# Medicine®

# Colorectal patients' readiness for hospital discharge following management of enhanced recovery after surgery pathway
## A cross-sectional study from China

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**Abstract**

The aim of this study was to ascertain the status quo of perceived readiness for hospital discharge in colorectal cancer patients who underwent enhanced recovery pathway and identify the variables that affect patients' perceptions about their readiness for discharge.

A cross-sectional survey was conducted in West China Hospital, Sichuan University. The Readiness for Hospital Discharge Scale and the Quality of Discharge Teaching Scale were delivered to 130 colorectal cancer (CRC) patients who underwent enhanced recovery pathway. Data collection was carried out 4 hours before discharge.

The total score of readiness for hospital discharge was 149.86 ± 33.65. The multiple linear regression analysis revealed that the quality of discharge teaching, discharge to a rehabilitative institution were associated with the readiness for hospital discharge.

The level of CRC patients' readiness for hospital discharge needs to be improved. Medical staff should improve the quality of discharge guidance and pay more attention to patients transferred to rehabilitation institutions when they leave hospital.

**Abbreviations:** CRC = colorectal cancer, ERAS = enhanced recovery after surgery, QDTS = Quality of Discharge Teaching Scale, RHDS = Readiness for Hospital Discharge Scale.

**Keywords:** cancer, colorectal surgery, enhanced recovery after surgery, readiness for hospital discharge

## 1. Introduction

Colorectal cancer is one of the most common malignancies worldwide.[1] Following surgery for colorectal cancer, patients frequently stay in hospital for 10 to 14 days.[2] Over the past few decades, modern approaches and efforts focusing upon enhanced recovery after surgery (ERAS) improved outcome and reduced hospital stays.[3] ERAS program was proposed by Doctor Kehlet in 1997.[4] ERAS is a series of evidence based on perioperative treatment to reduce the stress of the patients both physically and psychologically, and has been widely adopted in many countries.[5,6]

In China, ERAS was introduced into colorectal units in 2007. It has been proved that ERAS was associated with more effective treatment, less post-operative complications, accelerated rehabilitation, and decreases hospital stay.[7,8] Under ERAS pathway, patients with colorectal cancer could discharge from hospital with an average of 6 days after operation.[9] However, there are concerns that shortening patients' length of stay may mean less time to prepare patients, their families, and health care professionals for discharge.

Readiness for hospital discharge refers to the ability of patients and their family members to cope in the community after transitioning from an acute care hospital.[10] To date, several studies are available in international literature that concern readiness for hospital discharge among puerpera,[11] hospitalized children,[12] and older people.[13] Studies on readiness for discharge have revealed that it affects patient outcomes such as readmission,[14,15] mortality,[16] and emergency department (ED) visits.[17] However, few researches had reported readiness for hospital discharge with ERAS pathways and none has ever been performed in China. Thus, the aim of this study was to ascertain the status quo of perceived readiness for hospital discharge of colorectal cancer patients who underwent enhanced recovery pathway and identify the variables that affect patients' perceptions about their readiness for discharge.

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## 2. Materials and methods

### 2.1. Study design

A cross-sectional survey was conducted in West China Hospital of Sichuan University between November 2017 and March 2018. The target patient population was included according to the inclusion criteria:

(a) 18 years and older;
(b) diagnosed with colorectal cancer;
(c) patients who underwent enhanced recovery pathways for colorectal cancer surgery.

Those who underwent exploratory surgery, died during the hospital admission, unconsciousness, combined with severe chronic diseases or mental disorders were excluded from the study.

### 2.2. Variables and instruments

#### 2.2.1. Patient characteristics.
Social demographic data such as age, sex, education, marital status, occupational state, family income per month, medical insurance, distance between home and hospital were collected by a self-designed general information questionnaire. Health related information, including preoperative comorbidity, tumor location, surgical approach, stoma, the place after discharge, were obtained using HIS medical record system.

#### 2.2.2. Readiness for hospital discharge.
Perception of readiness was measured using the Readiness for Hospital Discharge Scale (RHDS).[18,19] Adult Form is a 23-item questionnaire which contains 1 single-item question "are you ready to go home as planned?" with a dichotomous yes/no response. The remaining 22 items are divided into 4 dimensions (personal status, knowledge, coping ability, and expected support) and scored on an 11-point scale (0–10) with anchor words (e.g., "not at all," "totally") to cue the subject to the meaning of the numeric scale. Higher scores indicate greater readiness. The Cronbach's alpha reliability coefficient for the total RHDS – Adult Form scale (items 2–23) was reported to be 0.93. The RHDS was translated and culturally adapted into Chinese by Xianqiong Feng in 2015.[20] In this present study, Cronbach's alpha coefficient results were 0.929 for the total scale and 0.824 to 0.901 for each dimension.

#### 2.2.3. Quality of discharge teaching.
Quality of discharge teaching was measured using the Quality of Discharge Teaching Scale (QDTS).[19] QDTS is a 18-item questionnaire that uses a 0 to 10 point response format. It explores 3 areas of patient perceptions of their discharge teaching: content needed (items 1a–6a), content received (items 1b–6b), and the delivery of discharge teaching (items 7–18). The Content Needed dimension measures how much information patients thought they needed before discharge and is used for comparison with the Content Received dimension, which is a measure of how much they actually received. The Delivery dimension reflects the skill of the nurses as educators in presenting discharge teaching. The total scale, calculated as the sum of Content Received and Delivery dimension, can be considered both a measure of receiver characteristics of nursing process and the outcome of the nursing process of discharge teaching. The QDTS was translated into Chinese by Hui Wang in 2017. The content validity index of the total scale is 0.98. Cronbach's alpha coefficient results were 0.924 for the total scale and 0.882 to 0.935 for each dimension.

### 2.3. Data collection

After being reviewed by the hospital ethics committee, trained study research assistants accomplished informed consent process and arranged patients to fill in the paper-based questionnaires within 4 hours before discharge, including general information questionnaire, RHDS, and QDTS. In order to ensure the quality of the questionnaire, a unified guidance is used to introduce the requirements. The investigators check these questionnaires and verify the information in case of missing or obvious logical errors. When necessary, information was retrieved from the hospital information system to ensure the authenticity of data.

### 2.4. Statistical analysis

The collected data were analyzed with SPSS version 17.0. Participants' characteristics were described using frequency, mean, standard deviation. Independent sample $t$ test or one-way ANOVA were used to compare patients' readiness for discharge with respect to patient characteristics, depending on whether the variable is 2 or more categorization. Relationship between QDTS and RHDS was analysed with Pearson correlation analysis. A multiple linear regression analysis was used to determine the factors affecting the readiness for discharge. The variables included in the multivariate analysis were those with significance levels of $P < .05$ based on a univariate analysis and variables that may affect the readiness for discharge from a professional perspective.

## 3. Results

### 3.1. Outcomes of RHDS and QDTS

A total of 130 patients were enrolled. 80% of patients reported being ready to go home on a single-item yes/no format question. The total score of RHDS and QDTS was 149.86 ± 33.65 and 140.24 ± 29.04, respectively. The scores of each dimension were shown in Tables 1 and 2. Pearson correlation analysis showed

**Table 1**

The score of readiness for hospital discharge scale of samples.

| Dimension | Number of items | Actual score (M ± SD) | Average score of the item (M ± SD) | Ranking |
|---|---|---|---|---|
| RHDS | 22 | 149.86 ± 33.65 | 6.81 ± 1.53 | – |
| Expected support | 4 | 32.82 ± 6.13 | 8.20 ± 1.53 | 1 |
| Coping ability | 3 | 20.20 ± 6.23 | 6.73 ± 2.08 | 2 |
| Knowledge | 8 | 53.47 ± 15.59 | 6.68 ± 1.95 | 3 |
| Personal status | 7 | 43.38 ± 12.45 | 6.20 ± 1.78 | 4 |

Note. M = mean; RHDS = readiness for hospital discharge scale; SD = standard deviation.

**Table 2**

The score of quality of discharge teaching scale of samples.

| Dimension | Number of items | Actual score (M ± SD) | Average score of the item (M ± SD) | Ranking |
|---|---|---|---|---|
| QDTS | 18 | 140.24 ± 29.04 | 7.79 ± 1.61 | – |
| Content needed | 6 | 49.61 ± 9.75 | 8.27 ± 1.63 | 1 |
| Delivery | 12 | 96.42 ± 20.04 | 8.04 ± 1.67 | 2 |
| Content received | 6 | 43.82 ± 10.85 | 7.30 ± 1.81 | 3 |

*Note.* M = mean; SD = standard deviation; QDTS = quality of discharge teaching scale.

that the total score of RHDS was positively correlated with the total score of QDTS ($r = 0.499$, $P < .001$).

### 3.2. Patients' readiness for discharge with respect to their characteristics

Table 3 showed patients' scores of readiness for discharge with respect to their characteristics. There were differences of patients' readiness for discharge with respect to different marital status and whether discharge to a rehabilitative institution ($P < .05$). Besides, Pearson analysis was performed to examine the correlation between length of stay (LOS) and discharge readiness. In our study, the post-operative hospital stay ranged from 5 to 8 days. There was no correlation between length of stay and discharge readiness ($r = 0.050$, $P = .533$).

### 3.3. Variables affecting readiness for discharge

Multiple linear regression was performed with the total score of RHDS as dependent variable. The independent variables in the multivariate analysis included the total score of QDTS, marital status, whether discharge to a rehabilitative institution, and other variables that may affect the readiness for discharge from a professional perspective. The assignments of the independent variables were shown in Table 4. The multiple linear regression analysis revealed that the total score of QDTS, discharge to a rehabilitative institution were associated with the readiness for hospital discharge ($P < .05$), showed in Table 5.

## 4. Discussion

Colorectal surgery requires a great deal of health resources.[21,22] In order to control medical costs, attention has been focused on accelerating post-operative recovery.[23] In the context of existing studies describing the benefits of ERAS in colorectal resection areas, it is essential to clarify the clinical impact of ERAS on readiness for hospital discharge. The aim of this study was to ascertain the status quo of perceived readiness for hospital discharge of colorectal cancer patients who underwent enhanced recovery pathway and identify the variables that affect patients' perceptions about their readiness for discharge. A patient's readiness for discharge can be estimated by the patient themselves, caregiver, or other family members.[18] The reason for assessing patient-reported readiness rather than caregiver, or other family member was that the patient's perceived readiness for discharge is the best representation of the patient's reality.

Perception of readiness for discharge has been examined by Weiss et al using a sample of adult medical-surgical patients (n = 135) over 18 years of age.[19] Weiss concluded from his studies that when asked whether to be ready to go home, 93% of patients reported yes. And the subjects investigated reported that they felt reasonably ready for discharge (RHDS item mean = 8.0, SD =

0.9). While in our research, only 80% of samples reported being ready to go home. The total score and item mean of RHDS were 149.86 ± 33.65 and 6.81 ± 1.53, respectively. The results revealed that following ERAS pathway, colorectal cancer (CRC) patients' readiness for hospital discharge was at a moderate level in China. ERAS for colorectal surgery was implemented in China in 2007, obviously later than the western countries. Besides that, the community health resources are limited. In China, Community Health Centers (CHCs) are facing many problems in delivering their services, attributable to the different speeds of development among centers, lack of resources, and imbalance in the sizes of CHCs, so it is difficult for them to meet citizens' needs.[24] Although the concept of ERAS optimized perioperative treatment and nursing measures, the health management of patients after discharge is still not standardized. Based on these situations, patients may worry that early discharge will be difficult to deal with, such as malnutrition, wound infection, and stoma. In case of emergency, patients and their families expect to observe more days in the hospital, and are not willing to discharge subjectively. This may be the reason for the moderate ready for discharge in our study.

Items in RHDS scoring ranking from high to low were expected support, coping ability, knowledge, and personal status. Personal status dimension had the lowest score. The possible reason is that for the colorectal surgery patients receiving ERAS management, they can be discharged after reaching the discharge pointer, including the recovery of food solid food, no venous rehydration, oral analgesics can be well analgesic, and can freely move to the bathroom. However, the patient's strength, energy, and self-care ability have not been fully restored at this time, which leads to the patient's subjective opinion that he is not in good condition and is not suitable for discharge. This suggested that it is necessary to develop an appropriate discharge criteria based on the safety of patients and in consideration of patients' readiness for hospital discharge. Discharge may take place as soon as the patient has adequate post-discharge support and is willing to leave the hospital. In clinical practice, ERAS should adhere to the principle of safety first and efficiency second, so as to ensure the healthy and orderly implementation of ERAS.

Our research revealed that discharge to a rehabilitative institution was associated with the readiness for hospital discharge. Patients who returned to home directly had better readiness for hospital discharge when compared to those who were transferred to the rehabilitation facility. The probable cause is that patients transferred to rehabilitation institutions after discharge are generally in relatively poor physical condition, suggesting that subsequent treatment programs will be more complex. The patients' fear of prognosis, coupled with limited role function, has reduced the perception of the patient's readiness to discharge. On the contrary, samples who chose to go home directly were more confident in their rehabilitation

**Table 3**

**Patients' readiness for discharge with respect to their characteristics.**

| Characteristics | Classification | N | Total score of RHDS (M ± SD) | F/t | P |
|---|---|---|---|---|---|
| Age, yr | 18–44 | 14 | 137.14 ± 27.67 | 0.958[a] | .415 |
| | 45–59 | 47 | 150.53 ± 33.93 | | |
| | 60–74 | 48 | 149.94 ± 32.32 | | |
| | ≥75 | 21 | 156.67 ± 39.24 | | |
| Sex | Male | 63 | 148.56 ± 34.15 | −0.428[b] | .670 |
| | Female | 67 | 151.09 ± 33.38 | | |
| Education | Primary school and below | 30 | 152.30 ± 29.38 | 1.110[a] | .348 |
| | Junior middle school | 32 | 155.38 ± 40.26 | | |
| | High school /secondary school | 22 | 153.41 ± 32.05 | | |
| | College and above | 46 | 142.74 ± 31.78 | | |
| Marital status | Unmarried | 3 | 117.33 ± 15.57 | 3.078[a] | .049 |
| | Married | 109 | 148.50 ± 33.20 | | |
| | Others | 18 | 163.56 ± 34.12 | | |
| Occupational state | On the job | 43 | 142.51 ± 32.95 | 1.585[a] | .209 |
| | Retirement | 51 | 154.33 ± 34.66 | | |
| | Others | 36 | 152.31 ± 32.45 | | |
| Family income per month, RMB | <1000 | 16 | 128.56 ± 35.78 | 2.072[a] | .088 |
| | 1000–2999 | 33 | 155.94 ± 31.32 | | |
| | 3000–4999 | 42 | 153.12 ± 34.26 | | |
| | 5000–9999 | 22 | 148.18 ± 30.18 | | |
| | ≥10,000 | 17 | 152.24 ± 34.58 | | |
| Medical insurance | No | 39 | 156.67 ± 28.80 | 1.517[b] | .132 |
| | Yes | 91 | 146.95 ± 35.27 | | |
| Distance between home and hospital, km | <1 | 13 | 159.15 ± 28.25 | 0.387[a] | .762 |
| | 1–4.9 | 29 | 148.24 ± 30.31 | | |
| | 5–10 | 25 | 147.56 ± 42.23 | | |
| | >10 | 63 | 149.60 ± 32.78 | | |
| Ways of living | Living alone | 7 | 142.86 ± 34.94 | 1.207[a] | .311 |
| | Living with spouses | 69 | 148.33 ± 32.31 | | |
| | Living with children | 16 | 166.38 ± 33.94 | | |
| | Living with spouses and children | 33 | 147.97 ± 33.98 | | |
| | Others | 5 | 140.40 ± 44.93 | | |
| Preoperative comorbidity | No | 43 | 147.56 ± 31.25 | 0.205[a] | .815 |
| | 1–2 | 55 | 150.07 ± 36.22 | | |
| | ≥3 | 32 | 152.59 ± 32.98 | | |
| Tumor location | Rectum | 92 | 150.15 ± 35.42 | 0.153[b] | .879 |
| | Colon | 38 | 149.16 ± 29.36 | | |
| UICC classification | Stage I | 23 | 140.61 ± 36.76 | 0.832[a] | .479 |
| | Stage II | 48 | 150.77 ± 25.28 | | |
| | Stage III | 49 | 153.82 ± 38.26 | | |
| | Stage IV | 10 | 147.40 ± 38.28 | | |
| Surgical approach | Laparoscopy | 48 | 152.53 ± 28.24 | 0.688[b] | .493 |
| | Open | 82 | 148.30 ± 36.52 | | |
| Stoma | Yes | 34 | 146.18 ± 40.97 | −0.648[b] | .520 |
| | No | 96 | 151.17 ± 30.79 | | |
| Post-operative morbidity | Yes | 12 | 156.41 ± 27.15 | −0.707[b] | .481 |
| | No | 118 | 149.19 ± 34.27 | | |
| Discharge to a rehabilitative institution | No, go home directly | 98 | 154.85 ± 33.05 | 3.050[b] | .003 |
| | Yes | 32 | 134.59 ± 31.23 | | |

*Notes.* M = mean; RHDS = readiness for hospital discharge scale; SD = standard deviation.
[a] *F.*
[b] *t.*

ability after discharge, and had better perception of discharge readiness. Several studies have revealed that discharge readiness affects patient outcomes such as readmission,[14,15] mortality,[16] and emergency department visits.[17] In view of this, we suggested nurses pay more attention to assess patients' readiness before discharge, and help patients and their families to go home smoothly by implementing discharge preparation services. For patients with poor preparation for discharge, a transition can be considered through rehabilitation institutions.

In our study, another variable affecting RHDS was quality of discharge teaching, which was positively associated with discharge readiness. This finding is consistent with previous research findings.[11,19] Discharge guidance is the provision of important medical care information to patients and their families by nurses, doctors, or other medical workers through education or communication. The results in our study indicated that implement of discharge education through discharge planning activities is an important strategy for improving the readiness of patients to discharge.

**Table 4**

**The assignments of the independent variables.**

| Independent variables | Assignment |
|---|---|
| Marital status | Unmarried ($X_1=0$, $X_2=0$); married ($X_1=1$, $X_2=0$); others ($X_1=0$, $X_2=1$) |
| Occupational state | On the job ($X_1=0$, $X_2=0$); retirement ($X_1=1$, $X_2=0$); others ($X_1=0$, $X_2=1$) |
| Distance between home and hospital | <1 km=1; 1–4.9 km=2; 5–10 km=3; >10 km=4 |
| Family income per month, RMB | <1000=1; 1000–2999=2; 3000–4999=3; 5000–9999=4; ≥10,000=5 |
| Preoperative comorbidity | No=1; 1–2=2; ≥3=3 |
| Discharge to a rehabilitative institution | No, go home directly=0; yes=1 |
| Total score of QDTS | Original value input |

*Notes.* QDTS = quality of discharge teaching scale.

**Table 5**

**Results of multiple linear regression of the variables affecting readiness for discharge.**

| Variables | B | β | t | P |
|---|---|---|---|---|
| Marital status | | | | |
|   Married | 28.010 | 0.308 | 1.672 | .097 |
|   Others | 34.952 | 0.360 | 1.927 | .056 |
| Occupational state | | | | |
|   Retirement | 7.787 | 0.113 | 1.225 | .223 |
|   Others | 14.124 | 0.189 | 1.926 | .058 |
| Distance between home and hospital | −0.849 | −0.027 | −0.345 | .731 |
| Family income per month, RMB | 4.690 | 0.168 | 1.958 | .053 |
| Preoperative comorbidity | 0.695 | 0.016 | 0.206 | .837 |
| Discharge to a rehabilitative institution | −20.377 | −0.262 | −3.536 | .001 |
| Total score of QDTS | 0.545 | 0.470 | 6.311 | .000 |

*Notes.* $F=7.938$, $P=.000$, $R^2=0.373$, adjusted $R^2=0.326$. QDTS = quality of discharge teaching scale.

This study had some limitations. Firstly, the samples of this study included those who underwent enhanced recovery pathways for CRC surgery only in 1 hospital in 1 region of Sichuan, and the results may not be generalized to the whole country. Secondly, the sample size of 130 is a relatively low, which may affect the reliability of the results. Besides that, among 130 patient's only 46 patients have college education or above, which may not be exactly applied to a patient population with higher proportion of patients who has college education. Furthermore, a multi-center, large-sample research is necessary prior to widespread conclusion.

## 5. Conclusions

This study revealed that following ERAS pathway, CRC patients' readiness for hospital discharge was at a moderate level in our hospital. The quality of discharge teaching, discharge to a rehabilitative institution were associated with the readiness for hospital discharge. According to this study, improving the quality of discharge guidance and paying more attention to patients transferred to rehabilitation institutions after discharge will help improve the discharge readiness.

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## Author contributions

Jie Yang collected and analyzed the data; Yuhua He drafted the manuscript and provided analytical oversight; Ka Li designed, supervised the study, and provided administrative support; Lili Jiang revised the manuscript for important intellectual content; all authors have read and approved the final version to be published.

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