Health-related quality of life of day-case surgery patients: a pre/posttest survey using the EuroQoL-5D

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Abstract

Aim This paper describes and compares the perceived health-related quality of life (HRQoL) of day-case surgery patients before and after their procedures and examines some associated patient-related factors.

Method A pre/posttest survey design was employed to collect data from Finnish adult day-case surgery patients using participant-completed EuroQoL 5-Dimensional Classification Component Scores (EQ-5D) questionnaires given 2 weeks presurgery ($n = 131$) and 2 weeks postsurgery ($n = 131$) in 2004.

Results No noticeable change after minor surgery was found using the EQ-5D. Using the EQ-5D index, patients perceived their HRQoL as high before and after surgery. Almost one fifth (17%) reported no pain or discomfort before the procedure compared with 40% after it. As measured by the EuroQol visual analogue scale (EQ$_{VAS}$), those patients who reported chronic illness before the operation had a lower perception of their HRQoL compared with those who did not. It was also found that self-care and usual activities were more disturbed after surgery.

Conclusions Although there were increases and decreases within items of the EQ-5D, overall, there was no improvement on EQ-5D scores. More research is needed to explore the sensitivity and responsiveness of the EQ-5D measure in day-case surgery patients.

Keywords Day-case surgery patient · Health-related quality of life

Abbreviations

CI	confidence interval
EQ-5D	EuroQoL 5-Dimensional Classification Component Scores
EQ$_{VAS}$	EuroQoL visual analogue scale
HRQoL	health-related quality of life
SF-12, SF-36	Short-Form Health-Related Quality of Life questionnaires

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Introduction

The use of day-case surgery has increased in hospitals based on developing methods, procedures, technology, knowledge and skills, experiences, outcomes and economy [1, 2]. In line with this, between 1992 and 2004, the volume of day-case surgery increased from 50,000 to 135,000 operations in Finland. This amounts to 44% of all elective surgery in smaller hospitals and 33% if all hospitals, including central and university hospitals, are taken into account [3, 4]. In the United States, in the year 2000, day-case surgery represented 65% of all surgical procedures [5]. Provided patients are properly selected and well

informed, day-case care is preferable for the majority of patients undergoing minor surgery [6, 7]. It has been shown to be safe, efficient, convenient, able to soften the emotional impact of an operation [8, 9] and be cost effective [10].

Patient outcomes have been examined at length. One important outcome is health-related quality of life (HRQoL) [11, 12], which is regarded as the major factor predicting satisfaction with the outcomes of medical services [13]. It is therefore important to take patients' subjective assessments of their HRQoL into account in the development of health care procedures [11] and during the evaluation of heath care episodes [6, 11, 14].

Research on surgical patients' HRQoL is common, but studies reporting HRQoL of day-case surgery patients are rare, appearing in the literature from 1988. A computerised search using Medline (1988–2006) and the Cochrane Database (2006 Issue 2) produced 72 references from the keywords "day-case" or "outpatient" or "ambulatory surgery", and "quality of life" and "patient" interchangeably. The EuroQoL 5-Dimensional Classification Component Scores (EQ-5D) (previously called the Euro-QoL-5D), has been used to measure HRQoL of surgical patients, including cancer, trauma and total hip or knee replacement patients since 1998 ($n = 96$) but has rarely focused on day-case surgery patients [15]. Typically, the EQ-5D has been used to measure the health outcomes of major surgical procedures such as total replacements, low back surgery and gastrointestinal surgery [16–18]. Other generic instruments designed to evaluate HRQoL of day-case surgery patients include the Nottingham Health Profile [19, 20] and variations of the Short-Form Health-Related QoL questionnaires (SF-12, SF-36) [12, 20–22].

A few studies have been conducted with a primary focus on patient acceptance and preferences in terms of QoL comparing day-case surgery and inpatient surgery [7, 23–25] and between minimally invasive and traditional open treatment [12]. These studies found that patients' acceptance, in terms of QoL, is similar in both types of procedures. The major goal of patient management in day-case surgery is to promote patient comfort and satisfaction by reducing the anticipated side effects of surgery and anaesthesia. A number of studies concentrate on these side effects and comfort questions [26, 27], especially pain [28, 29] and nausea and vomiting [30]. Safety in day-case surgery operations has also been one of the main interests in these studies [31]. Some studies have been carried out on the stress response to treatment during and after minimally invasive procedures [1]. A more recent study focused on the relationship between HRQoL and education of patients about recovery after day-case surgery [32].

HRQoL is an important topic for outcomes research in health care, and there are many generic and specific instruments for measuring it [33, 34]. However, the measurement of HRQoL in day-case surgery patients is a relatively new area of research, and there is little evidence of the usefulness of the general HRQoL measures in this field. This research goes some way to address this.

Aims

This paper describes and compares HRQoL of day-case surgery patients before and after their procedures and examines the patient-related factors associated with their perceived HRQoL. The aims of this study were as follows:

- To describe day-case surgery patients' HRQoL using the EQ-5D
- To compare day-case surgery patients' HRQoL before the operation and 2 weeks after it
- To determine which, if any, patient-related background variables are associated with patients' HRQoL after day-case surgery
- To compare patients' assessments of their HRQoL using the EQ-5D index and EuroQol visual analogue scale (EQ$_{VAS}$)

The following hypothesis was set: day-case surgery has a positive effect on patients' perceptions of their HRQoL. HRQoL was used in a generic way rather than specific to any particular disease.

Methods

Settings and sample

The study was conducted in one of the five Finnish university hospitals during the 6-month period between March and August 2004. A pre/posttest survey design was used to examine HRQoL as perceived by day-case surgery patients in the 2 weeks before the operation (pretest) and again 2 weeks after it (posttest). The questionnaires were handed out in the preadmission clinic (pretest) or day-case surgery unit (posttest) to the adult day-case surgery patients and the returned results analysed.

A total of 2,891 day-case surgery operations were performed in this one university hospital in 2004 [3]. The sampling frame consisted of all day-case surgery patients treated in one operating theatre in consecutive order during the data collection period. The following inclusion criteria were applied: the patients must (1) be able to understand Finnish, (2) be able to complete the questionnaires independently, (3) be aged 18 years or older, (4) have no cognitive disorders, (5) have a day-case surgery operation that is primarily an orthopaedic procedure (for example,

focused on the knee, shoulder, other orthopaedic procedures) or urological or plastic surgery procedures and (6) volunteer to participate in the study.

A total of 200 day-case surgery patients fulfilled the inclusion criteria. Of those, 150 volunteered to participate and received a questionnaire. Everybody returned the pretest questionnaire. Out of those, five questionnaires were returned blank, making the total response rate 73% ($n = 145$).

The EQ-5D instrument

The EQ-5D is a generic, single-index measure that has been used widely in several European countries for the measurement of HRQoL or health outcome [35, 36]. It consists of a questionnaire (EQ-5D$_{SELF\ CLASSIFIER}$) that classifies the patient into one of 243 (3^5) possible theoretical health states, providing a simple method for capturing self-reported accounts of health problems on the basis of a five-dimensional (5D) classification: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension is divided into three levels: no problem; some/moderate problems; extreme problems/unable to. The EQ-5D generates a health profile and can be used to express HRQoL as a single index value using previously defined scoring weights derived from responses to the instrument made by the general public [37–40]. The logical best state is no problem in any dimension, and similarly, the logical worst state is severe problems in all dimensions. The EQ-5D$_{VAS}$ is added to record the respondent's self-rated health status on a visual scale graduated from 0 to 100, where 0 represents the worst imaginable health state and 100 the best imaginable health state.

The EQ-5D was evaluated for both reliability and validity in two studies using Finnish populations [41, 42] and large samples ($n = 2,461$, $n = 1,634$). Its validity has also been supported in many international studies [36, 37], specifically, its construct validity [37, 43, 44]. The EQ-5D has also been used previously in research projects with surgical patients in Finland [31, 45].

As part of the questionnaire, several background variables were requested, such as age, gender, basic education (elementary school/comprehensive school/matricular examination), vocational education (secondary/postsecondary/academic level vocational education and no vocational education), chronic illness (no/yes), previous day-case surgery experience (no/yes) and speciality of the operation (operation on shoulder/knee/other orthopaedic or other day-case surgery operation).

Ethics and data collection

The hospital research committee granted permission to conduct the study (8/2004), which adhered to the general principles of research ethics [46, 47]. The study was registered with the EuroQol group research base in 2003, and the official Finnish version of the EQ-5D$_{SELF-CLASSIFIER}$ and EQ-5D$_{VAS}$ were used.

The research assistant conducted data collection, systematically using data collection plans. Those patients who fulfilled the inclusion criteria were recruited to the study in consecutive order. The study nurse handed out the pretest questionnaires before preoperative counselling in the preadmission clinic. Patients left the completed questionnaires in the preadmission clinic on departure. In the posttest, patients returned the completed questionnaires to the university's department of nursing science.

Data analysis

The statistical software package SAS Release 8.02 was used for data analysis. Data were described using frequencies, minimum and maximum values, means, standard deviations (SD) and 95% confidence intervals (CI). HRQoL dimensions were described at the sum score level. The EQ-5D score was calculated for every respondent who answered the questions on all five dimensions using ordinary least squares regression analysis [40, 48]. Weights obtained in the Finnish valuation study were used [41, 42]. The lower the index score, the worse the patient's perceived HRQoL.

The differences in the five individual items within the pre- and post-EQ-5D$_{SELF-CLASSIFIER}$ questionnaire were analysed using the Wilcoxon Matched Pairs Signed Rank Test PROC CATMOD (Table 1). A comparison between the pre- and posttests (EQ-5D index score and EQ$_{VAS}$ (at the beginning the end) was made using the parametric t test for dependent samples (t value with P value), as their difference variable was normally distributed. Respondents' background variables (age, gender, basic and vocational education, presence of chronic disease, previous experiences of day-case surgery and orthopaedic diagnostic group) in relation to the sum scores were examined using inferential statistics in the posttest sample ($n = 133$) (Table 2). Because distributions of variables were not normal, the nonparametric Kruskal–Wallis test was used to assess their effect on HRQoL results. Spearman's rho correlation with P value was calculated to examine the association between EQ-5D index score and EQ-5D $_{VAS}$ [43]. In all statistical tests, P values ≤ 0.05 (two-tailed tests) were regarded as significant [49].

Table 1 A comparison of pre- and posttest day-case surgery based on self-reported descriptions of health problems using a five-dimensional EuroQoL 5-Dimensional Classification Component Scores (EQ-5D) classification Wilcoxon matched pairs signed rank test

EQ-5D Individual dimensions	Pretest		Posttest		P value
	n	%	n	%	
Mobility	133		133		
No problems		59		63	0.2468
Some problems		41		37	
Confined to bed		0		0	
Self-care	134		134		<0.0001
No problems		93		69	
Some problems		7		31	
Unable to		0		0	
Usual activities	134		134		<0.0001
No problems		51		35	
Some problems		42		39	
Unable to		7		26	
Pain/discomfort	131		131		<0.0001
No pain		17		40	
Moderate pain		79		59	
Extreme pain		4		1	
Anxiety/depression	132		132		0.3629
None		82		86	
Moderately		17		13	
Extremely		1		1	

Results

Participants

Responses were obtained from 145 out of 200 eligible day-case surgery patients. To compute the EQ-5D score, the respondent must have answered all five questions in the EQ-5D$_{SELF-CLASSIFIER}$. A total of 131 of these patients answered all questions in all five dimensions in the pretest (2 weeks before surgery) and in the posttest (2 weeks after day-case surgery), for which the EQ-5D index score could be computed. Mean patient age in the posttest was 48.4 ± 14.4 (range 19–83) years ($n = 133$). About half were women (Table 3).

Day-case surgery patients' HRQoL

A self-reported description of the HRQoL of each patient who returned the questionnaire was computed using the EQ-5D$_{CLASSIFIER}$ at the item and index score levels incorporating EQ-5D$_{VAS}$ ratings. Prior to day-case surgery, a majority of patients reported that they had no problems with their self-care (93%) and that they had no anxiety or

depression (82%). Most notably, 41% reported some problems with mobility and 79% reported moderate pain. After day-case surgery, the number of patients who reported no problems with mobility rose to 63%, and those who reported no pain or discomfort rose from 17% to 40% (Table 1). However, the frequency of patients who reported some problems in maintaining self-care rose from 7% prior to surgery to 31% after surgery. Similarly, those unable to carry out their usual activities rose from 7% to 26%. Fifty-one percent had no problems with their usual activities prior to surgery, which decreased to 35% after surgery. Considering the statistical significance, the day-case surgical procedure decreased patients' ability to self-care and carry out their usual activities ($P < 0.001$). However, reduction in pain and discomfort after surgery demonstrated a positive effect of day-case surgery ($P < 0.0001$) (Table 1).

Mean score for the current HRQoL state on the EQ-5D index score was 0.79, (SD = 0.15) and 0.78 (SD = 0.18) in pretest and posttest data, respectively. There was no significant change in EQ-5D scores between the two measurements ($t = 1.16$, $P = 0.247$; EQ-5D diff mean = 0.0162, SD = 0.155, 95% CI = −0.0114 to 0.0440). The EQ-5D$_{VAS}$ was 72.13 (SD = 15.67, minimum 20, maximum 100) in the pretest and 75.35 (SD = 15.93, minimum 26, maximum 100) in the posttest data. This change was statistically significant (t value = −2.24, $P = 0.027$; EQ-5D$_{VAS}$ diff mean = −3.1789, SD = 16.034, 95% CI = −5.9833 to −0.3745). Spearman's rho correlation between EQ-5D$_{VAS}$ and EQ-5D index score was moderate: 0.558 ($P < 0.0001$) in the pretest and 0.554 ($P < 0.0001$) in the posttest.

Patient-related factors in association with HRQoL

There were no statistically significant associations between the respondents' background variables and the EQ-5D index score (Table 2). However, as measured by the EQ$_{VAS}$, those patients who had chronic illness compared with those who did not had a decreased perception of their HRQoL. (EQ$_{VAS}$; mean 71.06 vs. 79.70; $P = 0.0018$).

Discussion

Discussion

Day-case surgery patients perceived their HRQoL as high before and after their operation, but some important findings were found between pretest and posttest results. Less than one fifth (17%) reported no pain or discomfort before the procedure, and this rose to about two fifths (40%) after

Table 2 Respondents' background variables in association with their perceptions of health-related quality of life as measured by EuroQoL 5-Dimensional Classification Component Scores (EQ-5D) index and EQ-5D visual analogue scale (EQ-5D$_{VAS}$)

Variable	EQ-5D index			EQ-VAS		
	Mean (standard deviation)	Parameter			Parameter	
		Chi-square	P value		F	P value
Age (years)		2.0334	0.5655		0.69	0.559
19–34	0.76 (0.20)			75.40 (16.04)		
35–50	0.79 (0.15)			77.76 (13.16)		
51–65	0.77 (0.19)			74.23 (17.32)		
66–83	0.83 (0.20)			71.31 (19.18)		
Gender		1.1137	0.2913		0.17	0.683
Male	0.80 (0.17)			75.97 (16.01)		
Female	0.76 (0.19)			74.82 (15.95)		
Basic education		1.3870	0.4998		0.76	0.469
Elementary	0.80 (0.17)			72.69 (17.74)		
Secondary school	0.78 (0.17)			76.77 (15.26)		
Matricular examination	0.75 (0.20)			75.86 (14.71)		
Vocational education		1.1203	0.7722		0.39	0.759
Vocational school	0.81 (0.15)			74.22 (15.53)		
Vocational college	0.78 (0.17)			77.40 (15.22)		
Academic	0.75 (0.19)			77.18 (15.63)		
No vocational education	0.76 (0.24)			73.77 (18.76)		
Chronic illness		0.0091	0.9238		10.17	0.0018
No	0.78 (0.18)			79.70 (12.21)		
Yes	0.79 (0.17)			71.06 (18.34)		
Previous day-case surgery		0.0841	0.7719		1.50	0.222
No	0.79 (0.17)			77.12 (15.62)		
Yes	0.78 (0.18)			73.68 (16.35)		
Speciality		7.0360	0.0708		0.32	0.813
Shoulder	0.75 (0.18)			74.96 (17.62)		
Knee	0.73 (0.18)			74.56 (13.71)		
Other orthopaedic	0.78 (0.18)			74.68 (17.80)		
Other day-case surgery	0.86 (0.15)			78.23 (11.58)		

The EQ-5D index score was analysed by the Kruskal–Wallis test and the EQ-5D-VAS by analysis of variance, $n = 133$

the procedure. As the major goal of patient management in day-case surgery is to promote patient comfort and satisfaction by reducing the anticipated side-effects of surgery and anaesthesia, this finding supports the promotion of patient well-being as a health care outcome [26, 27]. Previously, patients have reported pain as the most common side effect of day-case surgery [28, 29]. It can be concluded that health professionals have managed to treat pain satisfactorily after day-case surgery in this sample.

It was also found that self-care and usual activities were disturbed more after the surgical procedure. This result was expected. Reduction in ability to self-care and carry out usual activities may not have been as pronounced had the follow-up been conducted later. This may be due to the diagnosis and procedures on lower and

upper extremities, which cause specific problems. These disturbances often disappear over time as recovery takes place [50, 51]. Recovery time is individually based and has been measured in terms of sick leave from work. It is usually about 7–14 days after minor day-case surgery procedures and much longer (3–4 months) after some orthopaedic procedures on the shoulder and knee. In addition, these patients were operated in university hospitals, which offer specialised care, and the patients may have had specific health problems, which demand longer recovery periods.

The mean EQ-5D index score ranged from 0.78 to 0.79, being somewhat lower than that derived among lay people in an earlier Finnish valuation study [41]. Similarly, the EQ-5D$_{VAS}$, which ranged from 72.13 to 75.35, was lower

Table 3 Respondents' background variables ($n = 145$)

Variable	Total response		Posttest	
	$n = 145$	%	$n = 133$	%
Age, years				
19–34	30	20	26	20
35–50	50	35	44	33
51–65	50	35	49	37
66–83	15	10	14	10
Gender				
Male	68	47	61	46
Female	77	53	72	54
Basic education				
Elementary school	40	28	38	29
Comprehensive school	63	44	56	43
Matricular examination	39	28	36	28
Vocational education				
Secondary level	58	43	54	44
Postsecondary level	34	25	29	23
Academic level	18	13	17	14
No vocational education	25	19	24	19
Chronic illnes				
No	79	56	72	56
Yes	62	44	57	44
Previous day-case surgery				
No	70	49	65	50
Yes	73	51	66	50
Procedure				
Shoulder			25	19
Knee			26	20
Other orthopaedic			58	44
Urological/Plastic surgery			24	18

than standardised scores for the general population [52]. Correlations between the EQ-5D index and EQ-5D$_{VAS}$ can be considered moderate. This finding may demonstrate inconsistency in these two methods measuring HRQoL, indicating that respondents as a whole were not logically consistent when assigning values to perceived health states [43]. The EQ-5D$_{VAS}$ generates information on self-perceived overall HRQoL and was more sensitive to patients' perceptions in this study. No noticeable change after minor surgery was found using this descriptive system.

Patients' background factors were not associated with the EQ-5D index score. However, the EQ-5D$_{VAS}$ was rated lower by those patients who had chronic illness than by those who did not. This finding is in line with earlier results [53], suggesting that HRQoL is somewhat lower in patients with chronic conditions. This is useful because it demonstrates that patients with chronic conditions should be carefully managed before day-case surgery and that their

illness should be taken into account during planning. Chronic diseases may hinder normal recovery and may also restrict the ability to perform daily activities and self-care after minor surgery. Contrary to earlier findings [52, 54], patients' higher age or lower educational level were not related to lower perceptions of their HRQoL in this sample.

In conclusion, the hypothesis that day-case surgery has a positive effect on patients' perceptions of their HRQoL was rejected. Although there were increases and decreases within items of the EQ-5D, overall, there was no improvement in EQ-5D scores. QoL was improved in terms of decreased pain and discomfort, but the operation itself produced some passing disturbances in the usual activities and self-care. After day-case surgery, total EQ$_{VAS}$ increased, supporting the noted increase in perceived HRQoL. There was no statistically significant difference in the EQ-5D index score before and after day-case surgery. These may be due to the limitations of the EQ-5D instrument. It may not be sensitive enough to reveal fine distinctions in HRQoL after minor surgery [43]. Firm conclusions and causal comments cannot be drawn regarding the efficacy or efficiency of day-case surgery due to the design of the study without control groups.

Musculoskeletal disorders increase with increasing age, and the prevalence of these disorders is common in the working population [55]. These disorders are associated with loss HRQoL [56] and, thus, effective treatment will be needed to improve HRQoL [57]. Measuring patient-perceived outcomes following orthopaedic procedures has become an important component of clinical research [58]. Outcomes of health care should include the patient's subjective experience. Studies on HRQoL of day-case surgery patients are lacking. The increasing number of day-case surgical procedures, e.g. in orthopaedic surgery, gives reason for studying outcomes from the patient's point of view. However, the generic EQ-5D may not be sensitive enough for this patient group.

Limitations and methodological considerations

Some limitations need to be considered while interpreting our results. Firstly, data were collected in one university hospital only. Although day-case surgery operations are common in health care, university hospitals tend to admit more demanding cases, making the percentage of day-case surgery procedures lower than in smaller regional hospitals [3]. Even so, the number of day-case surgery patients in this university hospital is significant.

Secondly, only one general HRQoL instrument was used. However, this instrument has been used previously to measure HRQoL of surgical patients [16–18] as well as those undergoing minor surgery [45]. Our study revealed

some improvements in day-case surgery patients' perceptions on their HRQoL at the item level. This may be an important finding because it has been argued that generic health instruments do not comprehensively capture improvement in patients undergoing minor surgery [19, 20]. However, the instrument was not able to reveal any background variable association with patients' perceptions of their HRQoL. The only finding was the association between chronic illness and lower HRQoL, supporting previous results [53, 59]. The EQ-5D index score did not reveal noticeable changes from pretest to posttest. There is a need for further research to evaluate in a healthy population group the general instrument's sensitivity, responsiveness and validity to a variety of individual patient characteristics.

Thirdly, although 133 out of 150 patients responded to both questionnaires, which can be considered a satisfactory response rate, 50 of those who could have been included declined, and five returned blank forms. Two further patients completed the pretest but not the posttest questionnaire. The final sample, therefore, represented 66% of patients who fulfilled the inclusion criteria during the data collection period. The sample size was small, which can be considered a study limitation. The length of hospitalisation was also short, and patients have to take in a good deal of information during this time. This makes it difficult to conduct longitudinal studies, which would include many follow-up periods and produce a rich stream of data. The results may have been different if the posttest had been completed later than just 2 weeks after surgery. From a methodological point, this time frame is usual. However, from the clinical point of view, it may have been too short to reveal improvements in orthopaedic day-case surgery patients.

Implications for research and clinical practice

Day-case surgery patients are a challenging group in health care because self-care and recovery after surgical treatment is demanding. Because the time patients are with the professionals is short, professionals need to help patients empower themselves efficiently to the benefit of their recovery.

Further research needs to include other specific instruments to capture day-case surgery patients' perceived outcomes. The EQ-5D may be too general to assess specific conditions that, although minor in day-case surgery patients, encompass a wide variety of procedures. In the future, the validity and responsiveness of the EQ-5D should be tested against a widely used specific HRQoL instrument, restricting the sample to one or two diagnostic groups.

Patient selection for day-case surgery needs careful consideration, because individual patients have different personal situations, resources and abilities that will help or hinder their recovery. By providing information and education to patients and their families, health professionals have enormous potential to improve satisfaction and outcomes for patients undergoing these procedures [60].

Even though day-case surgery typically deals with minor disturbances concerning patients' health, it has a positive effect on patients' perceptions of their HRQoL. General HRQoL instruments, such the EQ-5D, may only provide a small insight into the evaluation of patients' level of empowerment. Although tools such as the generally based EQ-5D demonstrate that the patients' baseline health status may be slightly related to the magnitude of benefit following surgery [21], they are not specific to any particular condition. As patients seek health care services based on their individual perceptions of distress, it would be useful to develop more specific tools to capture these changes more accurately.

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