The best thing would be if I knew nothing! I'm serious. You decide whether I'm to go into hospital or not and I'll go, but I don't want to know the details. If I'm to have an operation I would rather not know the diagnosis, otherwise I'll be thinking the whole time during the operation, “What on earth are they doing to me now? What are they taking out now?” Do you understand?'

In medical care for patients with (gastric) cancer, the 5-year survival is a crucial outcome. At the same time, quantity of survival is increasingly supplemented by data on quality of survival. In this journal, for example, 15 articles that are retrieved under the search heading 'gastric cancer and quality of life' have all been published since 1998. Defining quality of life (QOL) is a complex matter, a universally accepted definition does not exist. Schipper et al, proposed the functional effect of an illness and its consequent therapy upon a patient, as perceived by the patient. Functional effects usually are separated into three categories: physiological, psychological, and social. QOL, therefore, is a multidimensional construct. In a patient with gastric cancer, a physiological effect might be nausea or problems with swallowing, and a psychological effect could be depression, and a social effect might be withdrawal due to embarrassment about being ill. Sometimes economic effects are also discussed in the context of functional effects of illness. There is also a discussion about spiritual effect of illness. In general, however, the triad 'physiological', 'psychological', and 'social' effects is considered to represent the QOL.

QOL can be assessed using generic or disease-specific measures. Generic measures are used in every conceivable disease or disorder. Scores on those measures allow comparisons between groups of patients with an identical diagnosis but with different grades of severity or in different settings or countries, between two groups of patients with different diseases, or between a group of patients with a disease and persons without disease. Disease-specific measures have been designed to particularly assess QOL of patients with a specific disease. For example, in patients with Crohn's disease, the IBS-QOL is a disease-specific QOL measure, and the SF-36 is a generic QOL measure.
Cancer-generic measures (e.g., EORTC-QLQ-C30) assess QOL across various diagnostic cancer categories\(^7\). EORTC and FACIT have developed a wide range of questionnaires that assess QOL for various specific cancer types (visit www.eortc.be and www.facit.org/qlist.aspx)\(^8\).

QOL is not a ‘soft’ measure. If surgical technique A results in a similar 5-year survival as surgical technique B, differences in aspects of QOL, such as nausea, depression, and embarrassment, may determine which surgical technique is preferable. This view has been previously described in the area of gastroenterology, e.g., in functional bowel syndrome\(^9\). In gastric cancer, however, the topic of QOL is virtually unexplored. Recent reviews of gastric cancer in major journals do not mention QOL at all, let alone discussing QOL in the context of one of the outcome measures\(^10\). This is in sharp contrast with the area of QOL and, for instance, breast cancer. In this area, QOL is assessed with well-developed and validated measures, and QOL is a major outcome variable, which also influences the choice of medical management\(^11\).

In this paper, our aim is to review all empirical studies on the topic of gastric cancer and QOL, with a view to outline strengths and weaknesses in the empirical material available, and to suggest some future research avenues.

### MATERIALS AND METHODS

Literature searches were conducted in MedLine from 1966 to February 2004, with Mesh headings ‘gastric cancer’ and ‘quality of life’, and ‘gastric cancer’ and ‘psychology’. References in the retrieved papers were studied meticulously, and ‘snowballing’ produced additional papers. Only papers in English were selected. Excluded were studies on mixed diagnostic groupings, i.e., patients with gastric cancer were part of a large group of patients with various other types of (usually gastrointestinal) cancer, or that dealt with QOL, but only symptoms were measured, where only one of the three core QOL domains was assessed, or where QOL was not a patient-reported outcome but merely a physician-reported outcome\(^12\). Given the high prevalence of gastric cancer in Japan, an additional literature search was carried out in Ichushi-WEB, one of the largest literature searches in Japan of original papers, case reports and minutes of meetings held in Japan, which can be searched.

Empirical studies were analyzed according to first author and year of publication, country where the study was conducted, diagnosis or diagnostic category, study objective(s), number of patients and sociodemographic details, measure(s) used to assess QOL, results, domains in the QOL assessment, type of scale (generic, cancer-generic, or disease-specific), and remarks (on weaknesses in the study). The results are summarized in Table 1.

### RESULTS

The literature searches plus extensive and detailed studying

| First author, yr | Country | Diagnosis | Objective(s) | N patients, age in yr, ♂; ♀ | QOL measure(s) | Result(s) regarding QOL | Domains | Type(s) of questionnaires | Remarks |
|------------------|---------|-----------|--------------|-----------------------------|----------------|--------------------------|---------|--------------------------|---------|
| Adachi, 1999\(^{[15]}\) | Japan | Early gastric cancer | Evaluate QOL after laparoscopic-assisted vs conventional gastrectomy | 76-64±10 (mean) | Mailed questionnaire, 24 items (cf. Korenaga 1992\(^{[28]}\)) QOL, social dumping syndrome QOL; non-randomized design | PHY: eating; fatigue; pain; SOC: – multiple testing, no social dimension in QOL, non-randomized design | Gastric-Spec-H, L-C-Gen | - | No Bonferroni correction for multiple testing, no social dimension in QOL, non-randomized design |
| Anderson, 1995\(^{[16]}\) | Scotland | Adenocarcinoma of the stomach | Examine relief of symptoms after surgical treatment | 57 and 67 (median and range) | Symptom list scored via interviews | After surgery: symptoms | PHY: dysphagia, Gastric-Spec-H | - | - |
| Buhl, 1990\(^{[17]}\) | Germany | Gastric cancer | Evaluate QOL after subtotal vs total gastrectomy | 89-61±13 (mean) | Troidl questionnaire: disease-specific and socio-personal dimensions; psychological problems; Florowitz scale; Zerrsen | No significant differences between groups | PHY: eating; PSY: intrusion, avoidance, depression; SOC: – | Disease specific, H | Of the six measures, only three assessed QOL; no correlation between objective and subjective measures; no social |

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**Table 1 Summary of the 26 studies on QOL in gastric cancer**
| Author          | Country | Disease          | Methodology                                      | Sample Size | Measures                                      | Findings                                                                                                                                                                                                 |
|-----------------|---------|------------------|-------------------------------------------------|-------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Davies, 1998   | UK      | Gastric cancer   | Evaluate QOL after subtotal vs total gastrectomy | 47          | ADL, HAD, RSCL, Troidl                       | QOL ↑ in subtotal gastrectomy                                                                                                               |
| Eguchi, 2003    | Japan   | Gastric cancer   | Examine effects of docetaxel+5FU on survival and QOL | 5           | EORTC-QOL-C30                                 | QOL ↑ Full blown QOL: PHY, PSY, SOC Cancer generic, QOL is secondary endpoint                                                                 |
| Fuchs, 1995     | Germany | Gastric cancer   | QOL as one of the outcome measures in two surgical procedures (JIP vs RYP) | 120         | Spitzer and Visick questionnaire: both patient scored | No differences between procedures PHY: functional status Cancer generic, interesting: Spitzer and Visick were patient scored; randomized design                                                                 |
| Hoffman, 1998   | Sweden  | Gastric cancer   | Assess relevance of Clinical Benefit Response (CBR) criteria for effectiveness of chemotherapy | 61          | EORTC-QOL-C30, QLQ-C13 items, symptoms → translated into CBR | Patients’ views, doctors’ views and CBR: similar results Full blown QOL: PHY, PSY, SOC Cancer generic, gastric cancer specific, H CBR reflects combination of objective and subjective changes Retrospective design |
| Hoksch, 2002    | Germany | Gastric cancer   | Assess QOL after gastrectomy, with different types of reconstruction (IPP, IPP7, IPP15) | 41-59       | EORTC-QOL-C30, food consumption               | No major differences, except for ‘global health status’ (IPP15 ↓) Full blown QOL: PHY, PSY, SOC Cancer generic, gastric cancer specific, H Prospective randomized trial; QOL was target of trial |
| Horváth, 2001   | Hungary | Total gastrectomy| Assess QOL (aboral pouch, R-and-Y)               | 46          | GIQLI                                         | In aboral pouch: QOL ↑ Full blown QOL: PHY, PSY, SOC Interesting: QOL reflects CBR Committee on research and evaluation for gastrointestinal disorders in general Disease specific for controlled study; author Randomized design |
| Ishihara, 1999  | Japan   | Stomach cancer   | Evaluate QOL and ADL ≥2 yr after total gastrectomy | 51          | QLI, dumping symptoms                        | QOL ↓ PHY: physical strength PSY: fatigue, anxiety SOC: – Cancer generic, H gastric cancer specific, H Validity? |
| Jentschura, 1997| Germany | Gastric carcinoma| Effects of subtotal vs total gastrectomy on QOL | 195         | GIQLI                                         | Subtotal gastrectomy better QOL Questionnaire designed for assessing gastrointestinal symptoms Randomized trial; see also Horváth et al., 2001 Retrospective randomized design |
| Kalmár, 2001    | Hungary | Adenocarcinoma of the stomach | Aboral pouch vs total gastrectomy re QOL | 40          | GIQLI                                         | Pouch better QOL Full blown QOL: PHY, PSY, SOC See Jentschura 1997 Retrospective trial; see also Horváth et al., 2001 Randomized controlled design; author Randomized controlled study; author modified GIQLI; no social dimension QOL? |
| Kono, 2003      | Japan   | Early gastric cancer | R-en-Y vs pouch re QOL | 47          | GSRS and symptoms                            | Pouch better QOL (at 3 mo; not at 12 or 48 mo) PHY: reflux PSY: pain SOC: – Disease specific for gastrointestinal disorders in general GSRS; no social dimension QOL? |
| Korenaga, 1992  | Japan   | Gastric cancer   | Retrospective QOL assessment after gastrectomy | 150         | QOL: symptoms, Food tolerance via interview (cf. Adachi et al., 1999) | Food tolerance ↓ Appetite ↑ PH: eating PSY: appetite SOC: – Gastric cancer specific, H See Adachi et al., |
| Year | Country | Study Type | Study Design | Sample Size | Measures Used | Results | Publication Year |
|------|---------|------------|--------------|-------------|--------------|---------|------------------|
| 1999 | Spain   | Gastric cancer | Assess QOL after curative resection | 54 | EORTC-QLQ-C30, and disease-specific questions | QOL-social | 1999[15] |
| 2003 | Sweden  | Gastric cancer | To examine relations between clinical nutritional parameters and QOL after gastrectomy | 32 | BSS, CPRS, GSRS (gastric symptoms), MACL, SIP, SIIM | Strong correlations between change in body composition and QOL | 2003[29] |
| 2001 | Japan   | Gastric cancer | Compare long-term results regarding symptoms and nutritional status in patients with/without pouch | 34 | GSRS and symptoms | Pouch: QOL ↑ | 2001[30] |
| 1999 | Japan   | Unresectable gastric cancer and postoperative gastric cancer | Effects of Lentinan on survival and QOL | 45 | Homemade QOL questionnaire | Lentinan: QOL ↑ | 1999[32] |
| 2002 | Japan   | Gastrectomy | Compare QOL among three surgical techniques | 51 | 24 items on symptoms | Gastric tube reconstruction: best QOL; no other differences in QOL between techniques | 2002[35] |
| 1999 | Sweden  | Subtotal vs total gastrectomy | Examine impact of gastrectomy procedures on QOL | 64 | BSS, CPRS, EDS, GSRS, MACL, SIP, SIAM | Physical QOL categories negatively impaired | 1999[36] |
| 1996 | Sweden  | Gastrectomy | QOL before gastrectomy | 103 | BSS, MACL, SIP | Patients vs healthy controls: QOL ↓; 25% report functional limitations | 1996[38] |
| 1999 | Germany | Total gastrectomy and D2 lymphadenectomy | Effects on QOL following surgical procedures | 62 | EORTC-QLQ-C30 and gastric cancer module | No major differences in QOL between procedures | 1999[37] |
| 1987 | Germany | Gastric cancer | Esophago-jejunosotomy vs Hunt-Lawrence-Rodino pouch on QOL | 38 | Troidl questionnaire: 11 items, “disease specific” and “socio-personal” | HLR-QOL ↑ | 1987[39] |
| 2001 | France, Spain, UK | Gastric cancer | Develop disease-specific QOL questionnaire | 115 | 22-item EORTC-QLQ-STO22 | Full blown QOL: PHY, PSY, SOC | 2001[41] |
been very useful to quite a few researchers later published their QOL questionnaire, which seems to have paper on QOL in gastric cancer: Troidl and colleagues selection criteria (Table 1).

of the references resulted in 26 studies that fitted our questionnaires were homemade ones, and only three studies QOL of patients using a QOL questionnaire. Almost all and 94 original case reports hits. Of the 119 studies, 8 assessed scores (e.g., the Karnofsky, Spitzer, and Visick questionnaires) ‘quality of life’, where they are in fact physician-reported by definition is not quality of life.

DISCUSSION

QOL in patients with gastric cancer is increasingly added as an outcome measure in clinical research. Over half of the studies in the review are recent (>1998 or later) studies. This development is in line with other areas in medicine. In most of the reviewed studies, QOL was used to evaluate the effects of medical treatment, usually after some form of surgery or chemotherapy. So far, there are no studies on prediction of QOL or on determinants of QOL in the area of gastric cancer. Another finding of our review reflects the coming of age of QOL research in gastric cancer: physiological functioning is included in virtually all studies, psychological functioning is included in about half of the studies, and social functioning is hardly included at all. Clearly, future research must take this result into account. Using symptom scores as a measure of QOL is not appropriate any longer—it reflects a rather strict biomedical model of thinking, while QOL research aims to further develop a biopsychosocial model of medicine.

Using only traditional outcome criteria such as response rate or objective tumor regression, for example in patients with solid tumors of the lung, colon or breast, is hardly valid any more in modern research on the outcome in cancer (cf. RECIST). This is especially the case in patients with gastric cancer as over one-third of those patients have non-measurable disease (e.g., ascites, lymphangitis carcinomatosa, military liver metastasis). The concept of ‘clinical benefit response’ (CBR) as a potential addition to QOL deserves mention in this regard. CBR combines objective with subjective measures to assess changes in the clinical status of patients.
The recent publication of the EORTC-QLQ-STO22 questionnaire signals a major improvement in the field of assessing QOL in patients with gastric cancer. The questionnaire has five scales (dysphagia, pain, diet, symptoms, emotional problems), and four single items (dry mouth, body image, and hair loss (two items)). The rigorous psychometric testing procedures of the EORTC QOL group suggest that the STO22 will no doubt become one of the standards for assessing QOL in this category of patients. Given the robust nature of this questionnaire, future research will allow examining correlates and predictors of QOL-in various domains, e.g., physiological, psychological, and social. Routinely incorporating the STO22 in clinical research on gastric cancer will improve our knowledge on the impact of gastric cancer and its treatment as perceived by the patients.

In addition to the EORTC-QLQ-STO22, which is a European-based questionnaire, the FACT-Ga, which was developed in USA, also assesses QOL in patients with gastric cancer. The FACT-Ga as a cancer generic QOL questionnaire has 27 items covering four subscales that assess physical, social/family, emotional, and functional well-beings. The gastric cancer-specific FACT-Ga is under construction and will be available shortly. Dumping syndrome (e.g., postprandial dizziness, cold perspiration) can also be considered when assessing QOL, as addition to gastric cancer-specific QOL questionnaires.

The ultimate study will examine the research question: How can we improve QOL in patients with gastric cancer? Medical care has the power to improve QOL. Other treatment strategies may also help improve QOL: self-management training, skills training, and support groups have shown to produce improvements in QOL. In gastric cancer patients, the study by Persson and Gimelius illustrated the positive effects on QOL of a group rehabilitation program combined with individual support. The study by Kuchler et al., is a hallmark paper in this regard. In this study, patients with gastrointestinal cancer were randomly allocated to standard care or additional psychotherapeutic support. Patients in the experimental group survived longer than in the ‘care as usual’ group. Generally, recent meta-analyses demonstrated the positive effects of psychosocial care for cancer patients, as gauged by improvements in QOL. Patients, physicians and researchers, therefore, may benefit from developing psychosocial support programs and from examining their effects on behavioral and medical outcomes.

A number of authors emphasize the importance of paying attention to QOL, given the important but as yet relatively modest effects of surgery, chemotherapy or radiotherapy in gastric cancer in particular. Bozzetti writes, “we think that when two surgical procedures are compared, if the oncological results are the same, the operation which is associated with least discomfort and impairment of QOL, should be chosen.” Our review indicates how in empirical studies on gastric cancer QOL has been addressed, assessed and evaluated. Choosing a questionnaire to assess QOL depends entirely on the study topic. There is no ‘best’ QOL questionnaire for patients with gastric cancer. The research question and clinical objectives determine the choice of the QOL instruments. The recent publication of the EORTC-QLQ-STO22 is a breakthrough. However, additional questionnaires are needed to answer specific research questions or to explore other psychosocial issues in patients with gastric cancer, e.g., demand for information by patients or on the partner’s concern and worries. Improving the medical care for patients with gastric cancer will ultimately be judged by improvement in survival and QOL. The quotation from ‘Cancer Ward’ at the beginning of our paper intended to help focus our attention on the goal of health care: to help people live longer and feel better.

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REFERENCES

1. Solzhentsyna A. Cancer ward. Harmondsworth, UK: Penguin Books, 1971
2. Spilker B, ed. Quality of life and pharmacoconomics in clinical trials. Philadelphia: Lippincott-Raven, 1996
3. Schipper H, Clinch J, Olweny LM. Definitions and conceptual issues. In: Spilker B, ed. Quality of life and pharmacoconomics in clinical trials. Philadelphia: Lippincott-Raven, 1996: 11-24
4. van Wegberg B, Sacchi M, Heusser P, Helwig S, Schaaf RA, von Rohr E, Bernhard J, Huerny C, Castiglione M, Cerny T. The cognitive-spiritual dimension—an important addition to the assessment of quality of life: validation of a questionnaire (SELT-M) in patients with advanced cancer. Ann Oncol 1998; 9: 1091-1096
5. Drossman DA, Patrick DL, Whitehead WE, Toner BB, Diamant NE, Hu Y, Jia H, Bangdiwala SI. Further validation of the IBS-QOL: a disease-specific quality-of-life questionnaire. Am J Gastroenterol 2000; 95: 999-1007
6. Blondel-Kucharski F, Chircop C, Marquis P, Cortot A, Baron F, Gendre JP, Colombel JF. Health-related quality of life in Crohn’s disease: a prospective longitudinal study in 231 patients. Am J Gastroenterol 2001; 96: 2915-2920
7. Aaronson NK, Ahmedzai S, Bergman B, Bullinger M, Cull A, Duez NJ, Filiberti A, Flechtnier H, Fleishman SB, de Haes JC. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. J Natl Cancer Inst 1993; 85: 365-376
8. Cella D, Tulsky DS, Gray G, Sarafian B, Linn E, Bonomi A, Silberman M, Yellen SB, Winicour P, Brannon J, The Functional Assessment of Cancer Therapy scale: development and validation of the general measure. J Clin Oncol 1993; 11: 570-579
9. Drossman DA, Toner BB, Whitehead WE, Diamant NE, Dalton CB, Duncan S, Emmott S, Proffitt V, Akman D, Fruscinte K, Le T, Meyer K, Bradshaw B, Mikula K, Morris CB, Blackman CJ, Hu Y, Jia H, Li JZ, Koch GG, Bangdiwala SI. Cognitive-behavioral therapy versus education and desipramine versus placebo for moderate to severe functional bowel disorders. Gastroenterology 2003; 125: 19-31
10. Hohenberger P, Gretschel S. Gastric cancer. Lancet 2003; 362: 305-315
11. Bottomley A, Therasse P. Quality of life in patients undergoing systemic therapy for advanced breast cancer. Lancet Oncol 2002; 3: 620-628
12. Bamias A, Hill ME, Cunningham D, Norman AR, Ahmed FY, Webb A, Watson M, Hill AS, Nicolaou MC, O’Brien ME, Evans TC, Nicolson V. Epirubicin, cisplatin, and protracted venous infusion of 5-fluorouracil for esophagogastric...
adenocarcinoma: response, toxicity, quality of life, and survival. Cancer 1996; 77: 1978-1985

Glimelius B, Ekström K, Hoffman K, Graf W, Sjödén PO, Haglund U, Svensson C, Enander LK, Linné T, Sellström H, Heuman R. Randomized comparison between chemotherapy plus best supportive care with best supportive care in advanced gastric cancer. Ann Oncol 1997; 8: 163-168

Dent DM, Werner ID, Novis B, Cheverton P, Brice P. Prospective randomized trial of combined oncological therapy for gastric carcinoma. Cancer 1979; 44: 385-391

Adachi Y, Suematsu T, Shiraishi N, Katsuta T, Morimoto A, Kitano S, Akazawa K. Quality of life after laparoscopy-assisted Billroth I gastrectomy. Ann Surg 1999; 229: 49-54

Anderson ID, Machtyne IM. Symptomatic outcome following resection of gastric cancer. Surg Oncol 1995; 4: 35-40

Buhl K, Schlag P, Herfarth C. Quality of life and functional results following different types of resection for gastric carcinoma. Eur J Surg Oncol 1990; 6: 404-409

Davies J, Johnston D, Sue-Ling H, Young S, May J, Griffith J, Miller G, Martin I. Total or subtotal gastrectomy for gastric carcinoma? A study of quality of life. World J Surg 1998; 22: 1048-1055

Eguchi T, Fujii M, Wakabayashi K, Aisaki K, Tsuneda Y, Kochi M, Takayama T. Docetaxel plus 5-fluorouracil for terminal gastric cancer patients with peritoneal dissemination. Hepatogastroenterology 2003; 50: 1735-1738

Fuchs KH, Triede A, Engemann R, Deltiz E, Stremme O, Hamelmann H. Reconstruction of the food passage after total gastrectomy: randomized trial. World J Surg 1995; 19: 698-705; discussion 705-706

Hoffman K, Glimelius B. Evaluation of clinical benefit of chemotherapy in patients with upper gastrointestinal cancer. Acta Oncol 1998; 37: 651-659

Hoksch B, Abbassmaier B, Zieren J, Mueller JM. Quality of life after gastrectomy: Long-term's reconstruction alone compared with additional pouch reconstruction. World J Surg 2002; 26: 335-341

Horvath OP K, Cseke L, Poto L, Zamko B. Nutritional and life-quality consequences of aboral pouch construction after total gastrectomy: a randomized, controlled study. Eur J Surg Oncol 2001; 27: 558-563

Ishihara K. Long-term quality of life in patients after total gastrectomy. Cancer Nurs 1999; 22: 220-227

Jentschura D, Winkler M, Strommeier N, Rumstadt B, Hagnueller E. Quality-of-life after curative surgery for gastric cancer: a comparison between total gastrectomy and subtotal gastric resection. Hepatogastroenterology 1997; 44: 1137-1142

Kalmar K, Cseke L, Zamko K, Horvath OP. Comparison of quality of life and nutritional parameters after total gastrectomy and a new type of pouch construction with simple Roux-en-Y reconstruction: preliminary results of a prospective, randomized, controlled study. Dig Dis Sci 2001; 46: 1791-1796

Kono K, Iizuka H, Sekikawa T, Sugai H, Takahashi A, Fujii H, Matsumoto Y. Improved quality of life with jejunal pouch reconstruction after total gastrectomy. Am J Surg 2003; 185: 150-154

Korenaga D, Orita H, Okuyama T, Moriguchi S, Maehara Y, Sugimachi K. Quality of life after gastrectomy in patients with carcinoma of the stomach. Br J Surg 1992; 79: 248-250

Diaz De Liano A, Oteiza Martinez F, Ciga MA, Aizcorbe M, Cobo F, Trujillo R. Impact of surgical procedure for gastric cancer on quality of life. Br J Surg 2003; 90: 91-94

Liedman B, Svedlund J, Sullivan M, Larsson L, Lundell L. Symptom control may improve food intake, body composition, and aspects of quality of life after gastrectomy in cancer patients. Dig Dis Sci 2001; 46: 2673-2680

Miyoshi K, Fuchimoto S, Ohsaki T, Sakata T, Ohtsuka S, Takakura N. Long-term effects of jejunal pouch added to Roux-en-Y reconstruction after total gastrectomy. Gastric Cancer 2001; 4: 156-161

Nakano H, Namatame K, Nemoto H, Motohashi H, Nishiyama K, Kuimzda K. A multi-institutional prospective study of lentinan in advanced gastric cancer patients with unreatsectable and recurrent diseases: effects on prolongation of survival and improvement of quality of life. Kanagawa Lentinan Research Group. Hepatogastroenterology 1999; 46: 2662-2668

Shiraishi N, Adachi Y, Kitano S, Kakikasto K, Inomata M, Yasuda K. Clinical outcome of proximal versus total gastrectomy for proximal gastric cancer. World J Surg 2002; 26: 1150-1154

Svedlund J, Sullivan M, Liedman B, Lundell L. Long term consequences of gastrectomy for patient's quality of life: the impact of reconstructive techniques. Am J Gastroenterol 1999; 94: 438-445

Svedlund J, Sullivan M, Liedman B, Lundell L, Sjödin I. Quality of life after gastrectomy for gastric carcinoma: controlled study of reconstructive procedures. World J Surg 1997; 21: 422-433

Svedlund J, Sullivan M, Sjödin I, Liedman B, Lundell L. Quality of life in gastric cancer prior to gastrectomy. Qual Life Res 1996; 5: 255-264

Thybusch-Bernhardt A, Schmidt C, Käuehter, Schmid A, Henne-Brins D, Kremer B. Quality of life following radical surgical treatment of gastric carcinoma. World J Surg 1999; 23: 503-508

Troidl H, Kusche J, Vestweber KH, Eypasch E, Maul U. Pouch versus esophagojejunostomy after total gastrectomy: a randomized clinical trial. World J Surg 1987; 11: 699-712

Vickery CW, Blazeby JM, Conroy T, Arraras J, Sezen O, Koller M, Rosemeyer D, Johnson CD, Alderson D. Development of an EORTC disease-specific quality of life module for use in patients with gastric cancer. Eur J Cancer 2001; 37: 966-971

Yamaoka K, Shigeisha T, Ogoshi K, Haruyama K, Watanabe M, Hayashi F, Hayashi C. Health-related quality of life varies with personality types: a comparison among cancer patients, non-cancer patients and healthy individuals in a Japanese population. Qual Life Res 1998; 7: 535-544

Zieren HU, Zippel K, Zieren J, Müller JM. Quality of life after surgical treatment of gastric carcinoma. Eur J Surg Oncol 1998; 164: 119-125

Kurhara M, Shimizu H, Tsuboi K, Kobayashi K, Murakami M, Eguchi K, Shizomuza K. Development of quality of life questionnaire in Japan: quality of life assessment of cancer patients receiving chemotherapy. Psychooncology 1999; 8: 355-363

Saji S, Toge T, Kuros Y, Hirata K, Gochi A, Tominaga S, Inokuchi K. Interim report of JFMC study no. 23 - phase III randomized clinical trial on the effectiveness of low-dose cisplatin plus 5-FU as a postoperative adjuvant chemotherapy for advanced gastric cancer. Gan To Kagaku Ryoho 2002; 29: 2499-2507

Toge T, Fujita M, Hirata K, Kunii Y, Kitamura M, Hagawa H, Kubota T, Wakasugi J, Kasai Y, Takahashi Y, Furukawa H, Takao T, Kaibara N, Takashima S, Kakegawa T, Tomita M, Nose Y. Interim report of JFMC study no. 20 on the effectiveness of high dose CDDP plus 5-FU regimen as an adjuvant therapy for far-advanced cancer of the stomach. Gan To Kagaku Ryoho 2000; 27: 395-403

Yoshino K, Fujita M, Hirata K, Kunii Y, Kitamura M, Hagawa H, Kubota T, Wakasugi J, Kasai Y, Takahashi Y, Furukawa H, Takao T, Kaibara N, Takashima S, Kakegawa T, Tomita M, Nose Y. Interim report on JFMC study no. 21 on the effectiveness of UFT as an adjuvant therapy for semi-advanced cancer of the stomach. Gan To Kagaku Ryoho 2000; 27: 263-270

Holland JC, Marchini A. International psycho-oncology. In: Holland JC (ed) Psycho-oncology. New York: Oxford University Press 1998: 1165-1169

van Korlaar J, Voss C, Rosendaal F, Cameron L, Bovill E, Kaptein A. Quality of life in venous disease. Thromb Haemost 2003; 90: 27-35
48 Therasse P, Arbuck SG, Eisenhauer EA, Wanders J, Kaplan RS, Rubinstein L, Verweij J, van Glabbeke M, van Oosterom AT, Christian MC, Gwyther SG. New guidelines to evaluate the response to treatment in solid tumors. *J Nat Cancer Inst* 2000; 92: 205-216

49 Rothenberg ML, Moore MJ, Cripps MC, Andersen JS, Portenoy RK, Burris HA, Green MR, Tarassoff PG, Brown TD, Casper ES, Storniolo AM, Von Hoff DD. A phase II trial of gemcitabine in patients with 5-FU-refractory pancreas cancer. *Ann Oncol* 1996; 7: 347-353

50 Sakamoto J, Morita S, Yumiba T, Narahara H, Kinoshita K, Nakane Y, Imamoto H, Shiozaki H. A phase II clinical trial to evaluate the effect of paclitaxel in patients with ascites caused by advanced or recurrent gastric carcinoma: a new concept of clinical benefit response for non-measurable type of gastric cancer. *Jpn J Clin Oncol* 2003; 33: 238-240

51 Maillé AR, Kaptein AA, de Haes JC, Everaerd WT. Assessing quality of life in chronic non-specific lung disease--a review of empirical studies published between 1980 and 1994. *Qual Life Res* 1996; 5: 287-301

52 Kaplan RM. The significance of quality of life in health care. *Qual Life Res* 2003; 12 Suppl 1: 3-16

53 Lepore SJ, Helgeson VS, Eton DT, Schulz R. Improving quality of life in men with prostate cancer: a randomized controlled trial of group education interventions. *Health Psychol* 2003; 22: 443-452

54 Persson C, Glimelius B. The relevance of weight loss for survival and quality of life in patients with advanced gastrointestinal cancer treated with palliative chemotherapy. *Anticancer Res* 2002; 22: 3661-3668

55 Kuchler T, Henne-Bruns D, Rappat S, Graul J, Holst K, Willi- liams JL, Wood-Dauphinee S. Impact of psychotherapeutic support on gastrointestinal cancer patients undergoing surgery: survival results of a trial. *Hepatogastroenterology* 1999; 46: 322-335

56 Bottomley A, Vanwoorden V, Flechtnr H, Therasse P. The challenges and achievements involved in implementing Quality of Life research in cancer clinical trials. *Eur J Cancer* 2003; 39: 275-285

57 Andersen BL. Biobehavioral outcomes following psychological interventions for cancer patients. *J Consult Clin Psychol* 2002; 70: 590-610

58 Rehse B, Pukrop R. Effects of psychosocial interventions on quality of life in adult cancer patients: meta analysis of 37 published controlled outcome studies. *Patient Educ Couns* 2003; 50: 179-186

59 Arraras JI, Wright S, Greimel E, Holzner B, Kuljanic-Vlastic K, Velikova G, Eisemann M, Visser A. Development of a questionnaire to evaluate the information needs of cancer patients: the EORTC questionnaire. *Patient Educ Couns* 2004; 54: 235-241

60 Brédart A, Mignot V, Rousseau A, Dolbeault S, Beauloye N, Adam V, Elie C, Léonard I, Asselain B, Conroy T. Validation of the EORTC QLQ-SAT32 cancer inpatient satisfaction questionnaire by self- versus interview assessment comparison. *Patient Educ Couns* 2004; 54: 207-212

61 Bozzetti F. Total versus subtotal gastrectomy in cancer of the distal stomach: facts and fantasy. *Eur J Surg Oncol* 1992; 18: 572-579

62 Detmar SB, Muller MJ, Schornagel JH, Wever LD, Aaronson NK. Health-related quality-of-life assessments and patient-physician communication: a randomized controlled trial. *JAMA* 2002; 288: 3027-3034

63 Gilbody SM, House AO, Sheldon T. Routine administration of Health Related Quality of Life (HRQoL) and needs assessment instruments to improve psychological outcome – a systematic review. *Psychol Med* 2002; 32: 1345-1356

64 Kaptein AA, Scharloo M, Helder DL, Kleijn WC, van Korlaar IM, Woertman M. Representations of chronic illnesses. In: Cameron LD, Leventhal H (eds) The self-regulation of health and illness behaviour. London: *Routledge* 2003: 97-118