



# Status and associated factors of cross-regional healthcare-seeking among patients with advanced colorectal cancer in China: a multicenter cross-sectional study

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**Background:** The imbalanced allocation of medical resources leads to the occurrence of cross-regional healthcare-seeking in China. Due to the low cure rate, advanced colorectal cancer (CRC) patients may seek cross-regional healthcare for high-level medical facilities. Investigating status of cross-regional healthcare-seeking and its associated factors among advanced CRC patients is important for policymakers to understand access to health services and improve the quality of oncology services.

**Methods:** From March 2020 to March 2021, a cross-sectional, nation-wide, hospital-based, multi-center survey was conducted. Nineteen hospitals in seven regions were selected by multi-stage stratified sampling.

All eligible CRC patients in the selected hospitals were invited to participate in the current study. The outcome variable, cross-regional healthcare-seeking, was defined as seeking health facilities outside the local administration policy of medical insurance. The demographics, clinical information, and medical treatment history of each eligible CRC patient in stage III or IV, were collected through the patients' self-reporting or medical records by trained interviewers. Univariate and multivariate logistic analyses were used to explore the associated factors of cross-regional healthcare-seeking. All statistical analyses were conducted using SAS 9.4.

**Results:** A total of 4,589 individuals with advanced CRC were included. The average age of the patients was  $60.1 \pm 11.6$  years, and 59.5% were males. About 37.5% of the patients suffered from metastatic CRC at first diagnosis. Approximately 36.5% of the patients had sought cross-regional health care previously, and among them, 31.9% had encountered problems. The most common problems included complicated procedures (95.3%), unreimbursed expenses of outpatient service (71.0%), and reimbursement delay (59.4%). Logistic regression analysis showed that patients who completed undergraduate or above [odds ratio (OR) =1.40, 95% confidence interval (CI): 1.13–1.73], had an annual household income of more than 100,000 Chinese Yuan (CNY) (OR =1.46, 95% CI: 1.21–1.78), and had metastasis at diagnosis (OR =1.33, 95% CI: 1.18–1.51) were more likely to seek cross-regional health care.

**Conclusions:** About one third of advanced CRC patients seek cross-regional health care, and 31.9% had encountered problems. There is a need to simplify procedures of reimbursement, optimize direct settlement system and referral mechanisms in order to improve the equality of health services.

**Keywords:** Colorectal cancer (CRC); cross-regional healthcare-seeking; cross-sectional study

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## Introduction

The basic medical insurance system of China mainly includes basic medical insurance for urban and rural residents and basic medical insurance for employees (1), forming an almost “medical insurance for all” system. The principle of the system is local administration. That is, individuals need to participate in the basic medical insurance of the local region, with insurance funds being under the unified collection, utilization, and management within the region (2). However, with rapid economic development and accelerated urbanization, cross-regional population movement occurs frequently, resulting in a phenomenon known as cross-regional healthcare-seeking, in which individuals seek health facilities outside the local administration policy of medical insurance (3). The behavior of seeking cross-regional health care encompasses three aspects: across counties, across cities, and across provinces (2). Due to the imbalanced allocation of medical resources between regions in China and individuals' pursuit of quality health services, cross-regional healthcare-seeking is further aggravated (4).

Owing to discrepancies in medical insurance strategies across regions (5), individuals may encounter some difficulties when they seek cross-regional health care, such as complicated administrative approval procedures as well as unfamiliar cross-regional healthcare-seeking processes and reimbursement policies (2,6). To address these problems, the government has adopted measures since 1998, including the disbursement and reimbursement policy released in 2008, the policy of direct settlement of cross-regional healthcare-seeking within the province released in 2015, and the policy of direct settlement of cross-provincial health care in designated medical institutions released in 2020. However, after these reforms, whether the status of cross-regional healthcare-seeking and procedural problems are ameliorated have not been fully studied.

Colorectal cancer (CRC) is one of the common malignant tumors and a serious threat to the health of humans. According to Global Cancer Observatory (GLOBOCAN) 2020 data, it was estimated that about 555,477 new cases of CRC occurred in China in 2020, ranking second among all malignant tumors (7). Although the screening coverage

of CRC has been expanded (8-13), most CRC patients are diagnosed at an advanced stage in China. Compared with patients in the early stage, the 5-year survival rate of patients in the advanced stage decreases significantly (14), with increased difficulties in treatment. The allocation of medical resources in China is imbalanced. High-quality medical resources distributed mainly in eastern provinces, followed by central provinces, with western provinces least (15). In particular, high-quality medical resources in remote areas and rural areas are still in short supply, all of which can lead to cross-regional healthcare sought by CRC patients to pursue a better remedy. Noticeably, patients often face a series of difficulties in the process, such as high self-payment ratio, reimbursement delay, and indirect cost (16). Despite the benefit of the instant reimbursement system of cross-regional medical services, there is a lack of the general implementation of this policy. However, there are limited studies on status of cross-regional healthcare-seeking among cancer patients. In order to understand the current status and associated factors of cross-regional healthcare-seeking among patients with advanced CRC in China, this study was conducted based on a nation-wide multi-center survey. The results are expected to provide evidence for the formulation of CRC prevention and control measures as well as the optimization of cross-regional healthcare-seeking policy in the future. We present the following article in accordance with the SURGE reporting checklist (available at <https://atm.amegroups.com/article/view/10.21037/atm-22-1003/rc>).

## Methods

### *Study design and sites*

From March 2020 to March 2021, a cross-sectional, nation-wide, hospital-based, multi-center survey was conducted in mainland China. Multi-stage stratified sampling was adopted to select the participant hospitals across seven geographic regions (northeastern, northern, northwestern, eastern, central, southern, and southwestern) to ensure a balanced distribution. In stage one, two cities from each region were selected by convenient sampling. In stage two, one tertiary cancer hospital and/or one general hospital were selected from each city. Finally, a total of 19 hospitals (10 tertiary cancer hospitals and nine general hospitals) were selected.

### *Study population*

All eligible CRC patients in the selected hospitals were invited verbally by the interviewer to participate current study. Patients will receive a CRC health knowledge booklet as payment after being surveyed. The inclusion criteria of the study were as follows: (I) CRC patients with stage III or IV disease; (II) patients aged  $\geq 18$  years old; and (III) patients who provided informed consent. Patients were excluded if they had severe physical, cognitive, and/or verbal impairments that would interfere with their ability to complete the questionnaire. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). This research was approved by the independent review board of Henan Cancer Hospital (No. 2019273), and the other 18 hospitals were informed and agreed with the study. Informed consent was taken from all the patients. Staging of CRC was performed according to the 8<sup>th</sup> edition of the American Joint Committee on Cancer (AJCC) tumor-node-metastasis (TNM) staging system.

It has been estimated that there are about 400,000 advanced CRC patients in China (17,18). To ensure the representativeness of the sample, this study was expected to recruit about 1% of the patients. Considering the non-response rate of 10%, more than 4,445 patients would be enrolled into this survey. The sample size of each region was allocated proportionally according to the population density.

### *Data collection*

All of the eligible respondents were interviewed face-to-face using a semi-structured questionnaire by interviewers who were systematically trained before the study was launched. The detailed information included was as follows: (I) basic demographic information including birthdate, gender, occupational situation, marital status, education, and annual household income of patients; (II) clinical information including type of cancer (colon cancer, rectal cancer, and both) and metastasis status at diagnosis; and (III) medical treatment history including information on cross-regional healthcare-seeking (cross-regional healthcare-seeking refers to the health-seeking behavior occurring outside the local administration policy of medical insurance, that is, the medical insured place and the place where the medical expenses occurred are not in the same area), and difficulties

**Table 1** Characteristics of the selected advanced colorectal cancer patients

Variables	No.	%
Age (years), mean $\pm$ SD	60.1 $\pm$ 11.6	
<50	761	16.6
50–64	2,105	45.9
$\geq$ 65	1,723	37.5
Gender		
Male	2,730	59.5
Female	1,859	40.5
Marital status*		
Married	4,318	94.1
Other	270	5.9
Occupations of patients and/or their families*		
Non-healthcare-related	4,017	87.6
Healthcare-related	569	12.4
Education*		
Primary school or below	1,330	29.0
Junior or senior high school	2,522	55.0
Undergraduate or above	734	16.0
Health-care insurance type (multiple response)		
Urban employees basic medical insurance	1,923	41.9
Urban residents basic medical insurance	996	21.7
New rural cooperative medical scheme	1,560	34.0
Critical illness insurance program	249	5.4
Commercial medical insurance	220	4.8
Uninsured	51	1.1
Annual household income of patients (CNY)		
<50,000	2,640	57.5
50,000–99,999	1,293	28.2
$\geq$ 100,000	656	14.3
Metastasis at diagnosis*		
Yes	1,709	37.5
No	2,854	62.6
Type of cancer*		
Colon	2,063	45.0
Rectum	2,470	53.8
Other	55	1.2

\*, some data are missing. SD, standard deviation; CNY, Chinese Yuan.

encountered during cross-regional healthcare-seeking.

### Statistical analysis

In the current analysis, the questionnaire was regarded as complete and was included in the analysis if more than 95% items were filled. Unfilled items were included in the analysis as missing values. Continuous variables conforming to a normal distribution were presented as the mean  $\pm$  standard deviation (SD). Categorical variables were presented as frequency and percentage. The variable “Has the patients ever sought cross-regional healthcare-seeking” was taken as the dependent variable, and factors including age, gender, marital status, occupations of patients and/or their families, education, annual household income of patients, metastasis status at diagnosis, and type of cancer were taken as the potential independent variables. Univariate logistic regression model was used to explore factors related to cross-regional healthcare-seeking, and then the variables with statistical significance in univariate regression analysis were included in the multivariate logistic regression model to determine the independent risk factors related to cross-regional healthcare-seeking. All statistical analyses were performed using SAS 9.4 (SAS Institute, Cary, NC, USA), and the significance level was set to two-sided  $\alpha=0.05$ .

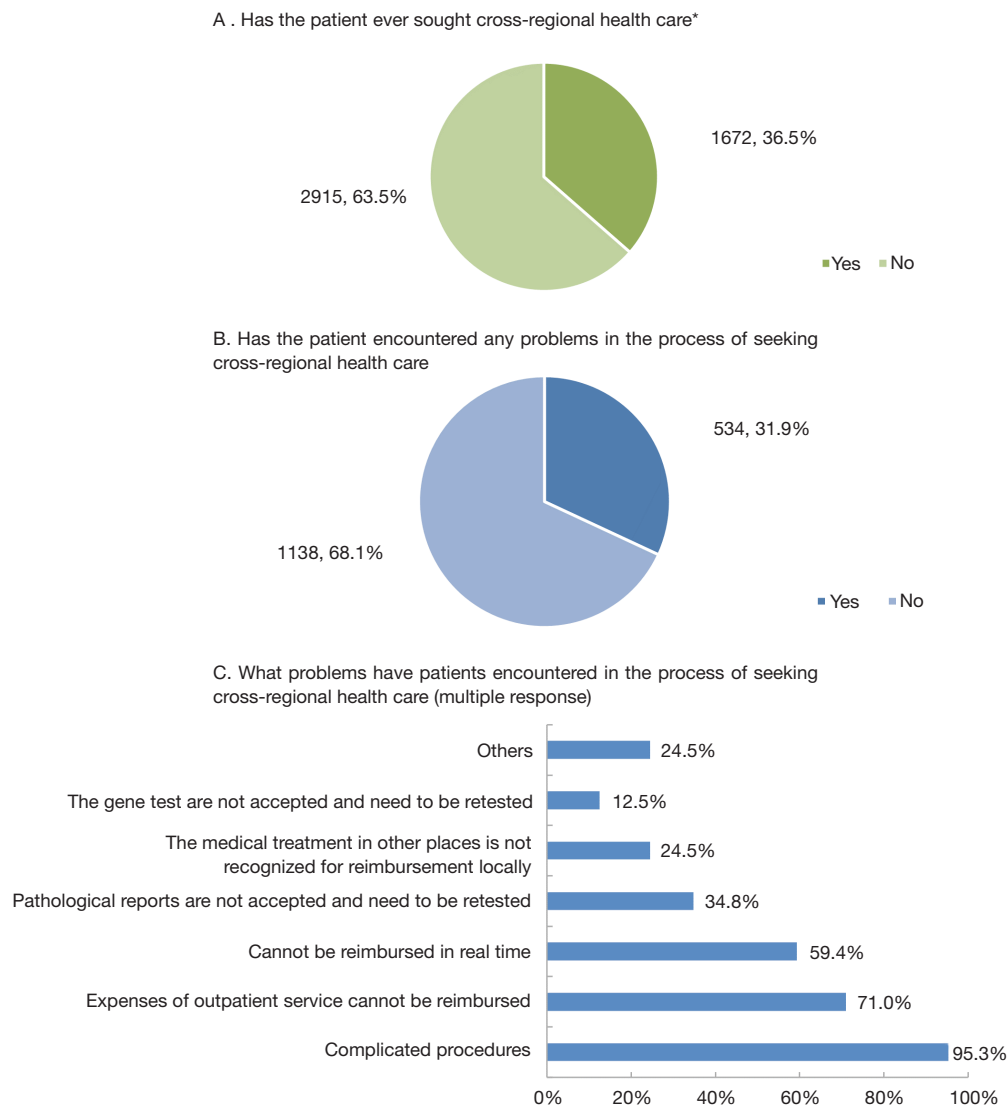
## Results

### Patient characteristics

A total of 4,589 CRC patients in stage III or IV were included in the current analysis. The mean age was 60.1 $\pm$ 11.6 years, with 45.9% of the patients in the 50–64 years age group, 59.5% of the patients were males, and 55.0% completed junior or senior high school. Most of the patients and their families (87.6%) were not engaged in healthcare-related industries. Over 95% of patients had medical insurance, and most of the patients (57.5%) had an annual household income of less than 50,000 Chinese Yuan (CNY). A total of 37.5% of the patients had metastatic CRC at diagnosis, and 53.8% had rectal cancer (Table 1).

### Current situation of cross-regional healthcare-seeking and barriers

More than one-third (36.5%) of the patients had sought cross-regional healthcare-seeking previously, among which



**Figure 1** Current status and difficulties of advanced colorectal cancer patients seeking cross-regional health care. \*, some data are missing.

31.9% had encountered problems. Before seeking cross-regional health care, the most common barrier encountered by patients was the complicated procedures of reporting the cross-regional health-seeking behavior to the local administration system of medical insurance (95.3%). In the process of cross-regional healthcare-seeking, the most confusing problem for patients was that the pathological report in the local region was unacceptable and required re-examination (34.8%). After seeking cross-regional health care, patients also encountered barriers such as expenses for outpatient services, which cannot be reimbursed (71.0%), and reimbursement delays (59.4%). More details are shown

in *Figure 1*.

#### ***Univariate and multivariate analyses of cross-regional healthcare-seeking***

We performed univariate logistic regression analysis, and the results showed that the associated factors of seeking cross-regional health care included age, marital status, education, annual household income of patients, and metastasis status at diagnosis (*Table 2*).

A multivariate logistic regression was further performed to identify the factors associated with cross-regional

**Table 2** Univariate analysis of seeking cross-regional health care in advanced colorectal cancer patients

Variables	Seeking cross-regional health care*		OR (95% CI)	P
	Yes	No		
Age (years)				
<50	358 (47.0)	403 (53.0)	1	–
50–64	835 (39.7)	1,268 (60.3)	0.74 (0.63, 0.88)	<0.001
≥65	441 (27.8)	1,181 (72.2)	0.43 (0.36, 0.52)	<0.001
Gender				
Male	1,025 (37.6)	1,703 (62.4)	1	–
Female	647 (34.8)	1,212 (65.2)	0.89 (0.78, 1.00)	0.056
Marital status*				
Married	1,589 (36.8)	2,727 (63.2)	1	–
Other	82 (30.4)	188 (69.6)	0.75 (0.57, 0.98)	0.033
Occupations of patients and/or their families*				
Non-healthcare-related	1,444 (36.0)	2,571 (64.0)	1	–
Healthcare-related	228 (40.1)	341 (59.9)	1.19 (1.00, 1.43)	0.057
Education*				
Primary school or below	406 (30.5)	924 (69.5)	1	–
Junior or senior high school	923 (36.6)	1,597 (63.4)	1.32 (1.14, 1.52)	<0.001
Undergraduate or above	340 (46.3)	394 (53.7)	1.96 (1.63, 2.37)	<0.001
Annual household income of patients (CNY)				
<50,000	882 (33.4)	1,756 (66.6)	1	–
50,000–99,999	471 (36.4)	822 (63.6)	1.14 (0.99, 1.31)	0.064
≥100,000	319 (48.6)	337 (51.4)	1.89 (1.59, 2.24)	<0.001
Metastasis at diagnosis*				
No	959 (33.6)	1,893 (66.4)	1	–
Yes	701 (41.0)	1,008 (59.0)	1.37 (1.21, 1.55)	<0.001
Type of cancer*				
Colon	760 (36.8)	1,303 (63.2)	1	–
Rectum	887 (35.9)	1,582 (64.1)	0.96 (0.85, 1.09)	0.524
Other	24 (44.4)	30 (55.6)	1.37 (0.80, 2.36)	0.255

\*, some data are missing. OR, odds ratio; CI, confidence interval; CNY, Chinese Yuan.

healthcare-seeking among advanced CRC patients, and the results are shown in *Table 3*. Patients who were above 50 years old [50–64 years old: odds ratio (OR) =0.80, 95% confidence interval (CI): 0.68–0.95; over 65 years old: OR =0.50, 95% CI: 0.41–0.60] were less likely to seek cross-

regional health care. Patients who completed undergraduate education or above (OR =1.40, 95% CI: 1.13–1.73), had an annual household income of more than 100,000 CNY (OR =1.46, 95% CI: 1.21–1.78), and had metastasis at the time of diagnosis (OR =1.33, 95% CI: 1.18–1.51) were more likely

**Table 3** Multivariate analysis of seeking cross-regional health care in advanced colorectal cancer patients

Variables	$\beta$ -coefficient	OR (95% CI)	P
Age (years)			
<50	Reference	1	–
50–64	–0.219	0.80 (0.68, 0.95)	0.013
$\geq 65$	–0.701	0.50 (0.41, 0.60)	<0.001
Education			
Primary school or below	Reference	1	–
Junior or senior high school	0.124	1.13 (0.97, 1.32)	0.107
Undergraduate or above	0.333	1.40 (1.13, 1.73)	0.002
Annual household income of patient (CNY)			
<50,000	Reference	1	–
50,000–99,999	0.005	1.01 (0.87, 1.17)	0.945
$\geq 100,000$	0.381	1.46 (1.21, 1.78)	<0.001
Metastasis at diagnosis			
No	Reference	1	–
Yes	0.288	1.33 (1.18, 1.51)	<0.001

OR, odds ratio; CI, confidence interval; CNY, Chinese Yuan.

to seek cross-regional health care.

## Discussion

In this study, we found that 36.5% of advanced CRC patients had previously sought cross-regional health care, and its associated factors included age, education, annual household income of patients, and metastasis at diagnosis. This study deepened our understanding of cross-regional health care sought by CRC patients and may offer a wide range of possibilities for the improvement of health care policy.

The most obvious finding was that 36.5% of advanced CRC patients had sought cross-regional health care previously, and among these patients, 31.9% had encountered problems. In fact, the principle of the medical insurance system in China is localized management; that is, individuals need to participate in the basic medical insurance in the local region, and the insurance fund is also under unified collection, utilization, and management within the region (2). Based on this, patients will face complicated procedures when they seek cross-regional medical care (2). Consistent with this, our results showed that the most common barrier faced by CRC patients who

encountered problems during their cross-regional care seeking was the complicated procedures (95.3%). Other prominent problems included expenses for outpatient services that could not be reimbursed (71.0%), reimbursement delays (59.4%), and pathological reports in the local region that was unacceptable and required re-examination (34.8%). The results described the patients' predicament during their cross-regional healthcare seeking and emphasized the urgent need to improve medical care policy.

The second major finding was that age, education, annual household income of patients, and metastasis at diagnosis were associated with seeking cross-regional health care. We found that elderly CRC patients were less likely to seek cross-regional health care, which is consistent with previous studies that have shown that elderly patients are less prone to bypass local facilities (19–21). This may be attributed to the fact that elderly people have more difficulties traveling or have stronger relationships with their local professionals (19). Furthermore, the results showed that relatively higher-level education was associated with the preference for cross-regional healthcare-seeking, corroborating previous research into the association between education and cross-regional healthcare-seeking

(22-25). We also observed that the patients who had an annual household income of more than 100,000 CNY preferred to seek cross-regional health care, compared with lower income groups. This result was consistent with the findings of previous studies, which showed that there was a higher likelihood of bypassing relatively low-level facilities with increasing wealth or income (26-28).

Noticeably, our study showed that patients with metastasis at diagnosis had a higher tendency to seek cross-regional health care, which was consistent with previous reports (21,22). This may be due to the fact that metastasis status, regarded as the reflection of patients' perceived demands for healthcare, can motivate them to seek medical care. For patients suffering from a more severe medical condition, the pursuit of more sophisticated hospitals to obtain high-quality care are especially important. Therefore, it is urgent to improve the service quality of primary medical facilities to meet the needs of CRC patients and strengthen their trust in basic facilities. Additionally, considering that most CRC patients in China are in an advanced stage at diagnosis, cancer screening and early diagnosis are critical measures to decrease the disease burden and relieve the pressure of upper-level medical facilities. Thus, it is necessary to strengthen the early screening, diagnosis, and treatment of CRC, and expand the screening coverage in an orderly manner, thereby improving the quality of life of people.

Despite the advantages of this study, including the large sample size and national multi-center design, it also has some limitations that should be noted. Firstly, self-reported data on cross-regional healthcare-seeking might have resulted in recall bias and affected the reliability or validity of the results. Secondly, respondents might have avoided some sensitive questions, such as economic status, or inaccurately reported answers, which could confound the results. Furthermore, there is a possibility that the difficulties of seeking cross-regional health care was exaggerated, owing to the patients' negative emotion during medical care. Finally, generalization of the findings could be limited because only advanced CRC patients were enrolled in current study. We will conduct further studies to support the present findings.

In summary, this study assessed the status of cross-regional care seeking and its associated factors among advanced CRC patients. The results showed that about one-third of patients had sought cross-regional health care, highlighting the imbalanced allocation of medical resources. These findings demonstrate that there is still a need to

improve the quality of primary care facilities and optimize the health care system.

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## Footnote

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*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). This research was approved by the independent review board of Henan Cancer Hospital (No. 2019273), and the other 18 hospitals were informed and agreed with the study. Informed consent was taken from all the patients.

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