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ORIGINAL ARTICLE

Effectiveness of preoperative group education for patients with colorectal cancer: managing expectations

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Abstract

Purpose To evaluate the potential beneficial effect of preoperative face-to-face group education after colonic surgery in a pre-existing ERAS pathway environment.

Methods Patients were randomized to cohorts for 3 weeks to either the standard preoperative counseling by the colorectal surgeon and the nurse practitioner (control group) or to the additional group education (intervention group). Patients scored EORTC-QLQ-info25 after the preoperative information was completed and the EORTC-QLQ-30 and EORTC-QLQ-29 prior to surgery and 1, 3, and 6 months after surgery.

Results A significantly better level of information was scored considering the expectations and patient involvement in the intervention group. This coincided with a significant reduction of the in-hospital stay, enhanced return to the preoperative global health status, and persistent improved body image after surgery.

Conclusion By investing in the preoperative group education patients develop more realistic expectations resulting in a perceived improved quality of life and body image 1 month after operation coinciding with a statistically significant reduction in duration of in-hospital stay in this study.

Keywords Patient education · Psycho-education · Colorectal cancer · Quality of life · Surgery

Introduction

The perioperative care of patients undergoing colorectal resections has improved tremendously over the past decade. This is primarily due to the introduction and incorporation of Enhanced Recovery After Surgery (ERAS) programs in daily clinical practice [1]. Patients treated in an ERAS setting were shown to have reduced postoperative complications, a decreased in-hospital stay, and an earlier return to daily routines [2, 3]. The emphasis of these bundled interventions in ERAS programs has been focused on postoperative rehabilitation.

To further improve patient recovery, the focus is now shifting from a postoperative recovery program to exploring the benefit of additional interventions in the preoperative period. A potential lead point for further improvements is by better managing patients' expectations. Over the years, studies have shown that more realistic expectations can be obtained by patient education [4, 5]. Patient education is focused on the acquisition of information, skills, beliefs, and attitudes which impact health status and quality of life. Patient education can be combined with psycho-education to underline the consequences of the provided information [6]. It has been shown that when combining these two forms of education, it leads to better therapy compliance resulting in an improved quality of life [7, 8]. However, previous studies focusing on the effects of these forms of education have not consistently confirmed these supposed beneficial effects. Early meta-analyses conducted in a pre-ERAS setting demonstrated a reduced level of postoperative anxiety and pain when preoperative preparatory interventions for surgical patients had been offered [9, 10]. Later on, similar results were obtained in an ERAS setting [11]. In a more recent review, specifically analyzing surgical oncology patients, the positive effects were more pronounced [12]. In contrast, a systematic review of the literature from 2004 to 2010 showed a lack of evidence of a beneficial effect of preparatory interventions on anxiety, pain, and length of stay. Only a positive impact on the patient's knowledge was

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Table 1 Shows the patient characteristics for the control and intervention group considering gender, age, tumor location, type of surgery, neoadjuvant treatment, complications, and grade of complications

Patient characteristics	Total $n = 75$		p-value
	Control group $n = 39$ (52%)	Intervention group $n = 36$ (48%)	
Sex*			
• Male	22	25	
• Female	17	11	0.166
Age**	70.5 years (± 10,9)	72.6 years (± 9,0)	0.367
Tumor location*			
• Colon	24 (61.5%)	24 (67%)	
• Sigmoid colon	12 (30.7%)	10 (27.8%)	
• Rectum	3 (7.7%)	2 (5.6%)	0.877
Type of oncological resection*			
• Right hemicolectomy	18 (46.2%)	17 (47.2%)	
• Extended right hemicolectomy	2 (5.1%)	3 (8.3%)	
• Left hemicolectomy	4 (10.2%)	4 (11%)	
• Sigmoid resection	7 (18%)	9 (25%)	
• Low anterior resection	7 (18%)	2 (5.6%)	
• Abdominoperineal resection	1 (2.6%)	1 (2.8%)	0.585
Type of surgery*			
• Laparoscopy	11 (28.2%)	5 (13.9%)	
• Laparotomy	18 (46.2%)	25 (70%)	
• Intentionally laparoscopy but converted to laparotomy	10 (25.6%)	5 (13.9%)	
• Unknown	-	1 (2.8%)	0.201
Protective stoma*			
• Yes	3	1	
• No	36	35	0.344
Neoadjuvant treatment*			
• None	37	36	
• Radiotherapy	1	0	
• Chemoradiotherapy	1	0	0.387
Pathological tumor stage*			
• Stage 0	2 (5.1%)	1 (2.8%)	
• Stage I	10 (25.6%)	8 (22.2%)	
• Stage II	16 (41%)	20 (55.6%)	
• Stage III	11 (28.2%)	7 (19.4%)	
• Stage IV	-	-	0.621
Complications*			
• No	21 (55%)	25 (70%)	
• Yes	17 (45%)	11 (30%)	0.209
Grade of complications***			
• Grade 1	8	8	
• Grade 2	6	2	
• Grade 3	1	1	
• Grade 4	2	0	
• Missing	22	25	0.131
Hospital stay**	8 days (median)	6 days (median)	0.033

*Chi-square test

**Mann-Whitney test

***Linear-by-linear chi-square association test

found. However, this review was conducted in non-oncological surgical patients [13]. Until now, there is no general consensus on the benefits of patient education on the quality of life. This could be explained by either the heterogeneity of the study populations, the underlying disease patients are suffering from, and the way in which education was given.

Patient and psycho-education can be provided in multiple ways. To optimize the potential effect of education, several successful factors can be gleaned from the literature. Education in a group environment has been shown to be effective, especially in face-to-face sessions. Because of interaction with other fellow patients during group education, patients recognize their symptoms and can see how other patients cope with their disease. This results in a more active coping compared to individual patient education [14–16]. However, there are no studies found specifically analyzing the effects of group education in colorectal cancer patients. Using multimedia information in the educational sessions and having the ability to reflect on the provided information with other patients and surrounding caregivers also improves the impact [7, 17]. Furthermore, the timing of the education is of importance. An educational session 1 day prior to or on the day of the operation was less beneficial when compared to interventions earlier in the process.

This study aimed to evaluate the effect of the addition of preoperative patient and psycho-education in colorectal cancer patients in a pre-existing ERAS pathway environment on the quality of life. We hypothesized that well-structured face-to-face group education focusing on providing theoretical knowledge as well as psycho-education in an active manner with fellow patients and caregivers provides a better coping resulting in an improved quality of life.

Methods

Patient selection

Patients included in this study were diagnosed with primary colorectal cancer and eligible for curative surgical resection in the Albert Schweitzer Hospital, located in Dordrecht, The Netherlands. All patients were aged 18 years and older and able to comprehend, speak, and write Dutch.

The study was approved by the WOAC, formerly known as the local Medical Ethics Committee of the Albert Schweitzer Hospital, Dordrecht, The Netherlands (AG/2013.08/2013.16), and was performed in accordance with the ethical standards. Informed consent was obtained from all patients prior to participation in this study.

Procedure

After a colonoscopic diagnosis of a most likely colorectal malignancy, all patients were referred to the outpatient clinic of the nurse practitioner. In The Netherlands, a nurse practitioner is a protected title and is registered in a national register. The nurse practitioner has obtained a bachelor of nursing degree and has completed the Master Advanced Nursing Practice. The nurse practitioner in this case fulfills the role of case manager and is able to treat this defined group of colorectal patients with whom she will engage an independent and individual treatment relationship.

After further complete workup, all patients were discussed in a multidisciplinary team consisting of gastroenterologists, oncologists, radiotherapists, and colorectal surgeons. All patients were requested to participate in the study. Before the start of the study, the prefixed total study inclusion time was divided into 3-week blocks. These blocks were randomized as either a control or intervention block. The patients that were included in the study enrolled in the corresponding block based on the timepoint of their first outpatient clinic visit. The 3-week blocks were designed to ensure a sufficient number of patients for a "group" discussion during the group education.

Patients in the control arm were informed standardly by the nurse practitioner and the colorectal surgeon. Within a week of the initial consultation, both quality of life assessments, pretests 1 and 2, were completed. The patients in the intervention blocks were also standardly informed by the nurse practitioner and the colorectal surgeon at the time of their consultation. The intervention group completed only pretest 1, 1 week after consultation. In addition, this group then participated in the face-to-face group education intervention at least 1 week prior to the operation. Pretest 2 was completed within a week of the group intervention and prior to the operation. The colorectal surgeons, residents, and clinical medical team were blinded for the block randomization. All patients were operated on within 5 weeks of the endoscopic pathology sampling. After the operation, all patients completed the posttests at 1, 3, and 6 months postoperatively (Fig. 1).

Quality of life assessment

The quality of life was assessed by conducting validated questionnaires developed by the European Organization for Research and Treatment of Cancer (EORTC). Pretest 1 consists of the EORTC-QLQ-C30 and EORTC-QLQ-CR29 questionnaires. Pretest 2 consists of the EORTC-QLQ-info25 questionnaire. At the postoperative assessment moments, the EORTC-QLQ-C30 and EORTC-QLQ-CR29 were repeated, referred to as posttest 1.

The questionnaire QLQ C-30 is a combined questionnaire that can be subdivided into several categories for further analysis. The category "global health status" (QL2), "physical functioning" (PF2), "role functioning" (RF2), "emotional functioning" (EF), "cognitive functioning" (CF), and "social functioning" (SF) can be identified and were analyzed separately in this study. All items are scored by patients based on

Timing	All patients eligible (n=75)	
	Consultation	
	Control (n=39)	**Intervention (n=36)**
1 week		
	Pretest 1 &2	**Pretest 1**
		Group education
1 week		
		Pretest 2
< 5 weeks after biopsy	Operation	
1 month	**Posttest 1**	**Posttest 1**
3 months	**Posttest 1**	**Posttest 1**
6 months	**Posttest 1**	**Posttest 1**

Fig. 1 Flow diagram of participants' progress through the phases of the trial and timing of assessment

scale-scoring systems and the quality of life can be measured for each item.

Questionnaire QLQ CR-29 assesses the health-related quality of life in colorectal cancer patients. It has five functional and 18 symptom-related items. It contains four subscales (urinary frequency, blood and mucus in stool, stool frequency, and body image) and 19 single items. Higher scores indicate better functioning on the functional scales and a higher level of symptoms on the symptom scales [18]. In this study, only the functional parameter body image and single items anxiety and stoma were further analyzed.

The questionnaire QLQ info-25 consists of 23 closed and two open questions focusing on the patient's need for information in respect to the amount of information provided preoperatively.

Intervention group: group education

The group education consists of a 1-h session. This session takes place after the preoperative consultation at the outpatient clinic and at least 1 week prior to surgery. In this session, participants and directly involved caregivers received information by using a PowerPoint presentation given by the colorectal nurse practitioner. The first part of the group education concentrated on etiology, diagnosis, therapy, hospitalization, potential side effects, out of hospital recovery, and postoperative functional implications of colorectal cancer and its surgical interventions. The second part consists of the psychoeducation part in which coping with cancer and potential practical, social, and relational problems are addressed. The last part of this meeting consists of a group discussion.

Prior to this study, all collaborating professionals (doctors, nurses, dieticians, physiotherapists) received the same educational session to ensure that the patient is approached in a similar mindset receiving similar information at all times.

Control group

The standard preoperative consultation consists of a combined outpatient visit to the colorectal nurse practitioner and the colorectal surgeon. In this 20-min visit, the combined results of the prior diagnostic investigations are discussed resulting in a therapeutic proposal and overview of potential alternatives. A joint decision is made considering the therapeutic approach, nowadays referred to as shared decision-making, and potential complications are discussed. Furthermore, a comprehensive overview of etiology is provided.

Statistical analysis

No sample size calculation was performed for this study due to a fixed inclusion period of 1.5 years.

Data was summarized using means and standard deviation for normally distributed variables, using medians and interquartile ranges for continuous variables that were not normally distributed, and percentages for categorical variables.

Patient characteristics were compared between the two groups using chi-square tests for categorical variables and Mann-Whitney tests for continuous variables.

In univariate analyses, general linear models were used to analyze the repeated measurements of the QLQ-C30 and QLQ-29 questionnaires. The independent variables in the mixed models were timepoint (a categorical variable with levels: before surgery, 1 month after surgery, 3 months after surgery, and 6 months after surgery), randomization group, and the interaction between timepoint and group. An

unstructured covariance matrix was used in the linear mixed models to account for within-subject correlations. In multivariate analyses, age, type of surgery and complications, and their interaction effects with the group were added as independent variables to the linear mixed models.

The results of the QLQ-info-25 were compared between the intervention group and the control group with a linear-by-linear chi-square association test, and a Pearson chi-square test was used for the yes-no questions.

All statistical tests were two sided with a significance level of 0.05. Data analysis was performed using SPSS software, version 25 (SPSS Inc., Chicago, IL, USA).

Results

Recruitment and follow-up lasted in the preset timeframe from March 2013 to September 2014. During that time, 75 patients were assessed eligible for this study, willing to participate, and signed their informed consent. All patients returned the prescheduled assessments prior and after surgery and all "intervention group" patients participated in the group education.

Baseline demographics and clinical characteristics are shown in Table 1. No significant differences were found regarding gender, age, tumor location, type of surgery, neoadjuvant treatment, complications, and grade of complications. The hospital stay was significantly shorter in the intervention group (6 days) compared with the control group (8 days; p = 0.033).

QLQ-C30

The results of subsets of the QLQ-C30 are shown in Table 2. Although the global health status was not obtained prior to the colorectal cancer diagnosis, it was shown that shortly after the diagnosis, the global health status was reduced in comparison with the population norm [19]. One month after surgery, the absolute perceived global health status in the intervention group was significantly higher compared to the control group as shown in Fig. 2 and Table 3. From 3 months postoperatively on, the levels returned to the Dutch baseline in both groups in a similar way.

With respect to the physical functioning (Fig. 3) and role functioning, no significant differences were observed between the control and intervention group at any timepoint. A significant decrease is shown in both groups, 1 month after the operation, but the physical and role functioning were returned to preoperative levels in both groups after 3 months.

Regarding emotional functioning, both groups show similar levels 1 month after surgery. In contrast to physical and role functioning, the levels are both above the preoperative level.

We did not demonstrate a significant difference in the control and intervention group with respect to the cognitive and social functioning of colorectal patients. The quality of life was not related to the age of the patients (p = 0.209) nor the type of operation (p = 0.575).

QLQ-CR29

The results of the QLQ-CR29 scores of both groups are shown in Table 2. The analysis of the results for the item body image showed a remarkable pattern (Fig. 4). Before surgery, body image was scored higher in the intervention group than in the control group, yet this difference was not statistically significant. After the operation, body image levels decreased in both groups to a minimal level 1 month after surgery. Return to baseline occurred 6 months after surgery in the intervention group, whereas this did not happen in the control group.

Anxiety levels QLQ-29-ANX showed a comparable pattern after the diagnosis of colorectal carcinoma in both groups.

Due to the small number of patients with a stoma (n = 4), analysis on the QLQ-29-AP was not performed.

QLQ-info25

Patients in both the control and intervention group reported to be well informed. More than 80% responded that they did not want to receive more information than was provided. Despite the additional emphasis on etiology and diagnosis of the disease during the patient education in the intervention group, no significant differences in information supply were noted between both patient groups considering these aspects. The intervention group did perceive a better level of information considering postoperative expectations and physical coping at home after the operation, ways patients could beneficially influence the healing process and what patients could do to start eventual psychological counseling. The level of information considering potential side effects and complications after the operation was somewhat higher in the intervention group, but the difference with the control group was not statistically significant (p = 0.11).

Discussion

Nowadays, ERAS is well incorporated in the daily clinical practice of colorectal cancer patients. The focus has been put mainly on optimizing postoperative recovery programs to ensure a quick return to all-day activities. However, optimizing the preoperative course by providing colorectal patients better education including psycho-education might be as important. This study evaluates the effect of the incorporation of the preoperative group education on the quality of life of colorectal cancer patients.

Table 2 Compared results of the control and intervention group considering the global health status (QL2), physical function (PF2), role function (RF2), emotional function (EF), cognitive function (CF), social function (SF) as measured by the QLQ-C30 questionnaire. In addition to the compared results of the control and intervention group considering the body image as measured by the QLQ-CR29 (BI) questionnaire, the anxiety as measured by the QLQ-CR29(ANX) questionnaire and stoma as measured by the QLQ-CR29 (AP) questionnaire is shown. Higher scores represent better functioning with exception of the AP score where higher scores represent a higher level of symptoms

Outcome	Timepoints	Estimates per group (95% C.I.) and comparison versus baseline				Comparisons between groups	
		Control	*p*-value	Intervention	*p*-value	Mean difference (95% C.I.)	*p*-value
QLQ-C30 QL2	Before surgery	70.4 (64.3–76.6)		73.0 (66.7–79.2)		− 2.5 (− 11.2–6.2)	0.570
	1 month	63.9 (57.7–70.0)	0.092	72.1 (65.7–78.5)	0.839	− 8.3 (− 17.1–0.6)	0.047
	3 months after	78.4 (72.7–84.0)	0.025	78.8 (72.8–84.0)	0.109	− 0.4 (− 8.7–7.8)	0.913
	6 months after	75.4 (70.1–80.8)	0.123	79.0 (73.9–84.0)	0.055	− 3.5 (− 10.9–3.8)	0.342
QLQ-C30 PF2	Before surgery	81.2 (75.5–87.0)		82.8 (76.8–88.7)		− 1.5 (− 9.8–6.7)	0.712
	1 month	67.6 (60.5–74.8)	< 0.001	70.9 (63.6–78.3)	0.001	− 3.3 (− 13.6–7.0)	0.522
	3 months after	76.9 (70.5–83.3)	0.117	81.7 (74.9–88.4)	0.699	− 4.8 (− 14.0–4.5)	0.309
	6 months after	78.0 (72.0–84.0)	0.223	84.1 (78.3–89.9)	0.597	− 6.1 (− 14.4–2.3)	0.151
QLQ-C30 RF2	Before surgery	80.3 (71.1–89.6)		76.8 (67.0–86.5)		3.5 (− 9.8–17.0)	0.596
	1 month	51.1 (40.8–61.4)	< 0.001	53.9 (43.5–64.4)	0.001	− 2.8 (− 17.5–11.8)	0.700
	3 months after	80.1 (71.6–88.7)	0.966	78.3 (69.6–87.0)	0.770	1.8 (− 10.4–14.0)	0.766
	6 months after	80.8 (72.7–88.8)	0.922	84.7 (77.1–92.3)	0.080	− 3.9 (− 15.0–7.2)	0.484
QLQ-C30 EF	Before surgery	72.2 (65.8–78.6)		74.6 (68.0–81.2)		− 2.4 (− 11.6–6.8)	0.606
	1 month	78.9 (73.2–84.5)	0.039	80.8 (74.9–86.7)	0.060	− 2.0 (− 10.1–6.2)	0.632
	3 months after	84.8 (78.7–90.9)	< 0.001	87.8 (81.3–94.4)	< 0.001	− 3.0 (− 12.0–5.9)	0.497
	6 months after	84.1 (77.6–90.5)	< 0.001	84.0 (77.8–90.2)	0.003	0.8 (− 8.9–9.0)	0.987
QLQ-C30 CF	Before surgery	88.4 (83.0–93.9)		90.0 (84.3–95.7)		− 1.6	0.693
	1 month	84.5 (78.9–90.1)		88.8 (83.0–94.6)		− 4.2	0.301
	3 months after	85.5 (79.2–91.7)		87.6 (80.7–94.6)		− 2.1	0.654
	6 months after	90.4 (84.2–96.7)		91.3 (85.4–97.2)		− 0.9	0.837
QLQ-C30 SF	Before surgery	17.1 (9.8–24.4)		19.3 (12.0–26.6)		− 2.2 (− 12.5–8.1)	0.668
	1 month	24.5 (17.8–31.1)	0.082	16.9 (9.8–23.9)	0.572	7.6 (− 8.1–12.5)	0.122
	3 months after	14.0 (7.7–20.4)	0.460	14.3 (7.4–21.2)	0.247	− 0.3 (− 9.7–9.1)	0.951
	6 months after	12.6 (7.2–18.0)	0.267	9.1 (3.8–14.3)	0.014	3.5 (− 4.0–11.0)	0.357
QLQ—29 BI	Before surgery	90.8 (86.1–95.4)		95.4 (90.6–100.1)		− 4.6 (− 11.2–2.1)	0.173
	1 month	85.6 (79.4–91.8)	0.168	90.6 (84.2–96.9)	0.214	− 5.0 (− 13.9–3.9)	0.266
	3 months after	85.8 (79.3–92.2)	0.148	93.1 (86.3–100.0)	0.538	− 7.4 (− 16.7–2.0)	0.122
	6 months after	85.5 (79.6–91.3)	0.062	96.1 (90.5–101.7)	0.777	− 10.7 (− 18.7 to − 2.6)	0.010
QLQ—29 ANX	Before surgery	53.0 (44.3–61.6)		52.8 (43.8–61.8)		0.214 (− 12.3–12.7)	0.973
	1 month	63.8 (55.5–72.1)	0.016	70.8 (62.2–79.4)	< 0.001	− 7.0 (− 19.0–4.9)	0.246
	3 months after	73.7 (65.6–81.8)	<0.001	79.2 (70.3–88.0)	< 0.001	− 5.5 (− 17.4–6.5)	0.364
	6 months after	76.4 (68.6–84.2)	< 0.001	79.9 (72.4–87.4)	< 0.001	− 3.5 (− 14.3–7.4)	0.527
QLQ—29 AP	Before surgery	21.4 (14.2–28.5)		22.2 (14.8–29.7)		− 0.9 (− 11.2–9.5)	
	1 month	18.3 (10.9–25.8)	0.529	19.4 (11.7–27.1)	0.564	− 1.0 (− 11.7–9.7)	0.869
	3 months after	14.2 (6.8–21.6)	0.120	8.6 (0.4–16.7)	0.007	5.7 (− 5.3–16.6)	0.304
	6 months after	10.5 (4.2–16.7)	0.012	8.2 (2.3–14.1)	0.001	2.3 (− 6.3–10.9)	0.599

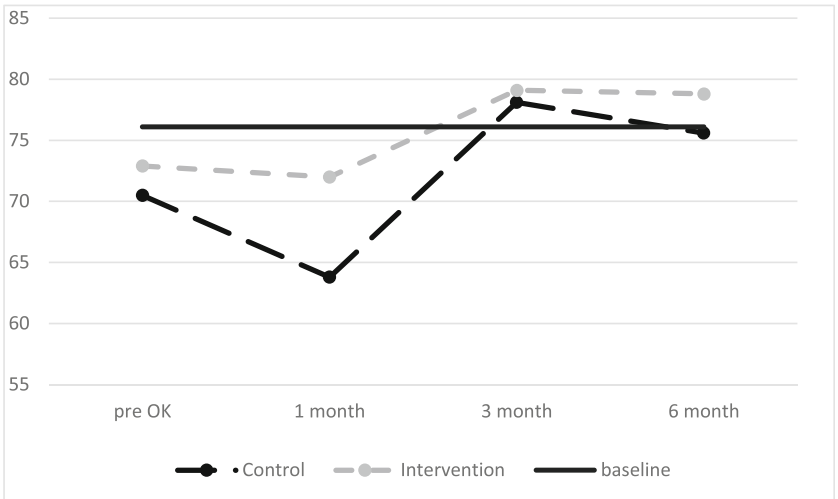

Fig. 2 Mean EORTC QLQ-C30 global quality of life score (QL2) in the Control and Intervention group at the separate sampling moments prior and after operation in combination with the age corrected Dutch baseline

Table 3 Shows the difference in perceived quality of live scored by the QLQ-C30-QL2 of the control and intervention group with respect to the differences between timepoints within the specific groups

Increase QL2 score	Differences		Difference of difference	95% C.I.		*p*-value
	Control	Intervention		L.B.	U.B	
Timepoint 2–timepoint 1	− 6.7	− 1	6.29	− 2.65	15.23	0.167
Timepoint 3–timepoint 2	14.3	7.1	− 7.13	− 17.54	3.28	0.178
Timepoint 4–timepoint 3	− 2.5	− 0.3	2.21	− 8.51	12.92	0.685
Timepoint 3–timepoint 1	7.6	6.7	− 0.84	− 11.14	9.46	0.872
Timepoint 4–timepoint 1	5.1	6.4	1.37	− 8.07	10.81	0.775

Using the EORTC QLQ-INFO 25, we were able to show that the preoperative group education in the intervention group primarily resulted in a perceived improved level of information considering the expectations and the patient involvement in the recovery process. According to the literature, this is a prerequisite to enable a better coping mechanism for patients [7]. This coincides with a significantly improved reported global health status 1 month after an operation in the intervention group as compared to the control group.

Prior to surgery, the self-reported scores on the patients' physical and role functioning were similar to non-age corrected Dutch baseline levels of patients "ever diagnosed with cancer" [19]. One month after surgery, both groups show a similar, and significant, decrease in both parameters. At 3 months after surgery, both patient groups are recovered from their operation and show global health status levels comparable to their peers [19, 20]. The time of recovery correlates well with previously reported data on recovery after colorectal surgery [21, 22]. Despite a similar drop in these levels after surgery, only in the control group, a significantly decreased quality of life score is shown. This is in line with our hypothesis that patients in the intervention group better expect the postoperative changes and are able to cope with these, resulting in a higher quality of life score despite a similar physical set back as in the control group.

The reported emotional functioning scores were lowest directly after the impact of the diagnosis, prior to surgery. From that moment on, a gradual incline is shown towards normalization at 3 months after surgery as compared to the non-age corrected Dutch baseline for patients "ever diagnosed with cancer." The group education showed no significant beneficial nor detrimental effect on this parameter.

The cognitive function of all patients does not seem to be impaired by the diagnosis nor the treatment of colorectal cancer.

In the domain body image of the colorectal specific QLQ CR29, a statistically significant difference between the control and intervention group is noted [23]. Most likely due to the group education patients have clearer expectations enabling them to cope with a similar operation derived physical impact on the body in a better way. Both groups show a decreased level 1 month after the operation. At 3 months after the operation, the intervention group already shows improved levels and is back to baseline at 6 months after surgery [24]. In contrast, a decrease in the body image level in the control group does not recover after the initial drop after surgery and shows no sign of recovery up to 6 months after surgery.

Anxiety levels showed similar patterns in both groups after the diagnosis of colorectal cancer. Over time, abnormal anxiety levels returned to normal in both groups in a similar

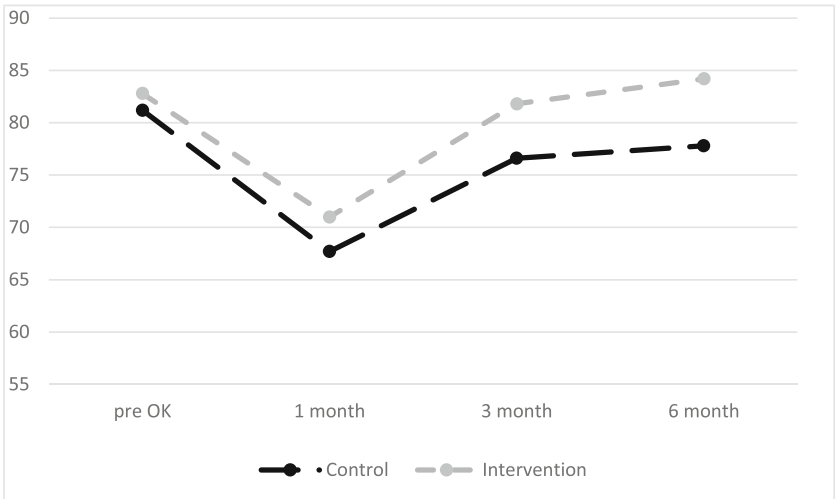

Fig. 3 Mean EORTC QLQ-C30 physical function (PF2) in the Control and Intervention group at the separate sampling moments prior and after surgery

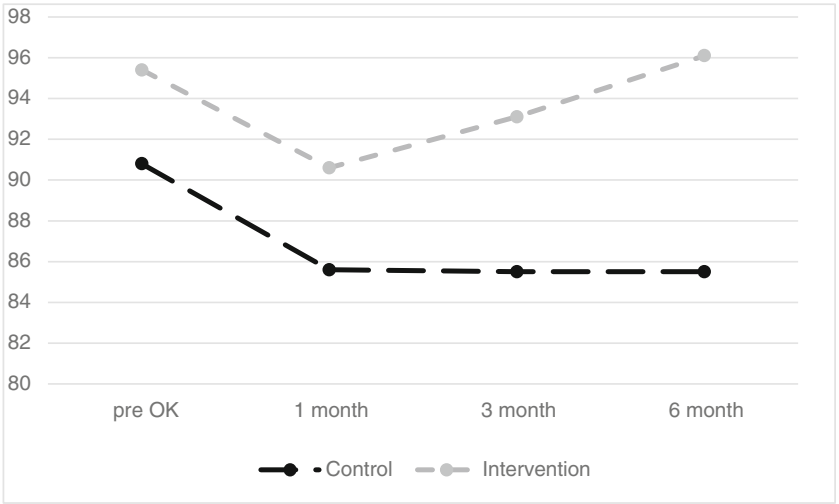

Fig. 4 Mean EORTC QLQ-CR29 body image scores in the Control and Intervention group at the separate sampling moments prior and after surgery

fashion. Previous research has shown that a large proportion of patients with cancer have the ability to handle the mental strain that the disease can cause. However, a small portion (20–30%) develops anxiety and depression symptoms [25, 26]. In previous studies, interventions to help reduce patient anxiety levels in a general cancer population have not shown convincing or clinically significant effects [27]. A plausible explanation is that only 20–30% of the patients with elevated levels of psychological distress are helped by the support which is therefore not picked up in the studies.

The in-hospital stay differed markedly between the intervention and control group. Patients in the intervention group were able to leave the hospital 2 days earlier than those in the control group. Nowadays, a median in-hospital stay of 8 days is considered long. However, at the time of this study, the average in-hospital stay in The Netherlands was comparable to the control group [28]. In light of a national and international further gradual decrease of the duration of the in-hospital stay, the additional beneficial effect of group education still stands; however, a standard reduction of 2 days, as shown in our study, is unlikely.

Several limitations of the current study should be acknowledged. First and foremost, the date of inclusion of this study is somewhat dated. Despite the clearly enthusing results of this study, our main focus has, until recently, been on the incorporation of the results of this study into our program. This resulted in a delay in the publication of these data. In the fast-evolving field of colorectal surgery, this is reflected by the high percentage of open surgery by current standards, the morbidity, and longer in-hospital stay. Considering the fact that no significant differences between the intervention and control group were observed for these items (besides the in-hospital stay), the effect of group education still stands. Furthermore, in the meantime, no similar studies have been published persuading us to push forward with this publication.

Based on this study, we cannot contribute to the discussion whether group education as such nor the content of the intervention is the best way to perform patient education, despite the fact that this study showed positive results. The intervention was developed by combining successful elements of patient education shown in the literature. In contrast to the MRC recommendations, we did not evaluate this combined intervention of itself prior to the study.

Despite the fact that the results of the small number of patients with a stoma were comparable to the patients without stoma in either the intervention or the control group, no separate comparing analysis is performed.

In conclusion, our data provides evidence of a beneficial effect of preoperative face-to-face interactive group education prior to colorectal surgery in a pre-existing ERAS environment. On the one side, this education enables physicians to better manage patients' expectations. On the other side, the additional information improves the patient involvement in their therapy and coping strategies. It enables the patients to recover sooner with an accelerated postoperative return to a good quality of life and an improved body image.

Author contributions All authors contributed to the study conception and design. Material preparation and data collection were primarily performed by Lesley Larissa Koet and Joost Alexander Boreas van der Hoeven. The analysis of the data was performed by Lesley Larissa Koet, Joost Alexander Boreas van der Hoeven, Annelot Kraima, and Joost van Rosmalen (statistical analysis). The first draft of the manuscript was written by Lesley Larissa Koet and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Availability of data and material All data are transparent and will be available on request by the corresponding author.

Code availability Data analysis was performed using SPSS software, version 25. All data are anonymous.

Declarations

Ethics approval All procedures performed were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the WOAC, formerly known as the local Medical Ethics Committee of the Albert Schweitzer Hospital, Dordrecht, The Netherlands (AG/2013.08/2013.16).

Consent to participate Informed consent was obtained from all individual participants included in this study.

Consent for publication Patients signed informed consent regarding publishing their data.

Conflict of interest The authors declare no conflict of interest.

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