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Brief Communications

General practitioner–led vs surgeon-led colon cancer survivorship care: a randomized clinical trial

Julien A.M. Vos, PhD*[,1], Laura A.M. Duineveld, PhD[1], Thijs Wieldraaijer, PhD[1], Jan Wind, PhD[1], Wim B. Busschers, MSc[1], Edanur Sert, MSc[1], Irma M. Verdonck-de Leeuw, PhD[2,3], Henk C.P.M. van Weert, PhD[1], Kristel M. van Asselt, PhD[1,4]

[1]Department of General Practice, Amsterdam UMC, location University of Amsterdam, Amsterdam, The Netherlands
[2]Department of Otolaryngology-Head and Neck Surgery, Cancer Center Amsterdam, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
[3]Department of Clinical Neuro- and Developmental Psychology, Section Clinical Psychology, Amsterdam Public Health, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
[4]Department of General Practice and Nursing Science, Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht, The Netherlands

*__Corresponding author:__ Julien A.M. Vos, PhD, Department of General Practice, Amsterdam UMC, University of Amsterdam, Post-Box 22660, 1100 DD Amsterdam, The Netherlands (j.a.m.vos@amsterdamumc.nl).

Abstract

The randomized controlled I CARE (Improving Care After colon canceR treatment in the Netherlands) trial evaluated the impact of general practitioner–led vs surgeon-led survivorship care on quality of life (QoL) in colorectal cancer survivors, alongside the effect of the eHealth application Oncokompas. The trial was conducted in 8 hospitals and 225 general practices across the Netherlands, including 303 patients who underwent surgery for stage I-III colon cancer or rectosigmoid carcinoma. Patients were randomly assigned into 4 groups: surgeon-led care, surgeon-led care with Oncokompas, general practitioner–led care, and general practitioner–led care with Oncokompas. QoL was assessed at multiple time points over 60 months. At 60 months, no clinically relevant differences in QoL were found between general practitioner–led and surgeon-led care (difference in summary score = −0.5, 95% CI = −1.6 to 0.5) or with Oncokompas (difference = 0.8, 95% CI = 0.0 to 1.6). In conclusion, neither general practitioner involvement nor access to Oncokompas led to clinically relevant improvements in long-term QoL. Survivorship care can be tailored to preferences. Netherlands Trial Register; NTR4860.

In the Netherlands, cancer survivorship care is typically managed by hospital specialists. However, concerns about the comprehensiveness of this care, particularly in addressing psychosocial needs, have sparked discussions and research into the potential role of general practitioners, who are trained to provide comprehensive, person-centered care.[1] In 2015, the randomized controlled I CARE (Improving Care After colon canceR treatment in the Netherlands) trial was initiated to assess the impact of general practitioner–led vs surgeon-led survivorship care on quality of life (QoL) after colon cancer treatment.[2] The trial also evaluated the impact of Oncokompas, a web-based self-management tool designed to improve patient knowledge about the effects of cancer and provide easier access to supportive care.[3] We hypothesized that general practitioner involvement and access to Oncokompas would improve the comprehensiveness of care, potentially leading to better QoL recovery.

An interim analysis after 12 months revealed no clinically relevant differences in QoL changes between any of the intervention groups.[4] However, patients continued to have follow-up consultations for up to 60 months after treatment, during which time QoL still evolves.[5] Previous trials comparing general practitioner–to surgeon-led survivorship care had maximum follow-up durations of only 24 months, leaving the long-term impact of general practitioner–led care unexplored.[6,7] This study aims to address this evidence gap by reporting the long-term QoL outcomes from the I CARE trial.

The I CARE trial was a pragmatic, 2-by-2 factorial, open-label, randomized controlled trial conducted in 8 hospitals and 225 general practices across the Netherlands.[2] Patients were eligible if they had undergone surgical treatment for stage I–III colon cancer or rectosigmoid carcinoma and qualified for routine follow-up based on national guidelines.[5] Eligible patients were invited after surgery or completion of chemotherapy and provided written informed consent.

Participants were randomly assigned centrally to 1 of 4 groups (1:1:1:1): standard surgeon-led care, surgeon-led care with Oncokompas, general practitioner–led care, or general practitioner–led care with Oncokompas. Random assignment was done using variable block random assignment stratified by age (65 years and younger vs older than 65 years) and tumor stage (I-II vs III). Patients randomly assigned to general practitioner–led care were referred to their general practitioner for postoperative follow-up according to the national guidelines.[5] General practitioners received a survivorship care plan that outlined the follow-up schedule and covered common survivorship issues, including symptom management and rehabilitation. Patients

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who were randomly assigned to Oncokompas received an email invitation to access the application, which offered personalized feedback on QoL issues.[3] Generic and disease-specific QoL were assessed using the European Organisation for Research and Treatment of Cancer (EORTC) QoL questionnaires (QLQ-C30 and QLQ-CR29[8,9]) at baseline and at regular intervals (3, 6, and 12 months and annually up to 60 months). The EORTC QLQ-C30 summary score was derived from the mean of 13 EORTC QLQ-30 scales (range = 0–100).[10] The primary goal was to assess the difference in QoL summary score at the end of the trial (60 months), with an interim analysis conducted at 12 months.[4] Other QoL outcomes were considered exploratory. A 10-unit difference (SD = 20) in QoL changes between the trial groups was considered clinically relevant.[11] Secondary outcomes, including recurrence detection, participants' experiences, and cost-effectiveness, have been addressed in separate papers.[12-15]

The trial followed a superiority design with a significance level (α) of 0.05 and 80% power. A total sample size of 300 participants was calculated. Statistical analyses were conducted according to an intention-to-treat principle. To capture potential deviations in the QoL recovery trajectory, piecewise linear mixed-effects models were used, with 1 knot at 24 months. When fitted to include all 4 trial arms, no important effect of Oncokompas was observed. To improve interpretability, results of the trial arms were reported separately, as was done in the interim analysis.[4] Per-protocol analyses (ie, patients who had received survivorship care as intended by random assignment and those who had access to Oncokompas) and sensitivity analyses (ie, assessing the effect of chemotherapy) were conducted to test robustness. All analyses were conducted in SPSS (version 28.0.1.1) and R (version 4.3.2), with trial oversight provided by an independent data monitoring board. The CONSORT 2010 guidelines were used for reporting the trial.[16] The trial was registered in the Netherlands Trial Register; NTR4860.

From March 26, 2015, to November 21, 2018, a total of 1238 patients were invited to participate of whom 303 enrolled (participation rate of 25%). Nonparticipants were slightly older (69.3 vs 68.1 years) and more likely to be female (51% vs 33%).[17] The most common reasons for declining participation were a preference to remain in specialist care (31%) and the perceived effort required to participate (12%). Among the participants, 141 were in the general practitioner–led care group (68 with access to Oncokompas) and 162 in the surgeon-led care group (83 with access to Oncokompas) (see Figure S1 for the trial profile, p1). Baseline characteristics were comparable across all groups, as previously reported (Table S1, p2-3).[4] Patients had a mean age of 68.0 (8.4) years and were predominantly male (67%). Adjuvant chemotherapy was administered to 68 (22%) patients. After 60 months of follow-up, 50 (35%) of 141 patients in the general practitioner–led care group had transferred back to surgeon-led care. The primary reasons for transfer were (suspected) recurrence (n = 22) and patients' preference (n = 21) (Figure S1, p1). The questionnaire completion rate at 60 months was 87% (Table S2, p4-5). Of the 151 patients assigned to Oncokompas, 51 (36%) reported using the app at least once in the first year.

At baseline, the mean QLQ-C30 summary score was 90.2 (9.1) in the general practitioner–led group and 86.1 (11.0) in the surgeon-led group (Table 1). After 60 months, these scores were 90.8 (9.6) and 90.6 (8.2), respectively. Tables S3 and S4, p6-13, show the QoL scores at each time point. No clinically relevant differences were observed in QoL changes between general practitioner–led and surgeon-led groups over 24 months (difference in summary score = −0.5, 95% CI = −1.6 to 0.5 months) and 60 months (difference in summary score = −0.01, 95% CI = −0.8 to 0.8 months) (Table 1, Figure 1). During the first 24 months, QoL scores generally improved, whereas after this period, the scores stabilized or declined. Minor effects on different subscales were evenly distributed between groups. Similarly, no relevant differences were observed in QoL changes between the Oncokompas and no Oncokompas groups (Table S5, p14-17). Per-protocol and sensitivity analyses aligned with the intention-to-treat analyses (Tables S6-S9, p18-33).

Consistent with the initial 12-month findings,[4] general practitioner–led care did not result in greater improvements in long-term QoL compared with usual surgeon-led care. Because of low usage rates, it is inconclusive whether Oncokompas has a long-term impact on QoL. As colon cancer survivors live longer and transition back to primary care, it is important to reconsider the role of general practitioners in providing survivorship care. The I CARE trial is the largest and longest randomized trial comparing general practitioner–led to surgeon-led survivorship care for colon cancer patients. Our findings are consistent with previous trials, confirming that general practitioner–led care results in similar QoL outcomes.[6,7] Secondary outcomes, like recurrence detection, were also similar between general practitioner– and surgeon-led care (hazard ratio [HR] = 0.75, 95% CI = 0.41 to 1.36).[12] Unlike earlier trials, the I CARE trial had a significantly longer follow-up period (60 vs 24 months), which underscores the importance of its long-term insights. The trial achieved a high questionnaire completion rate (87%) at 60 months, further strengthening the reliability of the findings.

Contrary to our hypothesis, neither general practitioner involvement nor providing access to Oncokompas improved long-term QoL. In the trial, baseline QoL was already high, suggesting a ceiling effect that left little room for improvement.[4] This indicates that the study population may not have been the most suitable group for these interventions. Patients also reported little need for Oncokompas, as they experienced few complaints or symptoms.[13] Future research should focus on survivors with a higher symptom burden, as they may benefit more from targeted interventions. Furthermore, most QoL changes were observed within the first 24 months, after which QoL remained relatively stable or declined in the 4 groups. These findings suggest that interventions aimed at improving QoL are most likely to be effective when implemented early in survivorship.

The pragmatic design of the trial makes it difficult to determine whether the interventions were implemented as intended. In theory, general practitioners may have more time to address QoL issues, but in practice, they faced numerous competing demands and reported limited time to provide comprehensive care.[18] These barriers to providing survivorship care in primary care have been consistently documented.[19,20] Semistructured interviews conducted alongside the trial also revealed variations in how general practitioner–led care was organized, ranging from solely patient-initiated contacts to shared-care approaches.[13,14] Therefore, rather than focusing on complete care substitution by the general practitioner, future research could explore specific areas where general practitioners can make meaningful contributions. Currently, there is a growing interest in shared care models, where general practitioners and surgeons collaborate in managing survivorship care. For instance, an Australian trial of 150 colorectal cancer patients found that patients were more likely to prefer shared care (63% vs 35%), and their follow-up adherence was higher (83% vs 68% at 9 months).[21] These findings suggest that patients value general practitioner involvement and may benefit from it. As for eHealth applications like Oncokompas, simply providing access proved insufficient.

Table 1. EORTC QLQ-C30 and CR29 QoL scores and results of piecewise linear mixed effects models for general practitioner–led vs surgeon-led survivorship care (intention-to-treat).

		General practitioner–led survivorship care (intervention) vs surgeon-led (control)					
Subdomain (no. of items in domain)	**Reference QoL mean (SD)[8,9] [a]**	**No.**	**Baseline QoL mean (SD)[b]**	**Mean change in QoL from baseline to 24 months (95% CI)[c]**	**Mean difference in QoL change after 24 months (95% CI)[c]**	**Mean change in QoL from 24 to 60 months (95% CI)[c]**	**Mean difference in QoL change after 60 months (95% CI)[c]**
EORTC QLQ-C30							
Summary score (27)							
Intervention	91.3 (10.6)	135	90.2 (9.1)	0.5 (−0.2 to 1.3)	−0.5 (−1.6 to 0.5)	−0.5 (−1.1 to 0.0)	−0.01 (−0.8 to 0.8)
Control		154	86.1 (11.0)	1.1 (0.4 to 1.8)		−0.5 (−1.1 to −0.0)	
Functional scales							
Physical function (5)							
Intervention	90.8 (14.5)	138	88.4 (13.5)	−0.2 (−1.4 to 0.9)	−1.0 (−2.5 to 0.6)	−1.3 (−2.2 to −0.5)	−0.7 (−1.9 to 0.5)
Control		156	84.3 (16.8)	0.8 (−0.3 to 1.8)		−0.6 (−1.4 to 0.2)	
Role function (2)							
Intervention	88.7 (20.8)	138	88.4 (19.3)[d]	0.1 (−1.8 to 1.9)	−2.2 (−4.7 to 0.3)	−1.1 (−2.7 to 0.5)	−0.7 (−2.8 to 1.4)
Control		156	78.2 (26.5)	2.3 (0.6 to 4.0)		−0.4 (−1.9 to 1.0)	
Emotional function (4)							
Intervention	88.8 (16.4)	138	90.8 (14.5)	−0.2 (−1.4 to 1.0)	−1.8 (−3.4 to −0.2)	0.1 (−0.8 to 1.0)	1.2 (−0.0 to 2.5)
Control		156	85.7 (18.0)	1.7 (0.6 to 2.8)	$P = .028$	−1.1 (−2.0 to −0.3)	
Cognitive function (2)							
Intervention	92.3 (14.8)	138	90.9 (14.3)	0.8 (−0.3 to 1.9)	−1.0 (−2.5 to 0.6)	−0.2 (−1.1 to 0.7)	0.7 (−0.5 to 1.9)
Control		156	87.2 (16.0)	1.8 (0.7 to 2.8)		−0.9 (−1.7 to −0.0)	
Social function (2)							
Intervention	94.1 (15.1)	138	90.2 (16.1)	1.9 (0.6 to 3.3)	0.6 (−1.2 to 2.5)	−1.4 (−2.6 to -0.3)	−2.0 (−3.6 to −0.4)
Control		156	86.9 (18.6)	1.3 (0.1 to 2.5)		0.5 (−0.5 to 1.6)	
Global health status (2)							
Intervention	77.9 (17.2)	136	83.1 (15.0)	0.1 (−1.3 to 1.5)	−0.8 (−2.6 to 1.1)	−0.6 (−1.6 to 0.5)	0.1 (−1.3 to 1.6)
Control		156	76.3 (16.0)	0.8 (−0.4 to 2.1)		−0.7 (−1.7 to 0.3)	
Symptom scales or items							
Fatigue (3)							
Intervention	17.4 (20.1)	138	20.3 (19.2)	−2.6 (−4.2 to −1.1)	−0.0 (−2.1 to 2.0)	0.5 (−0.7 to 1.8)	0.1 (−1.6 to 1.9)
Control		156	27.6 (23.3)	−2.6 (−4.0 to −1.2)		0.5 (−0.8 to 1.7)	
Nausea and vomiting (2)							
Intervention	2.8 (9.8)	138	1.7 (7.9)	−0.4 (−1.2 to 0.4)	−0.2 (−1.3 to 0.8)	0.4 (−0.3 to 1.1)	0.9 (−0.0 to 1.8)
Control		156	3.5 (10.0)	−0.1 (−0.9 to 0.6)		−0.5 (−1.1 to 0.2)	
Pain (2)							
Intervention	14.9 (22.3)	138	9.4 (15.7)	0.2 (−1.3 to 1.8)	0.2 (−1.9 to 2.3)	0.3 (−1.1 to 1.7)	0.2 (−1.7 to 2.1)
Control		156	12.9 (18.7)	0.0 (−1.4 to 1.4)		0.1 (−1.2 to 1.3)	
Dyspnea (1)							
Intervention	6.9 (16.7)	138	8.2 (16.5)	0.8 (−0.8 to 2.3)	1.5 (−0.6 to 3.6)	−0.1 (−1.3 to 1.1)	−0.8 (−2.4 to 0.9)
Control		155	11.4 (18.0)	−0.7 (−2.1 to 0.7)		0.7 (−0.5 to 1.8)	
Insomnia (1)							
Intervention	14.1 (23.1)	138	16.7 (23.2)	−0.9 (−2.8 to 1.0)	1.4 (−1.2 to 4.0)	0.6 (−1.1 to 2.3)	−0.1 (−2.4 to 2.2)
Control		156	23.9 (27.3)	−2.3 (−4.0 to −0.5)		0.6 (−0.9 to 2.2)	
Appetite loss (1)							
Intervention	3.2 (12.4)	138	5.1 (16.1)	−1.1 (−2.4 to 0.2)	−1.1 (−2.9 to 0.6)	0.4 (−0.6 to 1.4)	0.1 (−1.2 to 1.5)
Control		156	5.1 (15.2)	0.0 (−1.1 to 1.2)		0.3 (−0.7 to 1.2)	
Constipation (1)							
Intervention	4.5 (13.6)	135	8.1 (18.0)	−1.1 (−2.8 to 0.5)	−1.8 (−4.0 to 0.4)	0.7 (−0.5 to 1.9)	0.7 (−0.9 to 2.4)
Control		155	8.8 (18.2)	0.7 (−0.8 to 2.2)		−0.0 (−1.2 to 1.1)	

(continued)

Table 1. (continued)

Subdomain (no. of items in domain)	Reference QoL mean (SD)[8,9] [a]	General practitioner–led survivorship care (intervention) vs surgeon-led (control)					
		No.	Baseline QoL mean (SD)[b]	Mean change in QoL from baseline to 24 months (95% CI)[c]	Mean difference in QoL change after 24 months (95% CI)[c]	Mean change in QoL from 24 to 60 months (95% CI)[c]	Mean difference in QoL change after 60 months (95% CI)[c]
Diarrhea (1)							
Intervention	4.2 (13.8)	138	10.1 (19.2)	−1.3 (−3.0 to 0.5)	−0.2 (−2.5 to 2.2)	0.6 (−0.8 to 1.9)	−0.4 (−2.2 to 1.5)
Control		156	12.0 (22.4)	−1.1 (−2.7 to 0.5)		0.9 (−0.3 to 2.2)	
Financial difficulties (1)							
Intervention	3.1 (12.9)	137	4.6 (13.5)	−1.2 (−2.3 to −0.2)	−0.8 (−2.3 to 0.6)	0.3 (−0.6 to 1.2)	1.1 (−0.1 to 2.3)
Control		155	4.5 (14.3)	−0.4 (−1.4 to 0.6)		−0.8 (−1.6 to 0.1)	
EORTC QLQ-CR29							
Scales							
Urinary frequency (2)							
Intervention	32.2 (24.0)	137	29.3 (23.7)	−0.4 (−2.3 to 1.5)	1.3 (−1.3 to 3.9)	1.6 (0.1 to 3.1)	0.7 (−1.3 to 2.7)
Control		156	31.9 (23.0)	−1.7 (−3.4 to 0.1)		0.9 (−0.5 to 2.3)	
Blood/mucus in stool (2)							
Intervention	7.9 (15.9)	137	2.6 (9.0)	−0.3 (−0.9 to 0.4)	0.1 (−0.7 to 1.0)	0.1 (−0.4 to 0.6)	−0.1 (−0.7 to 0.6)
Control		155	2.5 (9.1)	−0.4 (−1.0 to 0.2)		0.2 (−0.3 to 0.6)	
Stool frequency (2)[d]							
Intervention	24.1 (22.6)	127	12.6 (17.5)	−2.5 (−3.9 to −1.2)	−1.2 (−3.0 to 0.6)	0.4 (−0.7 to 1.5)	1.0 (−0.5 to 2.5)
Control		147	16.2 (19.5)	−1.4 (−2.6 to −0.1)		−0.6 (−1.6 to 0.4)	
Body image (3)[e]							
Intervention	18.5 (21.7)	137	5.8 (10.9)	0.2 (−0.7 to 1.2)	0.3 (−1.0 to 1.6)	−0.0 (−0.8 to 0.7)	0.1 (−1.0 to 1.1)
Control		156	8.9 (14.1)	−0.1 (−0.9 to 0.8)		−0.1 (−0.8 to 0.6)	
Single items							
Urinary incontinence (1)							
Intervention	7.6 (18.2)	136	5.1 (13.4)	0.7 (−0.4 to 1.9)	−0.1 (−1.6 to 1.4)	0.1 (−0.9 to 1.1)	0.4 (−0.9 to 1.8)
Control		155	6.9 (14.6)	0.9 (−0.1 to 1.9)		−0.3 (−1.2 to 0.6)	
Dysuria (1)							
Intervention	4.1 (13.7)	136	2.0 (8.9)	0.3 (−0.5 to 1.1)	−0.3 (−1.4 to 0.8)	0.1 (−0.6 to 0.8)	0.3 (−0.6 to 1.2)
Control		155	2.2 (9.1)	0.6 (−0.1 to 1.4)		−0.2 (−0.8 to 0.4)	
Abdominal pain (1)							
Intervention	11.7 (22.2)	136	7.6 (15.2)	−0.8 (−2.4 to 0.7)	−0.9 (−3.0 to 1.2)	−0.2 (−1.3 to 1.0)	0.1 (−1.5 to 1.6)
Control		155	9.9 (16.6)	0.1 (−1.3 to 1.5)		−0.3 (−1.3 to 0.8)	
Buttock pain (1)							
Intervention	14.2 (24.8)	136	3.9 (14.1)	−0.6 (−1.9 to 0.8)	1.5 (−0.3 to 3.2)	0.6 (−0.5 to 1.6)	0.0 (−1.3 to 1.4)
Control		155	9.2 (18.8)	−2.0 (−3.2 to −0.8)		0.5 (−0.4 to 1.4)	
Bloating (1)							
Intervention	16.0 (22.7)	135	10.9 (19.5)	−0.7 (−2.3 to 1.0)	−1.0 (−3.3 to 1.2)	−0.4 (−1.7 to 1.0)	1.1 (−0.7 to 3.0)
Control		156	11.8 (19.2)	0.4 (−1.1 to 1.9)		−1.5 (−2.7 to −0.3)	
Dry mouth (1)							
Intervention	18.6 (25.7)	137	13.1 (21.1)	−0.2 (−2.0 to 1.6)	0.7 (−1.7 to 3.1)	0.8 (−0.6 to 2.1)	−0.1 (−2.0 to 1.7)
Control		156	16.9 (22.2)	−0.9 (−2.6 to 0.7)		0.9 (−0.4 to 2.2)	
Hair loss (1)							
Intervention	8.3 (20.9)	137	3.9 (15.2)	−0.6 (−1.8 to 0.7)	0.2 (−1.5 to 1.9)	0.1 (−0.8 to 1.0)	−0.4 (−1.6 to 0.9)
Control		155	4.9 (15.6)	−0.8 (−1.9 to 0.4)		0.5 (−0.4 to 1.3)	
Taste (1)							
Intervention	12.3 (24.9)	137	7.5 (20.2)	−1.4 (−2.9 to 0.0)	0.1 (−1.9 to 2.0)	0.6 (−0.5 to 1.8)	1.1 (−0.5 to 2.6)
Control		156	12.0 (24.5)	−1.5 (−2.8 to −0.2)		−0.5 (−1.5 to 0.6)	
Anxiety (1)[e]							

(continued)

Table 1. (continued)

Subdomain (no. of items in domain)	Reference QoL mean (SD)[8,9] [a]	General practitioner–led survivorship care (intervention) vs surgeon-led (control)					
		No.	Baseline QoL mean (SD)[b]	Mean change in QoL from baseline to 24 months (95% CI)[c]	Mean difference in QoL change after 24 months (95% CI)[c]	Mean change in QoL from 24 to 60 months (95% CI)[c]	Mean difference in QoL change after 60 months (95% CI)[c]
Intervention	33.8 (26.4)	137	16.5 (21.4)	−2.1 (−3.8 to −0.3)	−0.2 (−2.6 to 2.1)	−0.2 (−1.7 to 1.3)	−0.2 (−2.2 to 1.8)
Control		156	22.9 (22.0)	−1.8 (−3.4 to −0.3)		0.0 (−1.4 to 1.4)	
Weight (1)[e]							
Intervention	20.6 (26.6)	137	10.7 (17.6)	0.4 (−1.3 to 2.1)	−0.2 (−2.5 to 2.1)	0.1 (−1.2 to 1.4)	0.7 (−1.1 to 2.4)
Control		156	14.1 (20.4)	0.6 (−0.9 to 2.1)		−0.6 (−1.8 to 0.6)	
Flatulence (1)[d]							
Intervention	34.6 (27.4)	127	29.7 (26.6)	−2.5 (−4.8 to −0.2)	−1.3 (−4.4 to 1.8)	0.3 (−1.5 to 2.0)	0.5 (−1.9 to 3.0)
Control		147	29.7 (27.3)	−1.3 (−3.4 to 0.8)		−0.3 (−1.9 to 1.4)	
Fecal incontinence (1)[d]							
Intervention	12.1 (23.2)	126	5.8 (16.9)	−1.1 (−2.4 to 0.1)	−1.6 (−3.3 to 0.1)	0.3 (−0.8 to 1.4)	−0.1 (−1.7 to 1.4)
Control		147	5.4 (13.5)	0.4 (−0.7 to 1.6)		0.4 (−0.6 to 1.5)	
Sore skin (1)[d]							
Intervention	14.7 (26.8)	127	5.5 (15.6)	−0.7 (−2.1 to 0.7)	2.1 (0.3 to 4.0)	0.0 (−1.0 to 1.0)	−1.3 (−2.7 to 0.1)
Control		147	10.9 (19.6)	−2.8 (−4.0 to −1.5)		1.3 (0.3 to 2.2)	
Embarrassment (1)[d]							
Intervention	21.1 (30.0)	127	7.3 (16.8)	−2.1 (−3.7 to −0.4)	−1.6 (−3.9 to 0.7)	0.5 (−0.7 to 1.8)	0.6 (−1.1 to 2.3)
Control		147	12.2 (21.8)	−0.5 (−2.0 to 1.0)		−0.1 (−1.2 to 1.1)	
Sexual interest, men (1)[e]							
Intervention	30.6 (25.4)	96	36.1 (25.9)	1.1 (−1.2 to 3.5)	0.2 (−2.9 to 3.4)	−1.5 (−3.3 to 0.4)	0.0 (−2.5 to 2.5)
Control		101	33.3 (24.0)	0.9 (−1.2 to 3.1)		−1.5 (−3.2 to 0.2)	
Impotence (1)							
Intervention	41.7 (41.7)	86	27.1 (34.1)	−1.5 (−5.3 to 2.2)	1.8 (−3.3 to 6.9)	−0.7 (−4.2 to 2.9)	−3.9 (−8.7 to 0.9)
Control		89	31.5 (34.2)	−3.3 (−6.8 to 0.1)		3.2 (−0.0 to 6.5)	
Sexual interest, women (1)[e]							
Intervention	16.1 (22.8)	39	12.0 (16.2)	3.6 (0.8 to 6.3)	1.1 (−2.6 to 4.8)	−1.6 (−3.8 to 0.6)	−0.1 (−3.1 to 2.9)
Control		51	10.5 (18.2)	2.5 (0.0 to 4.9)		−1.5 (−3.5 to 0.5)	
Dyspareunia (1)							
Intervention	14.5 (28.5)	25	12.0 (27.0)	−1.9 (−7.1 to 3.4)	−3.1 (−10.1 to 4.0)	2.1 (−1.6 to 5.8)	1.6 (−3.2 to 6.5)
Control		30	12.2 (23.9)	1.2 (−3.5 to 5.9)		0.5 (−2.6 to 3.6)	

[a] Reference data for EORTC QoL scores based on the Dutch population. Abbreviations: CI = confidence interval; EORTC-QLQ = European Organisation for Research and Treatment of Cancer (EORTC) QoL Questionnaires; QoL = quality of life.
[b] Mean QoL scores and standard deviations were calculated based on the first questionnaires available of all patients. However, because most patients were included more than 3 months after surgical treatment, this score does not represent the actual baseline.
[c] Mean changes from baseline and differences in QoL change between trial arms were calculated using piecewise linear mixed effects models with 1 knot at 24 months.
[d] Clinically relevant difference of 10 points between the intervention and control group.

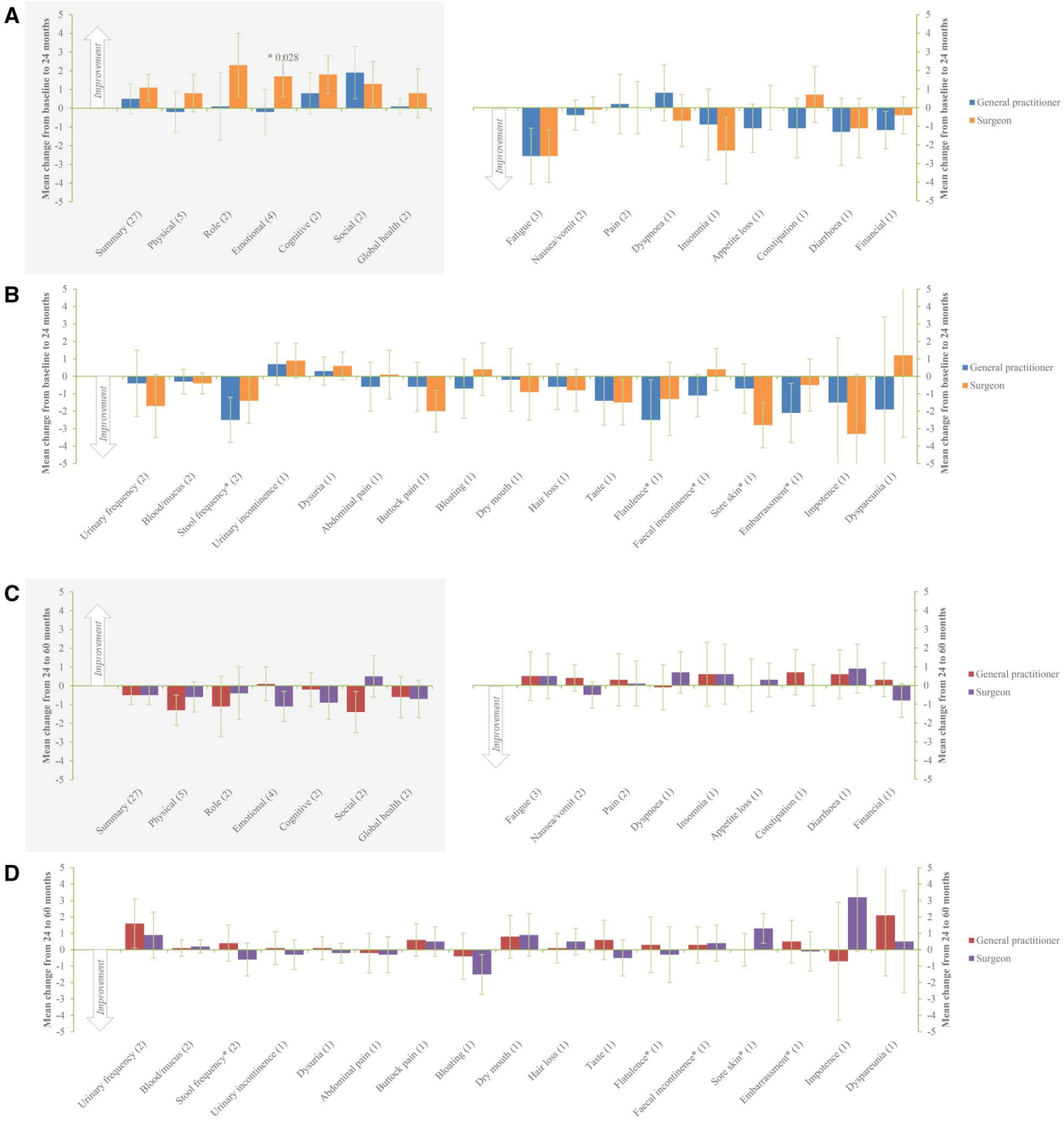

Figure 1. Overall change in quality of life (QoL) for general practitioner–led vs surgeon-led survivorship care as measured by the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (QLQ)–C30 **(A and C)** and -CR29 questionnaires **(B and D)**. For functional scores, higher scores indicated better QoL, hence positive changes over time **(upward bars)** indicated improvement from baseline, whereas for symptoms, higher scores indicated greater severity of symptoms, and hence negative changes (**downward bars)** indicated improvement (or decrease of symptoms). The QoL changes were estimated using piecewise linear mixed-effects models with 1 knot at 24 months. **A)** and **(B)** shows QoL changes from baseline to 24 months, whereas **(C)** and **(D)** shows QoL changes from 24 to 60 months. There were no clinically relevant differences. *P* values (<.05) are shown for the between-group comparison of the overall change from baseline. *Values and estimates for patients without a stoma are shown.

Research indicates that patients prefer technology integrated with a human element,[22] so additional support and guidance may improve uptake and effectiveness.

In this randomized controlled trial conducted in the Netherlands, general practitioner–led survivorship care did not improve long-term QoL compared with traditional surgeon-led care among nonmetastatic colorectal cancer survivors. The impact of Oncokompas remains inconclusive because of its low usage rates. Survivorship care models and eHealth applications can be tailored to individual preferences and needs.

Author contributions

Julien A.M. Vos (Conceptualization, Data curation, Formal analysis, Investigation, Writing—original draft, Writing—review &

editing), Laura Duineveld (Conceptualization, Data curation, Investigation, Writing—review & editing), Thijs Wieldraaijer (Conceptualization, Data curation, Investigation, Writing—review & editing), Jan Wind (Conceptualization, Data curation, Funding acquisition, Investigation, Writing—review & editing), Wim Busschers (Conceptualization, Formal analysis, Investigation, Writing—review & editing), Edanur Sert (Conceptualization, Data curation, Investigation, Writing—review & editing), Irma Verdonck-de Leeuw (Conceptualization, Investigation, Writing—review & editing), Henk van Weert (Conceptualization, Investigation, Supervision, Writing—review & editing), and Kristel van Asselt (Conceptualization, Investigation, Supervision, Writing—review & editing).

Supplementary material

Supplementary material is available at *JNCI Cancer Spectrum* online.

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Conflicts of interest

The authors declare that they have no competing interests.

Data availability

At the end of study, data can be made available, after anonymization, on request to the corresponding author. The data collected for this study will be stored up to 15 years after the end of study. This time period will take into account possible national and international legal restrictions (ie, from the Netherlands, E.U.).

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The study protocol was approved by the medical ethics committee of the Academic Medical Centre (Amsterdam, The Netherlands) (MEC 2014_332). The study was conducted according to the principles of Good Clinical Practice. Written informed consent for data collection was obtained from all participants.

In 2015, the I CARE study was initiated as a response to the increasing calls for other and more generalized cancer survivorship care strategies. Representatives of the patients and public were not directly involved in carrying out this research.

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