

Quality of Life in Postoperative Colorectal Cancer Survivors: A Structural Equation Model

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ABSTRACT

Objective: The present study has been aimed at constructing a causal model to determine factors affecting health-related quality of life (HRQoL) in postoperative patients with colorectal cancer (CRC) following discharge.

Materials and Methods: A cross-sectional study was conducted with 396 postoperative CRC cancer patients from ten tertiary hospitals representing each of the four Regions of Thailand. Data was collected through a standard questionnaire. Structure equation modeling (SEM) was applied to analyze data.

Results: The findings revealed that the majority of patients with CRC surgery had a moderate HRQoL. One hundred and twenty-three patients (31.1%) had complications. SEM showed a good fit with $\chi^2=40.347$, $df=28$, $p=0.062$, $GFI=0.980$, $CFI=0.959$ and $RMSEA=0.033$. The final model showed that age, stage of cancer and healthcare service being received following CRC surgery had direct effects on HRQoL. Nutritional status and follow-up outpatient clinic had indirect effects on HRQoL during postoperative complications. Moreover, social support and primary family caregiver support had indirect effects on HRQoL through self-management capacity.

Conclusion: The findings of this study emphasized the importance of implementing effective strategies to improve quality of life among postoperative patients with CRC after discharge and indicated these strategies should focus on quality of healthcare service following CRC surgery, self-management capacity and prevention of postoperative complications. Postoperative complications can be reduced by providing effective follow-up in outpatient clinics and nutritional status management, consequently improving quality of life among this population.

Keywords: Quality of life; postoperative complications; healthcare delivery; colorectal cancer (Siriraj Med J 2021; 73: 576-586)

INTRODUCTION

Health-related quality of life (HRQoL) is an important indicator of a healthcare system. One of the main goals of caring of postoperative patients with colorectal cancer (CRC) is the achievement of a better HRQoL. However, survivors of CRC following surgery might experience a

decrease in HRQoL owing to pain, diarrhea and physical and social functioning.¹⁻³ Such post-operative conditions impose great demands on follow-up models following discharge, thus making it difficult to improve the overall quality of life of patients.⁴ Post-discharge follow-up visits should take place either in the home⁵ or in an

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outpatient clinic⁶, or take the form of a telephone visit⁷ in order to promote continuity of care. Prompt follow-up of discharged patients has been related to reduced postoperative complications^{8,9} and improved functional ability and quality of life.¹⁰ Patients undergoing CRC surgery need continued healthcare service following discharge for symptom management¹¹, skill development¹², psychosocial support¹³, access to health care¹⁴, continuity of care⁹ and effectiveness of healthcare services for the purpose of maintaining HRQoL and reducing postoperative complication rates.

Many studies have investigated the impact on HRQoL of self-management capacity, family caregiver support, social support and patients' dimensional factors in patients who undergo CRC surgery. The self-management of patients is a behavioral factor that makes patients healthy and directly affects their quality of life.¹⁵ Successful self-management is the result of the use of knowledge, skills and confidence in dealing with the problem of illness, which can be achieved through postoperative symptom experience, social roles and stress-and-anxiety control at home, which can thus result in an improved quality of life.¹⁶ Moreover, family caregiver support has a direct influence on patients' self-management ability.¹⁷ Caregivers assist patients in managing their treatment plans and consistently keeping their appointments. Further, caregivers support patients in their daily-living activities and help them to monitor unusual symptoms after their surgeries and assist them in managing post-operative pain.¹⁸ Social support from families, peers and other people in the community is critical for people living with CRC. Social support has been found to be positively correlated with quality of life in patients with cancer.¹⁹ The influence of age, stage of cancer²⁰, co-morbidity²¹ and nutrition status²² on HRQoL has also been demonstrated in previous studies.

However, previous studies of postoperative quality of life following CRC surgery have focused on individual factors such as the physiological and psychological components of wellness.^{23,24} This study explored the health service delivery system by using a more comprehensive causal model to explain HRQoL in patients with postoperative CRC following their discharge from the hospital. The factors that were considered included the model of follow-up care, healthcare service after CRC surgery, postoperative complications, primary family caregiver support, social support, self-management capacity and patients' dimensional factors (age, co-morbidity, nutrition status and stage of cancer). The aim of this study was to identify the relationships between these factors and HRQoL in patients who had been discharged following CRC surgery in a hypothesized model using structure

equation modeling (SEM). The results from this study are expected to be useful in the application of information to formulate policy to develop models of care and health service systems for postoperative patients with CRC.

MATERIALS AND METHODS

Study design and setting

This study was based on a cross-sectional descriptive study design in ten tertiary hospitals from the four Regions of Thailand during from May 2018 to May 2019. The study was approved by the Siriraj Institutional Review Board (SIRB) (Si 318/2018) and Human Research Ethics Committee of each of nine tertiary hospitals.

Study participants

In structural equation modeling, sample sizes of 200-400 are usually recommended to test the model. Based on the recommendation that the ratio between sample size and free parameters should be 20:1.²⁵ The number of free parameters to be estimated in this study was 19. Thus, the study sample of 396 participants clearly satisfied the minimum sample size of 380. Then, the distribution of participants in each hospital setting was calculated based on the probability proportional to size sampling²⁶ that was appropriate for an unequal number of CRC population in each hospital. The participants were recruited from among the outpatients at the surgical and oncology clinic on the basis on the following inclusion criteria: (1) patients aged 18 years or older; (2) diagnosis with CRC and treatment with colon or rectal resection at least six weeks before the study; (3) stage I-IV cancer; (4) ability to understand and answer the questionnaires; and (5) knowledge of their diagnosis of cancer. In addition, the primary family caregivers were selected on the basis on the following inclusion criteria: (1) family caregivers aged 18 years or older; (2) identification as a family member; (3) duties as a primary family caregiver (the person who provided the majority of unpaid, informal care); (4) ability to communicate; and (5) provision of care for postoperative CRC patients who meet the inclusion criteria and are willing to participate in the study.

Data collection

The data were collected with standard questionnaires by the researcher. Approximately six weeks following discharge, the researcher was introduced to eligible participants and a) provided a written and verbal explanation of the project; b) obtained written consent for participation including consent to access the patients' medical record; and c) asked participants to identify a primary family

caregiver. Data collection took approximately 50 minutes for each participant. The instrument for data collection was a questionnaire consisting of the following seven parts:

Demographic characteristics were obtained, including age, sex, marital status and stage of cancer.

Health-related quality of life was measured by the Quality-of-Life Questionnaire C30, version 3.0 (EORTC QLQ-C30) of the European Organization for Research and Treatment of Cancer. This instrument was translated into Thai by Chatchawan Silpakit and Colleagues. Cronbach's alpha coefficient of the Thai version of the EORTC QLQ-C30 was 0.7.²⁷ This tool comprises 30 questions that correspond to five functioning scales, eight symptoms scales and the global health and financial impact of the disease and treatment. In the present study, the Cronbach's alpha of the reliability coefficient was 0.82.

Postoperative complications were measured on the basis of the Clavien–Dindo classification, which was developed by Clavien et al.²⁸ and translated into Thai by Chanutphorn Rattanamongkol and Colleagues. The content validity index (CVI) value of the Thai version of the Clavien–Dindo classification was 0.92. This tool was graded from I to V, which is based on the treatment required for any given postoperative complication. Severe complications were defined as those classified as Grade III or IV.²⁹ To improve reporting of postoperative complications, the comprehensive complication index (CCI) was designed by Slankamenac et al.²⁹ The CCI was calculated using the online with free access at www.assessurgery.com.²⁹ The CCI is thus a summation of all the postoperative complications in a continuous scale ranking from 0 (no complications) to 100 (death).

Healthcare service after CRC surgery was measured using the Healthcare Service after CRC Surgery Questionnaire. This tool was developed by the researchers. The instrument is composed of 39 items and focuses on symptom management support, skills-training service, psychosocial support, access to health care, continuity of information, continuity of management, continuity of the relationship and effectiveness of the service with scores ranging from 1 to 5; higher scores mean better services than lower scores. In the present study, the content validity index (CVI) value of this instrument was 0.92. In addition, the Cronbach's alpha of the reliability coefficient was 0.83.

The model of follow-up care was measured using the Model of Follow-up Care Questionnaire. This tool was developed by the researcher and covers the following three aspects: a) follow-up outpatient clinic, b) follow-up

outpatient clinic and a telephone visit, and c) follow-up outpatient clinic and a home visit. The patients in this study received follow-up under one of several follow-up models. The questions are answered “received” or “not received”. In the present study, the CVI value of this instrument was 0.80.

Self-management capacity was measured with the Patient Activation Measure (PAM), which was developed by Hibbard et al.³⁰ and translated into Thai by Choocherd and Wanitkun. The Content Validity Index (CVI) value of the Thai version of the PAM was 0.92. The PAM provides an assessment of the potential or capacity of patients to be engaged in health care from three aspects of disease self-management, including patient knowledge, skills and confidence. The response categories of the 13-item scale ranged from strongly disagree to strongly agree and “not applicable.” This tool has a scoring range between 0 and 100, with higher scores indicating better self-management capacity. In the present study, the Cronbach's alpha of the reliability coefficient was 0.83.

Comorbidity was measured by the Charlson Comorbidity Index (CCI). This tool was translated into Thai version by Utriyaprasit.³¹ The CCI score included 19 different medical conditions and each comorbid condition ranges from 1 to 6 points. The CCI was calculated as based on the total points for each comorbidity.

Nutritional status was measured by the nutritional risk screening tool (NRS-2002). This tool was developed by Kondrup et al.³² This tool consists of a nutritional status score based on weight loss, food intake, body mass index (1-3 points), a severity of disease score (1-3 points) and an age adjustment for patients older than 70 years (+1). The total NRS 2002 score ranges from 0 to 7, and a score of ≥ 3 denotes nutritional risk.

Social support was measured with the Multidimensional Scale of Perceived Social Support (MSPSS), which was developed by Zimet et al.³³ and translated into Thai by Tinakon Wongpakaran and Colleagues, while a trial with 152 psychiatric patients had a Cronbach's alpha of the reliability coefficient was 0.87.³⁴ This tool consists of a 12-item scale that assesses the perception of social support from family, friends and a significant other. Each of the three subscales was assessed with four items. Each item was based on a 7-point Likert-type response format ranging from one (very strongly disagree) to seven (very strongly agree). High scores indicated better social support. In the present study, the Cronbach's alpha of the reliability coefficient was 0.80.

The researcher collected data from the primary family caregiver at outpatient clinics. The instrument for data collection was a questionnaire consisting of

two parts as described below. Demographic of primary family caregivers were obtained and included age, sex, marital status and relationship status.

Primary family caregiver support was measured by the Primary Family Caregiver Support Questionnaire. This instrument was developed by the researcher and covers the following five aspects: physical care, symptom management support, psychosocial support, advocating role and health resource accessibility. Scores range from 1 to 5 points, in which high scores indicate that the activity is more consistent than lower scores. In the present study, the CVI value of this instrument was 0.95. In addition, the Cronbach's alpha of the reliability coefficient was 0.93.

Data analysis

Data analyses were conducted by using SPSS software (Version 18, SPSS, Chicago, IL) and AMOS statistical package (version 26.0) and were based on an iterative process of adding significant pathways and removing variables that did not add significantly to the model's fit. The path coefficient and the causal relationship between the variables were tested by SEM.

RESULTS

Patient dimensional factors

The total number of postoperative CRC patients in

this study was 396. More than half of the participants (51.1%) were male. The mean age was 60.58 ± 11.13 years (ranging from 20 to 86 years). Pathological reports classified 3.5% of tumors as Stage I, 14.9% as Stage II, 44.7% as Stage III and 36.9% as Stage IV. Comorbidities were present for 180 participants (45.5%) and mild levels of comorbidity severity were common (36.7%). According to the NRS 2002, there were 265 participants (66.9%) at nutrition risk.

Health-related Quality of Life (HRQoL) of CRC patients

In the EORTC QOL-C30, the overall HRQoL mean score was 49.0 ± 21.9 for the respondents, indicating that the majority of the patients with CRC surgery had a moderate HRQoL. In addition, for the functional scales of the EORTC QOL-C30, the mean score was highest for role functioning (95.3 ± 16.48), followed by cognitive functioning (90.7 ± 15.81), physical functioning (82.3 ± 18.11), emotional functioning (78.6 ± 23.27) and social functioning (67.9 ± 31.37). On the symptom scales, the participants had lower median-symptom scores on fatigue, nausea and vomiting, pain, dyspnoea, insomnia, appetite loss, constipation and diarrhea. Scores for these symptoms were in contrast with financial difficulties, for which the scale showed a higher score in HRQoL with a median score of 33.3 (IQR: 0.0–66.6) (Table 1).

TABLE 1. Health-related quality of life characteristics of CRC patients as based on EORTC QOL-C30 assessment (N=396)

Domains	Range	Mean \pm SD	Median(IQR)
Global health status/QOL	0-100	49.0 \pm 21.9	50.0(33.3-66.6)
Functional scales*			
Physical functioning	0-100	82.3 \pm 18.11	86.7(73.3-93.3)
Role functioning	0-100	95.3 \pm 16.48	100(100-100)
Emotional functioning	0-100	78.6 \pm 23.27	83.3(66.6-100)
Cognitive functioning	0-100	90.7 \pm 15.81	100(83.3-100)
Social functioning	0-100	67.9 \pm 31.37	75.0(50.0-100)
Symptom scales/items**			
Fatigue	0-100	24.4 \pm 17.8	22.0(11.1-33.3)
Nausea and vomiting	0-100	8.3 \pm 18.3	0.0(0.0-0.0)
Pain	0-100	11.9 \pm 17.5	0.0(0.0-16.6)
Dyspnoea	0-100	12.4 \pm 19.3	0.0(0.0-33.3)
Insomnia	0-100	27.7 \pm 34.2	0.0(0.0-33.3)
Appetite loss	0-100	24.1 \pm 32.9	0.0(0.0-33.3)
Constipation	0-100	12.5 \pm 24.2	0.0(0.0-33.3)
Diarrhea	0-100	15.5 \pm 27.6	0.0(0.0-33.3)
Financial difficulties	0-100	42.1 \pm 39.0	33.3(0.0-66.6)

IQR, inter-quartile range

* Higher score on functional scale indicates a better level of functioning

** Higher score on symptom scale indicates a higher degree of symptoms

Postoperative complications

One hundred and twenty-three participants (31.1%) had one or more of the complications. Among these participants, 102 (25.8%) had less severe complications (grade I to II), whereas 21 participants (5.3%) had severe complications (grade \geq III). The mean CCI of participants with the complication severity was 20.8 ± 9.5 . In the complications group, postoperative complications were highest in the first week after discharge 66 (55.5%) and declined steadily by the second, third and fourth weeks to 27 (22.7%), 11 (9.2%), and 4 (3.4%) respectively. The most frequent complications were wound infections (12.6%).

Description of the study variables

The mean score for self-management capacity was 60.61 ± 0.71 . Most of the participants (66.6%) reported a Level ≥ 3 self-management capacity at six weeks following hospital discharge. Each factor in healthcare service following CRC surgery was analyzed, and it was found that the mean scores for symptom management support, skill-training service, psychosocial support, treatment accessibility, continuity of information, continuity of management, continuity of relationship and service effectiveness were 2.90 ± 0.90 , 1.48 ± 0.83 , 2.15 ± 0.89 , 3.80 ± 0.65 , 4.06 ± 0.80 , 3.93 ± 0.81 , 3.98 ± 0.79 and 4.06 ± 0.55 , respectively. Moreover, the total mean score of social support was 60.04 ± 12.18 . Participants had the highest degree of support from their families (25.73 ± 3.41). The primary family caregiver support score was frequently measured in terms of five domains, namely, the mean scores on the physical care, symptom management support, psychosocial support, advocate role and health resource accessibility domains. Scores in these domains were based on frequently performed activities and were evaluated as 3.51 ± 0.80 , 3.45 ± 1.11 , 3.81 ± 0.91 , 3.29 ± 1.61 , and 3.67 ± 0.98 , respectively (Table 2).

Model of follow-up care following CRC surgery

Following discharge, 80.1% of the participants received follow-up at the outpatient clinic only. The participant visits (40.4%) at the clinic tended to occur 8-to-14 days after their discharge. The median number of follow-up appointments within a sixweek period was 3 (IQR, 2 to 4). As regards clinic follow-up visits, participants (48.6%) received follow-up care from a general surgeon, a medical oncologist and a registered nurse, inclusively. In addition, thirty-two participants (8.1%) received both outpatient-clinic visits and telephone follow-up calls. The median time to the telephone follow-up calls was 22.5 days (IQR, 22.5 to 30.7). Of 32 participants, 19 (59.4%)

received a telephone call from their oncology specialist nurses and follow-up care by a general surgeon, a medical oncologist and a registered nurse. Forty participants (10.1%) received home visits, in addition to outpatient-clinic follow-up. The majority of the first home visits (62.5%) occurred within 1 to 7 days, and the median time to first home visits was 7 days (IQR, 7 to 14). Most home visits were provided by a registered nurse from the local sub-district health promotion hospital (42.5%). In addition, the majority of participants (90%) received a follow-up care model from their general surgeons, medical oncologists and registered nurses.

Relationship between study variables and HRQoL

The structure equation model was implemented to examine the effects of follow-up care, healthcare service after CRC surgery, postoperative complications, primary family caregiver support, social support, self-management capacity and patients' dimensional factors (age, co-morbidity, nutrition status and stage of cancer) on HRQoL in a hypothesized model by using the AMOS statistical package (version 26.0). Table 3 presents the hypothesized model which did not fit with the empirical data and the poor goodness-of-fit coefficient. Therefore, the hypothesized model (Fig 1) was revised by deletion of non-significant paths between variables and the addition of paths, as indicated by modification and GFI indices. Fig 2 shows the paths leading from co-morbidity, social support, follow-up outpatient clinic, follow-up outpatient clinic and telephone visit, follow-up outpatient clinic and a home visit to both HRQoL and postoperative complication, which were deleted in the final model. Inspection of the modification indices suggested that the path of nutrition status to social support would lead to an improvement of the model with a better fit than the hypothesized model. In addition, the covariance parameters should be placed between e3 and e5, and between healthcare service after CRC surgery and the follow-up outpatient clinic. The final modified model has an adequate fit ($\chi^2=40.347$ (df=28, $p=0.062$), GFI=0.980, CFI=0.959, RMSEA=0.033) without the input of correlated error measurements of observed variables (Table 3).

The final model is shown in Fig 2 and Table 4. Age ($\beta = -0.12$, $P < 0.05$), stage of cancer ($\beta = 0.13$, $P < 0.01$), self-management capacity ($\beta = -0.12$, $P < 0.05$), healthcare service after CRC surgery ($\beta = -0.14$, $P < 0.01$) and postoperative complication ($\beta = 0.23$, $P < 0.01$) had direct effects on HRQoL. Nutritional status ($\beta = 0.04$, $P < 0.01$), creation of stoma ($\beta = 0.03$, $P < 0.01$), healthcare service after CRC surgery ($\beta = -0.07$, $P < 0.01$) and follow-up outpatient clinic ($\beta = -0.03$, $P < 0.01$) had indirect effects on HRQoL

TABLE 2. Self-management capacity, healthcare service, social support and primary family caregiver support after CRC surgery of patients with CRC surgery (N=396)

Scale items	Number (%)	Range	Mean (SD)
Self-management capacity			
Level 1 (score ≤47.0)	74(18.7)		
Level 2 (score 47.1–55.1)	58(14.7)		
Level 3 (score 55.2–67.0)	132(33.3)		
Level 4 (score ≥67.1)	132(33.3)		
Mean=60.61, SD=0.71, range=25.70–100			
Healthcare service after CRC surgery			
Symptom management support		1-5	2.90 (0.90)
Skills training service		1-5	1.48(0.83)
Psychosocial support		1-5	2.15(0.89)
Treatment accessibility		1.75-5.00	3.80(0.65)
Continuity of information		1-5	4.06(0.80)
Continuity of management		1-5	3.93(0.81)
Continuity of the relationship		1-5	3.98(0.79)
Effectiveness of the service		2.20-5	4.06(0.55)
Social support			
Family		4-28	25.73(3.41)
Friends		4-28	15.16(8.11)
Significant other		4-28	19.16(5.18)
Total score of social support		24-84	60.04(12.18)
Level of perceived social support			
Low		75(18.9)	
Moderate		201(50.8)	
High		120(30.3)	
Primary family caregiver support			
Physical care		1.17-5.00	3.51(0.80)
Symptom management support		1-5	3.45(1.11)
Psychosocial support		1-5	3.81(0.91)
Advocate role		1-5	3.29(1.61)
Health resources accessibility		1-5	3.67(0.98)

SD, standard deviation

TABLE 3. Statistical fitted index values of hypothetical model and final modified model (N=396)

	$\chi^2(df)$	χ^2/df	GFI	CFI	RMSEA	SRMR
Hypothetical model	1056.991 (df = 58,	18.22 P<0.001)	0.842	0.194	0.209	3.670
Final modified model	40.347 (df = 28,	1.44 P=0.062)	0.980	0.959	0.033	3.570

Abbreviations: df degree of freedom; GFI goodness of fit index; CFI comparative fit index; RMSEA root mean square error of approximation; SRMR standardized root mean square residual

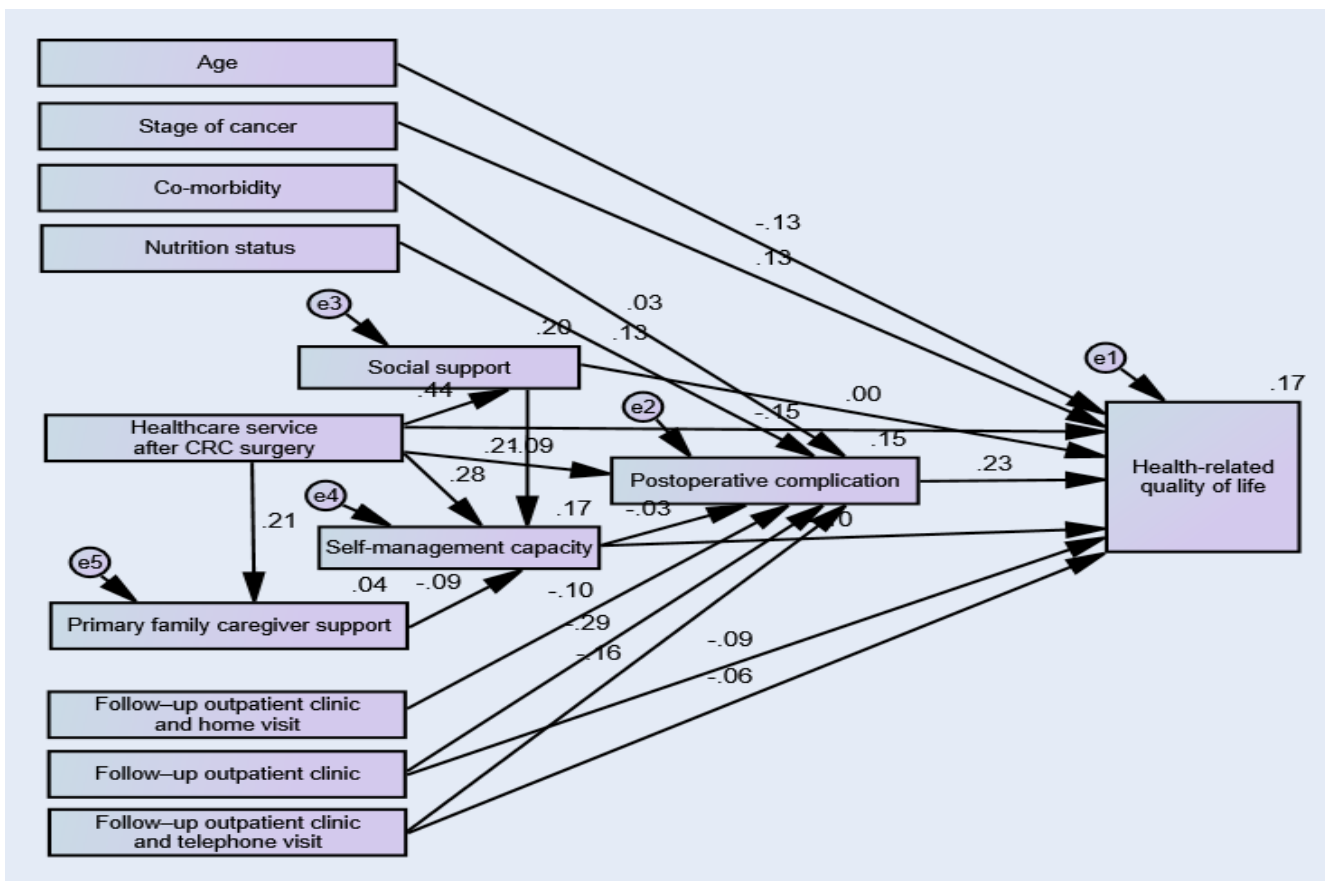


Fig 1. Hypothesized model: relationships between model of follow-up care, healthcare service after CRC surgery, postoperative complication, primary family caregiver support, social support, self-management capacity, patients' dimensional factors and HRQoL in hypothetical model.

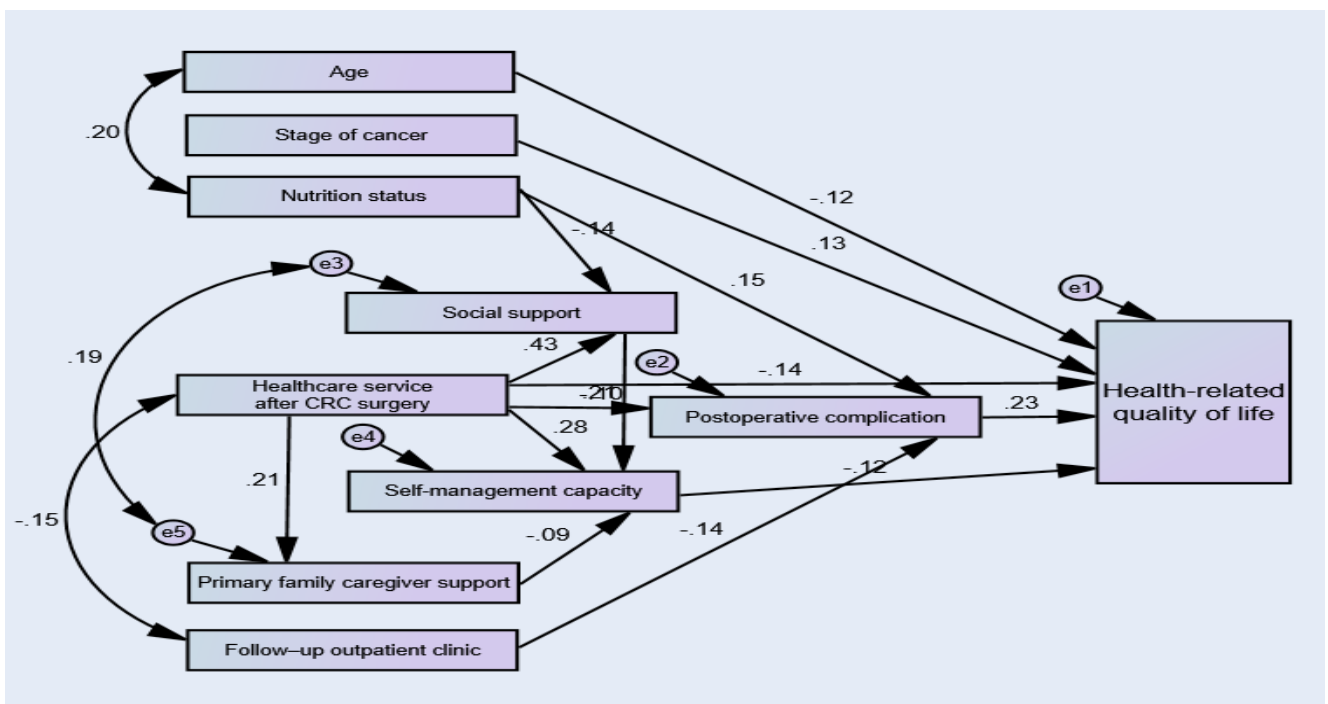


Fig 2. Final modified model: relationships between model of follow-up care, healthcare service after CRC surgery, postoperative complication, primary family caregiver support, social support, self-management capacity, patients' dimensional factors and HRQoL in final modified model.

TABLE 4. Direct effect, indirect effect, and total effect of study variables in the final modified model.

Endogenous (dependent) variable	Exogenous (independent) variable	Direct effect	Indirect effect	Total effect
HRQoL	Age	-0.12*	-	-0.12*
	Stage of cancer	0.13**	-	0.13**
	Postoperative complication	0.23**	-	0.23**
	Healthcare service after CRC surgery	-0.14**	-0.07**	-0.21**
	Self-management capacity	-0.12*	-	-0.12*
	Follow-up outpatient clinic	-	-0.03**	-0.03**
	Primary family caregiver support	-	0.01*	0.01*
	Social support	-	-0.02*	-0.02*
	Nutrition status	-	0.04**	0.04**
Postoperative complication	Follow-up outpatient clinic	-0.14**	-	-0.14**
	Nutrition status	0.15*	-	0.15*
	Healthcare service after CRC surgery	-0.10*	-	-0.10*
Self-management capacity	Social support	0.21**	-	0.21**
	Healthcare service after CRC surgery	0.28**	0.07**	0.35**
	Primary family caregiver support	-0.09*	-	-0.09*
Social support	Healthcare service after CRC surgery	0.43**	-	0.43**
	Nutrition status	-0.14**	-	-0.14**
Primary family caregiver support	Healthcare service after CRC surgery	0.21**	-	0.21**

*p<0.05, **p<0.01, ***p<0.001

through the postoperative complications. Moreover, social support ($\beta = -0.02$, $P < 0.05$), primary family caregiver support ($\beta = 0.01$, $P < 0.05$) and healthcare service after CRC surgery ($\beta = -0.07$, $P < 0.01$) had indirect effects on HRQoL through self-management capacity.

DISCUSSION

This study provides a comprehensive model for postoperative CRC survivors that illustrates the relationships among the model of follow-up care, healthcare service following CRC surgery, severity of complication, primary

family caregiver support, social support, self-management capacity, patients' dimensional factors and HRQoL in patients undergoing CRC surgery. Postoperative complications were shown to have a significant direct effect on HRQoL, while nutritional status, healthcare service following CRC surgery and the follow-up outpatient clinic were shown to have a significant indirect effect through postoperative complications. This result may indicate that 123 (31.1%) participants developed one or more postoperative complications. The most frequently encountered complications were wound infections (16.9%). A previous study found that patients with postoperative complications have poorer HRQoL and suffer from pain, insomnia and problems eating than patients without complications.³⁵ The results of this study show that nutritional status ($\beta=0.15$, $P<0.05$) had significant positive direct effects on postoperative complications, possibly because the prevalence of participants at malnutrition was 269 (66.9%). Malnutrition was an independent risk factor for anastomotic leakage, wound dehiscence and wound infection following CRC surgery.³⁶ The finding revealed that comorbidities did not have significant direct or indirect effects on HRQoL. A possible reason for this finding is that the participants (54.5%) had no comorbidities. In addition, 36.7 percent of the participants had mild comorbid severity. As a result, comorbidity had no significant direct effect on postoperative complications.

Not surprisingly, this study showed that the type of follow-up outpatient clinic has a direct effect on postoperative complications. This result might be because postoperative complications were highest in the first week following hospital discharge (55.5%). Visits from participants (40.4%) at the clinic tended to occur from 8 to 14 days after discharge. Of the patients who made follow-up visits at the clinic, most (48.6%) received follow-up care from a general surgeon, a medical oncologist and a registered nurse. According to a previous study, shorter waiting times from symptom onset following discharge to first contact with health-care professionals increased quality of life.¹⁴ As a result of the healthcare service they received following their CRC surgeries, the majority of the participants reported good service in the areas of treatment accessibility, continuity of information, continuity of management, continuity of relationship and effectiveness of services provided. As previously reported, continuity of care was significantly associated with an improvement in physical functioning, role functioning, general health and emotional functioning.³⁷ Accordingly, the results show that the healthcare service received after CRC surgery had a significant direct effect on HRQoL.

Although several studies revealed that the follow-up outpatient clinics and telephone visits, as well as follow-up home visits, have a direct effect on HRQoL^{38,39}, these actions were not shown to have a statistically significant direct effect on HRQoL in this study, but merely mediated the ensuing post-operative complications. As regards telephone follow-ups, a possible reason for this finding is that the median time to the first discharge call was 22.5 days (IQR, 22.5 to 30.7). During each phone call, a nurse would assist the patient in coordinating his/her appointments, as well as chemotherapy treatments, and in dealing with possible side-effects. Acher et al. (2017) suggested that a telephone follow-up within 48 to 72 hours after discharge with continued calls every three to four days can identify early health problems and social difficulties before patients enter a critical stage, thereby reducing postoperative complications.⁴⁰ As regards home visits, the median time to the first home visit was seven days. However, the participants reported the lowest median score on the subject of management continuity, thereby indicating very poor continuity of management in surgical-wounds care. This result may have been influenced by the average distance of 47.95 kilometers from a village to a hospital providing treatment. Thus, the participants would need to use public transportation in order to access medical care.⁴¹

Self-management capacity was shown to have a significant relationship with HRQoL. The participants who reported higher self-management capacity perceived a higher HRQoL. One possible reason for these findings was that the majority of the participants (66.6%) reported level ≥ 3 self-management capacity during their postoperative periods, a level indicating that the majority of the participants felt confidence in managing their health and were ready to make behavioral changes as they adopted new behaviors to support their health. These findings were similar to those of previous studies, which found that the patients with higher self-management capacity were at an advantage, since their self-management abilities were significantly and directly related to a greater quality of life and better overall health status.⁴²

Social support is an important factor in Thai society.⁴³ In this study, the participants with higher social support had higher self-management capacity, possibly because the participants had the highest degree of support from their families (25.73 ± 3.41). The social environment is an important determinant for the ability of patients with CRC in their efforts to cope with stressful situations during times of illness. Previous literature has indicated

that patients with high levels of social support had 2.23 times higher levels of self-management capacity than individuals reporting low levels of social support.⁴⁴ Another important factor that had significant, positive, direct effects on self-management capacity in this study was primary family caregiver support. This result may have come about because most caregivers (52.9%) were in a spousal or partnered relationship with the patients. In Thai culture, the primary family caregivers normally played significant roles in looking after their older relatives, especially when they were sick.⁴⁵ Accordingly, the participants in this study were more advanced in age, resulting in a higher HRQoL. When considering the primary family caregiver support, most family caregivers often arranged for the patients to receive sufficient food. As regards psychosocial support, the family caregivers often provided support to the patients and thus bolstered their efforts to manage their own health problems. In this way, the caregivers gave their patients the perception that they were their own health supporters and helped them to meet with their peers and neighbors. Furthermore, caregivers often provided health resource accessibility. Therefore, higher family caregiver support is significantly associated with a higher level of patient self-management.⁴² Therefore, the caregivers played significant roles in looking after their older relatives, especially when they were sick (Subgranon & Lund 2000, Jullamate et al. 2007 the participants in this study had a higher age level leading to higher HRQoL.

CONCLUSION

From the results of this study, it was found that CRC patients suffer mostly from postoperative complications during the early phase. For that reason, the health service system, which is intended to promote the HRQoL of CRC survivors, should address this situation by selecting the most effective models of follow-up care. Especially in cases of malnutrition, there needs to be early efforts underway to prevent complications, together with clinical-practice guidelines and adequate healthcare service following CRC surgery. Only in this way will it be possible to provide the specific follow-up care that needs to be developed in order to support improved HRQoL of CRC survivors.

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