





# Present Status of Discharge Readiness and Its Influencing Factors in Individuals Receiving Surgery for Pancreatic Cancer: A Cross-Sectional Study

*Ann. Ital. Chir.*, 2026 97, 5: 810–819  
<https://doi.org/10.62713/aic.4337>

Jiaping Chen<sup>1,†</sup> , Xiaolan Shi<sup>2,†</sup> , Lifang Bian<sup>2</sup> , He Li<sup>2</sup> 

<sup>1</sup>Department of Nursing, The First Affiliated Hospital, Zhejiang University School of Medicine, 310000 Hangzhou, Zhejiang, China

<sup>2</sup>Hepatobiliary and Pancreatic Surgery Ward, The First Affiliated Hospital, Zhejiang University School of Medicine, 310000 Hangzhou, Zhejiang, China

**AIM:** To ascertain the present status of readiness for hospital discharge (RHD) in individuals after pancreatic cancer (PC) surgery and clarify its influencing factors, providing a reference for formulating an intervention program for RHD in these patients.

**METHODS:** The current cross-sectional research employed a convenience sampling method. The study selected patients who underwent PC resection at a tertiary hospital from January 2024 to July 2024. Data were collected using general demographic questionnaires, the Readiness for Hospital Discharge Scale (RHDS), the Quality of Discharge Teaching Scale (QDTS), the Social Support Rating Scale (SSRS), and the Chinese version of the simplified Connor-Davidson Resilience Scale-10 (CD-RISC10). The data were analysed using descriptive statistics and multivariate linear regression. The influencing factors of RHD were then elucidated.

**RESULTS:** 122 PC patients receiving surgery were enrolled, with a mean postoperative RHDS score of  $(90.84 \pm 13.80)$ . The RHDS score of expected support was the highest, followed by adaptability and personal status. Multivariate linear regression analysis revealed that gender, discharge with tubes, social support, discharge guidance quality, and psychological resilience were independent influencing factors for RHD ( $p < 0.05$ ).

**CONCLUSIONS:** Healthcare professionals should pay particular attention to female patients, those discharged with tubes, those with weak social support, and those with low psychological resilience. During hospitalization, diversified health education methods should be employed to enhance the content that patients receive, improve guidance skills, and ultimately increase RHD, thereby improving the patients' quality of life.

**Keywords:** pancreatic cancer; discharge readiness; influencing factors; psychological resilience

## Introduction

Readiness for hospital discharge (RHD), as proposed by British scholar Fenwick in 1979, is used to assess the readiness for discharge in patients from physiological, psychological, and social perspectives [1,2]. Discharge readiness, as the beginning of continuous care services, ensures the continuity and coordination of medical care, facilitating a safe transition from hospital to home. It is both a state and a process that comprehensively reflects the patient's readiness for discharge [3]. As an integral element of discharge planning, RHD has garnered increasing attention from scholars worldwide and has become an essential indicator for evaluating discharge readiness [4].

Global cancer statistics in 2022 have indicated that pancreatic cancer (PC) ranks 12th in global cancer incidence and

6th in cancer mortality, which is on the rise compared to data from 2020 [5,6]. Currently, surgery remains the only potentially curative treatment approach for PC patients.

With the widespread application of Enhanced Recovery After Surgery (ERAS) principles and pathways in pancreatic surgery clinical practice, postoperative hospital stays have been significantly shortened (7.5 vs. 12 days) [7]. However, this has also led to a reduction in the time allocated for healthcare education. Post-discharge, PC patients face various challenges, such as the implementation of pancreatic enzyme replacement therapy, home nutritional support plans, effective pain management, risk awareness training for patients and caregivers, and psychological adjustments [8].

A retrospective study conducted in the United States [9] revealed that the incidence of postoperative complications following pancreatic surgery is as high as 57%, with a 30-day readmission rate of 23.0%. However, standardized health education has been shown to reduce these rates effectively. RHD is a self-assessment tool for patients to appraise their preparedness for discharge, reflecting their genuine perception of their health status and confidence in addressing potential health issues. It provides guidance for nurses in delivering personalized transitional health educa-

Submitted: 3 September 2025 Revised: 29 September 2025 Accepted: 5 November 2025 Published: 10 May 2026

Correspondence to: Jiaping Chen, Department of Nursing, The First Affiliated Hospital, Zhejiang University School of Medicine, 310000 Hangzhou, Zhejiang, China (e-mail: 18767167266@qq.com).

<sup>†</sup> These authors contributed equally.

Editor: Andrea Bondurri

tion. While studies on RHD have focused more on breast cancer and colostomy patients, there is limited research on RHD for PC patients after surgery.

The current research intended to ascertain the current status of RHD among individuals following PC surgery, investigate the link between RHD and the quality of discharge guidance, level of social support, and psychological resilience in these individuals, and clarify the influencing factors for RHD in individuals after PC surgery.

## Methods

The current investigation leveraged a cross-sectional design and convenience sampling method, conducted at The First Affiliated Hospital, Zhejiang University School of Medicine. All patients and their families provided informed consent. This study was approved by the Ethics Committee of The First Affiliated Hospital, Zhejiang University School of Medicine (Approval No.: 2024-0042-EXP). This study adhered to the principles of the Declaration of Helsinki. Risk screening was routinely performed using the Hospital Anxiety and Depression Scale (HADS) upon admission. For patients with a depression score above 8, a consultation with the psychology department was performed, and they were regularly followed up after discharge.

### Participants and Sample

The following patients were included: (1) Age  $\geq 18$  years; (2) Clinically and pathologically diagnosed with PC [10]; (3) Underwent PC resection during hospitalization; (4) Voluntary participation with signed informed consent. The following individuals were excluded: (1) Patients with unclear consciousness or communication difficulties; (2) Those with severe damage to other organs or who were discharged against medical advice; (3) Patients with other malignancies.

According to Kendall's rule, the sample size should be 5–10 times the number of predicted variables. This investigation included 20 variables. Assuming a 20% rate of invalid questionnaires, the required sample size was estimated to be between 125 and 250 cases. Eventually, 134 PC patients after surgery were enrolled.

### Data Collection and Instruments

Data collection was conducted from January 2024 to July 2024, spanning a total of seven months. A survey team comprising nurses who engaged in hepatobiliary and pancreatic surgery for over ten years was formed. Before the survey, the team underwent homogenized training on questionnaire administration. Investigators distributed questionnaires to research subjects being discharged on the same day based on discharge instructions from the department, conducting one-on-one surveys to guide patients in accurately completing the forms. For patients with difficulty filling out the questionnaire, investigators explained the questions and answer options and recorded the responses

as per the patient's wishes. Completed questionnaires were collected on-site. Disease-related data in the general information form were filled out by reviewing patients' medical records or consulting attending physicians. Questionnaires with insufficient data, obvious logical errors, or a completion time of less than five minutes were deemed invalid. 134 questionnaires were distributed, of which 12 were invalidated due to insufficient data, logical errors, or insufficient completion time. Finally, 122 questionnaires were valid, with an effective response rate of 91.04%.

The general information survey form included two sections: demographic data of the patient (gender, age, education level, marital status, employment status, residence, family per capita monthly income, and primary caregiver after discharge) and disease-related data (postoperative hospital stay, neoadjuvant chemotherapy, body mass index (BMI) at discharge, discharge with a tube, pancreatic fistula grade, tumor location, tumor staging, surgical method, and complications), totaling 17 variables.

The Readiness for Hospital Discharge Scale (RHDS), designed by Weiss *et al.* [2] in 2006, was adapted to Chinese by Lin *et al.* [11] and used in the current study. The localized version includes 13 items. The first item is answered "yes" or "no" and is not scored, while the other 12 items are distributed across three aspects: personal status (3 items), coping ability (5 items), and anticipated support (4 items), which are scored between 0 and 10. Consequently, the total score is on a scale of 0 to 120. Higher scores indicated better RHD. The content validity index of the Chinese version was 0.88, and the Cronbach's  $\alpha$  coefficient for internal consistency was 0.89.

The Quality of Discharge Teaching Scale (QDTS), designed by Weiss *et al.* [2], was localized to Chinese by Wang *et al.* [12]. QDTS consists of 24 items across three dimensions: required discharge content, actual content received, and teaching skills and effectiveness. The quality of discharge teaching is evaluated by the discrepancy between the scores of required and actual content. Each item is scored between 0 and 10. The total score is computed as the sum of the actual content and teaching skills/effectiveness dimensions. Higher scores indicate a better quality of discharge teaching. The content validity index of the entire scale is 0.98, and the Cronbach's  $\alpha$  coefficient is 0.924, with dimension-specific coefficients ranging from 0.882 to 0.935.

The Social Support Rating Scale (SSRS), developed by Xiao [13], assesses an individual's level of social support. It consists of 14 items and evaluates three aspects: objective support (3 items), subjective support (8 items), and the use of social support (3 items). The total score is on a scale of 12 to 66. Higher SSRS scores denote higher levels of social support. Social support is graded as high ( $\geq 45$ ), moderate (23–44), or low ( $\leq 22$ ). The Cronbach's  $\alpha$  coefficient of the scale is 0.72, and its test-retest reliability is 0.92.

The simplified version of the Connor-Davidson Resilience Scale-10 (CD-RISC10), localized by Wang *et al.* [14], is widely used for assessing psychological resilience in adult patients. The scale encompasses 10 items scored on a 5-point Likert method (0–4). A score of 0 represents “never”, and a score of 4 indicates “almost always”. The total score is between 0 and 40. Lower scores denote poorer psychological resilience. The Cronbach’s  $\alpha$  coefficient of the Chinese version is 0.91.

### Statistical Analysis

Data entry and analysis were implemented leveraging Excel (version 2405, Microsoft Corporation, Redmond, WA, USA) and IBM SPSS software (version 27.0, IBM Corp, Armonk, NY, USA). Frequency and percentage were adopted to describe count data. Normally distributed data were displayed as mean  $\pm$  standard deviation; the normality of distribution was assessed using the Shapiro-Wilk test, and the comparison of means between the two groups was performed using *t*-test. Non-normally distributed data were displayed as median (interquartile range), and the medians between the two groups were compared using the nonparametric Mann-Whitney U test. Single-factor analysis was implemented by leveraging independent sample *t*-tests and one-way analysis of variance (ANOVA) or non-parametric tests (as appropriate). Relationships between RHD and quality of discharge teaching, social support, and psychological resilience were examined by leveraging Pearson correlation for normally distributed variables or Spearman correlation for non-normally distributed variables. Variables with  $p < 0.05$  in the univariate analysis were included in the multivariate model. Additionally, multiple linear regression analysis was utilized to determine the factors influencing RHD in individuals with PC after surgery. A  $p$ -value of  $<0.05$  denotes statistical significance.

## Results

### General Information on PC Patients After Surgery

The current study enrolled 122 patients who received surgery for PC. 25 cases (20.49%) were aged  $< 60$  years, and 97 cases (79.51%) were aged  $\geq 60$  years. The detailed information is depicted in Table 1.

### Current Status of Readiness for Discharge Among PC Patients Undergoing Surgery

The average RHDS score among the 122 PC patients receiving surgery was  $90.84 \pm 13.80$ . The total and average item scores for each dimension are shown in Table 2.

### Single-Factor Analysis of Readiness for Discharge Among PC Patients Undergoing Surgery

The single-factor analysis revealed statistically considerable differences ( $p < 0.05$ ) in RHDS total scores among individuals with different characteristics, encompassing gender, age, education level, employment status, household per

capita monthly income, primary caregiver after discharge, BMI, and discharge with tubes. The RHDS scores across individuals with varying features are provided in Table 1.

### Correlation Analysis Between Readiness for Discharge and Social Support, Quality of Discharge Teaching, and Psychological Resilience Among PC Patients Undergoing Surgery

The total SSRS score was  $41.30 \pm 7.19$ , the total QDTS score was 154.5 (139.0, 166.3), and the total psychological resilience score was 29.0 (25.8, 31.0). The total and average item scores for other dimensions are presented in Table 2. Normality testing using histograms and P-P plots indicated that the RHDS total score, personal status score, adaptability score, total social support score, objective support score, and subjective support score followed a normal distribution. Scores for anticipated support, utilization of support, total quality of discharge teaching, required discharge content, actual discharge content received, discharge teaching skills, and psychological resilience followed a non-normal distribution. Accordingly, Pearson correlation analysis was leveraged to ascertain the link between the RHDS total score and the total social support score, objective support score, and subjective support score. Spearman correlation analysis was used for other variables. The results indicated positive correlations ( $r > 0, p < 0.01$ ) between RHDS total scores and the total scores for SSRS, QDTS, and psychological resilience. The correlations between RHDS scores and other dimension scores are shown in Table 3.

### Multiple Linear Regression Analysis of Readiness for Discharge Among PC Patients Undergoing Surgery

The total RHDS score of individuals with PC undergoing surgery was leveraged as the dependent variable, while 11 significant variables in the single-factor and correlation analyses were included as independent variables. The Enter method was employed for multiple linear regression analysis. The results disclosed that residuals followed a normal distribution, and the Durbin-Watson test statistic was 1.964, indicating that residuals were independent. Additionally, the variance inflation factor (VIF) for all independent variables varied between 1.218 and 4.161, suggesting no multicollinearity issues among the variables. The statistical results identified gender, discharge with tubes, social support, quality of discharge teaching, and psychological resilience as factors influencing RHDS scores among postoperative PC patients. The variable coding scheme is provided in Table 4, and the multiple linear regression analysis results are described in Table 5.

## Discussion

The postoperative RHDS score for PC patients was ( $90.84 \pm 13.80$ ), with an average item score of ( $7.57 \pm 1.15$ ). Nonetheless, in the current research, the RHDS score for PC patients aged  $\geq 60$  years was only ( $89.26 \pm 14.22$ ). The pos-

**Table 1. General characteristics and single-factor analysis of readiness for discharge scores among pancreatic cancer patients receiving surgery (n = 122).**

Variable	Number of cases (%)	RHD total score	Statistical value	p-value
Gender			<i>t</i> = 4.004	<0.001
Male	69 (56.56)	94.97 ± 12.38		
Female	53 (43.44)	85.45 ± 13.80		
Age			<i>t</i> = 3.104	0.003
<60 years old	25 (20.49)	96.96 ± 10.09		
≥60 years old	97 (79.51)	89.26 ± 14.22		
Educational level			F = 3.420	0.023
Elementary school or below	49 (40.16)	86.16 ± 13.60		
Middle school	44 (36.07)	94.86 ± 11.00		
High school or vocational school	21 (17.21)	92.33 ± 17.79		
Associate degree or higher	8 (6.56)	93.38 ± 10.36		
Marital status			<i>t</i> = -2.098	0.050
Unmarried, divorced, or widowed	12 (9.84)	85.42 ± 8.75		
Married	110 (90.16)	91.43 ± 14.14		
Employment status			<i>t</i> = -3.496	0.001
Not employed	103 (84.43)	89.53 ± 14.22		
Employed	19 (15.57)	97.89 ± 8.45		
Residence			<i>t</i> = 0.173	0.863
Urban	56 (45.90)	91.07 ± 14.66		
Rural or township	66 (54.10)	90.64 ± 13.14		
Monthly per capita household income (CNY)			F = 2.862	0.018
≤2000	8 (6.56)	83.75 ± 10.66		
2001–4000	36 (29.51)	85.64 ± 12.67		
4001–6000	24 (19.67)	94.04 ± 13.24		
6001–8000	26 (21.31)	91.23 ± 12.03		
8001–10,000	15 (12.30)	95.47 ± 14.21		
>10,000	13 (10.66)	97.54 ± 17.39		
Primary caregiver after discharge			F = 5.162	0.007
Spouse	89 (72.95)	93.17 ± 13.32		
Children	29 (23.77)	85.00 ± 13.94		
Others	4 (3.28)	81.25 ± 7.09		
Postoperative length of hospital stay			<i>t</i> = -0.390	0.697
≤14 days	60 (49.18)	90.35 ± 14.86		
>14 days	62 (50.82)	91.33 ± 12.71		
Neoadjuvant chemotherapy			<i>t</i> = 0.564	0.574
No	82 (67.21)	91.33 ± 13.44		
Yes	40 (32.79)	89.83 ± 14.63		
BMI at discharge			F = 2.971	0.035
<18.5	23 (18.85)	83.43 ± 12.23		
18.5~23.9	70 (57.38)	92.77 ± 13.32		
24~27.9	26 (21.31)	92.50 ± 14.18		
≥28	3 (2.46)	88.00 ± 20.66		
Discharge with drain			<i>t</i> = 4.132	<0.001
No	69 (56.56)	95.09 ± 11.98		
Yes	53 (43.44)	85.30 ± 14.15		
Tumor location			<i>t</i> = -1.233	0.220
Head and neck of the pancreas	72 (59.02)	89.56 ± 14.42		
Body and tail of the pancreas	50 (40.98)	92.68 ± 12.76		
Surgical approach			F = 1.066	0.348
Open surgery	48 (39.34)	89.60 ± 14.65		
Laparoscopy	58 (47.54)	90.60 ± 13.68		
Da Vinci robotic-assisted	16 (13.11)	95.38 ± 11.19		

**Table 1. Continued.**

Variable	Number of cases (%)	RHD total score	Statistical value	p-value
Tumor staging			F = 1.586	0.196
Stage I	56 (45.90)	92.79 ± 14.53		
Stage II	51 (41.80)	90.57 ± 11.37		
Stage III	11 (9.02)	83.18 ± 15.86		
Stage IV	4 (3.28)	88.00 ± 22.77		
Complication grading			F = 0.378	0.824
None	33 (27.05)	90.45 ± 16.43		
Grade I	47 (38.52)	91.36 ± 14.56		
Grade II	13 (10.66)	91.85 ± 8.23		
Grade IIIa	21 (17.21)	91.48 ± 12.08		
Grade IIIb	8 (6.56)	86.00 ± 9.91		
Pancreatic fistula grading			F = 0.011	0.989
None	44 (36.07)	90.84 ± 16.57		
Biochemical fistula	36 (29.51)	91.08 ± 13.42		
Grade B	42 (34.43)	90.62 ± 10.95		

Note: RHD, readiness for hospital discharge; BMI, body mass index; pancreatic fistulas are classified according to the criteria of the International Society for Gastrointestinal and Pancreatic Surgery (ISGPS); the Tumor staging for pancreatic cancer was determined following the 8th edition of the American Joint Committee on Cancer (AJCC) guidelines; complications were classified according to the Clavien-Dindo grading system. 1 USD = 6.91 CNY.

sible reasons for this finding may be related to the highly invasive nature of PC and the more significant postoperative symptom burden. According to the average scores across various dimensions of RHDS, the personal status dimension had the lowest average score, which may be attributed to the extensive surgical resection involved in PC, the complexity of the reconstruction steps, and the higher incidence of postoperative complications, all contributing to a longer recovery period. A study focusing on the symptom trajectory of patients who underwent pancreaticoduodenectomy for PC [15] showed that more than 70% of patients experienced symptom distress, with fatigue observed in 72% of patients, loss of appetite in 68%, and anxiety, depression, pain, and nausea in 14%–66%. With the ongoing development of prehabilitation concepts, exercise prehabilitation has become an essential part of the Enhanced Recovery After Surgery (ERAS) pathway. Preoperative training, including breathing exercises, aerobic exercise, and resistance training, can ameliorate cardiopulmonary function, enhance exercise endurance, and lower the incidence of postoperative complications in individuals with PC [16]. Healthcare providers should encourage patients to implement preoperative exercise prehabilitation, link this with early postoperative functional exercises, and incorporate it into the discharge plan. Additionally, healthcare providers could enhance rehabilitation programs by integrating technologies such as virtual reality and traditional Chinese medicine-based exercises like the Ba Duan Jin, which can improve patient adherence to exercise, increase activity endurance, enhance personal status, and boost recovery confidence.

The results of the current research revealed that females had a lower total RHDS score compared to males (85.45 ± 13.80 vs. 94.97 ± 12.38), with a statistically significant difference ( $p < 0.001$ ). Influenced by traditional Chinese gender roles, women often bear more responsibility for family caregiving, and when their role shifts to that of the cared-for, it can lead to role dysfunction. Men, on the other hand, are typically more independent in social roles and tend to exhibit better coping abilities and resilience when facing traumatic stress events, such as surgery for malignant diseases [17]. Besides, a prior cross-sectional survey by Polish scholars [18] indicated that males demonstrated significantly higher disease acceptance than females. The study further unveiled a positive link between RHDS and disease acceptance. As a key factor in psychosocial adjustment [19], disease acceptance facilitates patients' disease management behaviors and coping strategies, thereby improving their RHD. However, an analysis by Qian *et al.* [20] on the factors affecting RHD in chronic kidney disease patients showed that although females had lower RHDS scores than males, the difference was not statistically significant. Multi-center investigations with a larger sample population are warranted to clarify the impact of gender on RHDS. Nonetheless, healthcare professionals should still keep an eye on the discharge needs of female PC patients, assist them in adapting to role transitions, and encourage caregivers to actively engage in daily care, addressing any concerns they may have.

This study unraveled that the RHDS scores of PC patients discharged with tubes were significantly lower than those of patients discharged without tubes. This finding is con-

**Table 2. Scores for readiness for discharge, social support, quality of discharge teaching, and psychological resilience among pancreatic cancer patients undergoing surgery (n = 122).**

Items	Number of entries	Total score	Average score per item
Discharge readiness total score	12	90.84 ± 13.80	7.57 ± 1.15
Personal status	3	20.48 ± 4.45	6.83 ± 1.48
Adaptability	5	35.02 ± 7.54	7.00 ± 1.51
Anticipatory support	4	37.0 (33.0, 39.0)	9.3 (8.3, 9.8)
Social support total score	14	41.30 ± 7.19	2.95 ± 0.51
Objective support	3	10.51 ± 2.28	3.50 ± 0.76
Subjective support	8	24.28 ± 4.48	3.03 ± 0.56
Utilization of support	3	6.0 (5.0, 8.0)	2.0 (1.7, 2.7)
Discharge instruction quality total score	18	154.5 (139.0, 166.3)	8.6 (7.7, 9.2)
Content the patient needs to receive	6	57.0 (54.0, 60.0)	9.5 (9.0, 10.0)
Content actually received by the patient	6	48.0 (41.0, 54.0)	8.0 (6.8, 9.0)
Discharge instruction skills	12	107.0 (98.0, 114.0)	8.9 (8.2, 9.5)
Psychological resilience	10	29.0 (25.8, 31.0)	2.9 (2.6, 3.1)

Data are presented as the mean ± standard deviation or the M (P25, P75), depending on their distribution.

**Table 3. Correlation analysis between readiness for discharge, social support, quality of discharge teaching, and psychological resilience among pancreatic cancer patients undergoing surgery (r-values).**

Item	Discharge readiness total score	Personal status	Adaptability score	Anticipatory support
Social support total score	0.537**	0.394**	0.444**	0.466**
Subjective support	0.479**	0.321**	0.359**	0.473**
Objective support	0.556**	0.443**	0.473**	0.439**
Utilization of support	0.239**	0.177	0.294**	0.081
Discharge instruction quality total score	0.646**	0.589**	0.622**	0.248**
Content the patient needs to receive	0.069	0.025	0.067	0.102
Content actually received by the patient	0.567**	0.523**	0.586**	0.144
Discharge instruction skills	0.614**	0.547**	0.563**	0.299**
Psychological resilience	0.696**	0.622**	0.602**	0.430**

Note: For normally distributed variables, Pearson’s correlation analysis is used; for non-normally distributed variables, Spearman’s correlation analysis is used. \*\**p* < 0.01.

**Table 4. Variable coding scheme for independent variables.**

Independent variables	Assignment method
Gender	Male = 0 (Reference group), Female = 1
Age	<60 years old = 0 (Reference group), ≥60 years old = 1
Educational level	Elementary school or below = 000 (Reference group), Middle school = 001, High school or vocational school = 010, Associate degree or higher = 100
Employment status	Not employed = 0 (Reference group), Employed = 1
Monthly per capita household income (CNY)	<2000 = 00000 (Reference group), 2000–4000 = 00001, 4001–6000 = 00010, 6001–8000 = 00100, 8000–10,000 = 01000, >10,000 = 10000
Primary caregiver after discharge	Spouse = 00 (Reference group); Children = 01; Others = 10
BMI	<18.5 = 000 (Reference group); 18.5~23.9 = 001, 24~27.9 = 010, ≥28 = 100
Discharge with drain	No = 0 (Reference group), Yes = 1
Social support	Enter as a continuous variable
Discharge instruction quality	Enter as a continuous variable
Psychological resilience	Enter as a continuous variable

Note: Categorical variables are converted into dummy variables for use in regression analysis. 1 USD = 6.91 CNY.

sistent with the findings of previous research [21]. The possible reasons for this difference may be the higher dependence of patients and their families on medical staff in the hospital environment, as they cannot independently

maintain drainage tubes, monitor drainage fluid, and manage catheter-related issues. Additionally, the home environment is different from the hospital setting and lacks the necessary equipment. On the other hand, discharge with

**Table 5. Multiple linear regression analysis of readiness for discharge among pancreatic cancer patients undergoing surgery (n = 122).**

Variable	Regression coefficient	Standard error	Standardized regression coefficient	t-value	p	VIF
(Constant)	17.366	9.464		1.835	0.069	
Gender (with male as the reference group)						
Female	-4.381	1.829	-0.158	-2.396	0.018	1.376
Age (with <60 years old as the reference group)						
≥60 years old	-0.018	2.447	-0.001	-0.007	0.994	1.635
Educational Level (with elementary school or below as the reference group)						
Middle school	2.346	1.958	0.082	1.198	0.234	1.481
High school or vocational school	3.466	2.672	0.095	1.297	0.198	1.705
Associate degree or higher	-0.454	3.928	-0.008	-0.115	0.908	1.584
Employment Status (with not employed as the reference group)						
Employed	1.084	2.835	0.029	0.382	0.703	1.771
Monthly Household Income (with ≤2000 as the reference group) (CNY)						
2001–4000	1.410	3.455	0.047	0.408	0.684	4.161
4001–6000	6.042	3.668	0.175	1.647	0.103	3.561
6001–8000	2.529	3.602	0.075	0.702	0.484	3.646
8000–10,000	3.398	3.926	0.081	0.865	0.389	2.785
>10,000	4.852	4.313	0.109	1.125	0.263	2.968
Primary caregiver after discharge (with spouse as the reference group)						
Children	-1.377	2.186	-0.043	-0.630	0.530	1.451
Others	-3.818	4.788	-0.049	-0.797	0.427	1.218
BMI (with <18.5 as the reference group)						
18.5–24	-0.257	2.303	-0.009	-0.112	0.911	2.174
24–28	-0.390	2.742	-0.012	-0.142	0.887	2.113
≥28	-6.780	5.930	-0.076	-1.143	0.256	1.413
Discharge with drain (with discharge without drain as the reference group)	-3.690	1.738	-0.133	-2.123	0.036	1.244
Social support total score	0.384	0.147	0.200	2.613	0.010	1.855
Discharge instruction quality total score	0.247	0.052	0.357	4.732	< 0.001	1.801
Psychological resilience	0.719	0.227	0.243	3.162	0.002	1.865

Note: R<sup>2</sup> = 0.681, Adjusted R<sup>2</sup> = 0.618, F = 10.771, p < 0.001, VIF, variance inflation factor. 1 USD = 6.91 CNY.

tubes may also affect some patients’ social activities, causing psychological stress, which in turn impacts RHDS. Discharge with tubes poses a greater challenge for the safe transition of patients from hospital to home. During hospitalization, healthcare providers should strengthen education on catheter care and, through the pre-discharge time window, provide home care-related training on tube management. Using multi-modal teaching methods, such as video tutorials and in-person workshops, can improve patients’ knowledge of the drainage tube across multiple dimensions. Furthermore, leveraging internet platforms such as “Internet + healthcare” can offer remote consultation services and home nursing visits, enhancing the sense of security for patients discharged with drains. This approach can help prevent unplanned tube removal, catheter-related infections, tube blockages, and other adverse events, thereby reducing the rate of unplanned rehospitalizations and doctor visits, and improving patients’ quality of life.

A related study [22] has demonstrated that social support is positively linked with RHD, consistent with the findings of this study. Social support, as an available external resource, can alleviate psychological stress and improve coping abilities in cancer patients facing negative stressors of their illness. Social support is assessed from three domains: subjective support, objective support, and the use of support. Patients with higher objective support tend to have better material resources, ensuring that many of their post-discharge needs are met [23]. In contrast, individuals with insufficient subjective support are more susceptible to negative emotions, for instance, disease-related shame, depression, or anxiety, which can negatively affect their coping mechanisms. In severe circumstances, individuals may refuse support from others [24], leading to poorer RHD. A study by Lee *et al.* [25] on a quality of life prediction model for PC patients has found that social support directly impacts perceived health and functional status, and higher levels of social support improve health-related behaviors and

encourage patients to confront their illness more actively, thereby affecting RHD. Clinical healthcare providers are an integral part of social support, as they not only provide professional care and disease-related knowledge but also offer necessary social support channels. For example, healthcare providers can respect religious beliefs and offer spiritual care, providing emotional comfort and building confidence in overcoming the illness. A timely assessment of social support before discharge is essential, and for patients with weak social support, extended post-discharge care services should be provided based on their disease needs.

The current research demonstrated a positive link between QDTS and RHDS scores. QDTS was found to be an influencing factor for RHDS, consistent with the research by Wu *et al.* [26]. This finding unravels that a higher quality of discharge guidance denotes a higher RHD of the patient. Healthcare professionals should therefore focus on the quality of discharge guidance, enhancing not only the content of the guidance but also the delivery techniques. While enhancing nurses' disease-related knowledge, departments could also develop structured discharge education content specifically tailored to the needs of PC patients. Using visual aids such as illustrated health education leaflets or mind maps can help standardize discharge education and address the shortcomings of less experienced nurses in their guidance techniques. Additionally, feedback from patients should be gathered after the education sessions. Given the complexity of clinical work and limited human resources, departments could consider recording discharge guidance videos and distributing them through Quick Response codes or hospital social media platforms, allowing patients to access the information at home. By making the guidance content more concrete and using multi-modal teaching methods, the effectiveness of discharge guidance can be improved, enhancing nurse-patient communication, reducing anxiety, increasing patients' knowledge retention, and improving self-management, thereby lowering the incidence of complications.

Correlation analysis unveiled that higher psychological resilience was related to higher RHDS scores. The multiple linear regression analysis disclosed that psychological resilience was an independent influencing factor for RHDS. Several studies [27,28] have demonstrated a strong relationship between psychological resilience and RHDS. This finding suggests that PC patients with lower psychological resilience exhibit poor recovery abilities after major stress events such as surgery. They struggle to mobilize their resources to adapt to the physical and emotional changes brought about by the illness and are more susceptible to negative emotions, for instance, stress, pain, and fear, which can hinder RHD. Due to the high malignancy and low post-operative survival rates of PC, these patients experience higher rates of anxiety and depression compared to those with other malignant cancers. Assessing psychological resilience is therefore a crucial part of a psychological health

screening system. Clinical healthcare providers should regularly screen, assess, and intervene early with patients who have low psychological resilience levels. In addition to institutional social support (e.g., medical insurance) and traditional family-based support, new avenues such as online social media platforms can also be utilized to improve patients' psychological resilience. A four-tier social media intervention matrix comprising the department, hospital, society, and patient can provide medical, informational, emotional, and peer support to strengthen the patient's internal resilience, thereby improving psychological resilience and RHD.

This study ascertained the present status and influencing factors of RHD in individuals after PC surgery, and also investigated the impact of social support, discharge guidance quality, and psychological resilience on their RHD from multiple dimensions, such as humanities, society, and psychology. Our findings provide a comprehensive reference for the construction of an intervention program for RHD after PC surgery in the future. However, as this is a single-center investigation with a limited sample size, there are certain limitations in the findings. In the future, multicenter, large-scale studies are needed, and structural equation models should be used to analyze the mediating role of social support, psychological resilience, and discharge guidance quality in the influencing pathway to better clarify the influencing factors of RHD in PC patients and verify and expand the results of this study.

## Conclusions

Gender, discharge with drains, social support, quality of discharge guidance, and psychological resilience are identified as significant influencing factors for RHD. Nurses and healthcare providers should focus on patients who are female, discharged with drains, have weak social support, or have low psychological resilience. During hospitalization, improving guidance skills, such as incorporating videos, pictures, and mind maps, will enhance the content patients receive. During post-discharge care, using mobile health technology platforms to establish communication channels can improve the accessibility of healthcare services, thereby improving patients' RHD and quality of life.

## Availability of Data and Materials

The data used and analyzed during the current study are available from the corresponding author on reasonable request.

## Author Contributions

JPC, LFB, XLS and HL contributed to the study conception and design. JPC: Writing—original draft preparation, formal analysis, investigation and funding acquisition. XLS: supervision. LFB: methodology and supervision. HL: formal analysis and investigation. All authors contributed to

the critical revision of the manuscript for important intellectual content. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

### Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of The First Affiliated Hospital, Zhejiang University School of Medicine (Approval No.: 2024-0042-EXP). The study adhered to the ethical standards established by the hospital as well as the principles outlined in the Declaration of Helsinki. All patients and their families provided informed consent.

### Acknowledgment

Not applicable.

### Funding

This work was supported by the Nursing Research Project of The First Affiliated Hospital, Zhejiang University School of Medicine (2023ZYHL03); Medical Science and Technology Planning Project of Zhejiang Province (2023KY716).

### Conflict of Interest

The authors declare no conflict of interest.

### References

[1] Fenwick AM. An interdisciplinary tool for assessing patients' readiness for discharge in the rehabilitation setting. *Journal of Advanced Nursing*. 1979; 4: 9–21. <https://doi.org/10.1111/j.1365-2648.1979.tb02984.x>.

[2] Weiss ME, Piacentini LB. Psychometric properties of the Readiness for Hospital Discharge Scale. *Journal of Nursing Measurement*. 2006; 14: 163–180. <https://doi.org/10.1891/jnm-v14i3a002>.

[3] Galvin EC, Wills T, Coffey A. Readiness for hospital discharge: A concept analysis. *Journal of Advanced Nursing*. 2017; 73: 2547–2557. <https://doi.org/10.1111/jan.13324>.

[4] Bobay KL, Jerofke TA, Weiss ME, Yakusheva O. Age-related differences in perception of quality of discharge teaching and readiness for hospital discharge. *Geriatric Nursing*. 2010; 31: 178–187. <https://doi.org/10.1016/j.gerinurse.2010.03.005>.

[5] Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians*. 2021; 71: 209–249. <https://doi.org/10.3322/caac.21660>.

[6] Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*. 2024; 74: 229–263. <https://doi.org/10.3322/caac.21834>.

[7] Dai J, Jiang Y, Fu D. Reducing postoperative complications and improving clinical outcome: Enhanced recovery after surgery in pancreaticoduodenectomy - A retrospective cohort study. *International Journal of Surgery*. 2017; 39: 176–181. <https://doi.org/10.1016/j.ijssu.2017.01.089>.

[8] Oncologist Branch of the Chinese Medical Doctor Association, Pancreatic Disease Special Committee of the China International Ex-

change and Promotive Association for Medical and Health Care, Abdominal Tumor Special Committee of the China Medical Education Association. Expert consensus on the whole-course management of home medical care for patients with pancreatic cancer in China. *Chinese Journal of Oncology*. 2022; 44: 1076–1082. <https://doi.org/10.3760/cma.j.cn112152-20220523-00362>. (In Chinese)

[9] Ceppa EP, Pitt HA, Nakeeb A, Schmidt CM, Zyromski NJ, House MG, et al. Reducing Readmissions after Pancreatectomy: Limiting Complications and Coordinating the Care Continuum. *Journal of the American College of Surgeons*. 2015; 221: 708–716. <https://doi.org/10.1016/j.jamcollsurg.2015.05.012>.

[10] Conroy T, Pfeiffer P, Vilgrain V, Lamarca A, Seufferlein T, O'Reilly EM, et al. Pancreatic cancer: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. *Annals of Oncology*. 2023; 34: 987–1002. <https://doi.org/10.1016/j.annonc.2023.08.009>.

[11] Lin YH, Kao CC, Huang AM, Chi MT, Chou FH. Psychometric testing of the Chinese version of the readiness for hospital discharge scale. *The Journal of Nursing*. 2014; 61: 56–65. <https://doi.org/10.6224/JN.61.4.56>. (In Chinese)

[12] Wang BH, Wang H, Yang CZ. Reliability and validity of the Chinese version of the Quality of Discharge Teaching Scale. *Chinese Journal of Nursing*. 2016; 51: 752–755. (In Chinese)

[13] Xiao SY. Theoretical basis and research applications of the Social Support Rating Scale. *Journal of Clinical Psychiatry*. 1994; 4: 98–100.

[14] Wang L, Shi Z, Zhang Y, Zhang Z. Psychometric properties of the 10-item Connor-Davidson Resilience Scale in Chinese earthquake victims. *Psychiatry and Clinical Neurosciences*. 2010; 64: 499–504. <https://doi.org/10.1111/j.1440-1819.2010.02130.x>.

[15] Tung S, Davis LE, Hallet J, Mavros MN, Mahar AL, Bubis LD, et al. Population-Level Symptom Assessment Following Pancreaticoduodenectomy for Adenocarcinoma. *JAMA Surgery*. 2019; 154: e193348. <https://doi.org/10.1001/jamasurg.2019.3348>.

[16] Wijma AG, Hoogwater FJH, Nijkamp MW, Klaase JM. Personalized multimodal prehabilitation reduces cardiopulmonary complications after pancreaticoduodenectomy: results of a propensity score matching analysis. *HPB*. 2023; 25: 1429–1437. <https://doi.org/10.1016/j.hpb.2023.07.899>.

[17] Dong M, Nie A, Liu C, Zheng J. Psychological resilience of patients with bladder cancer after radical cystectomy and urinary diversion: A cross-sectional study. *Psycho-Oncology*. 2022; 31: 21–29. <https://doi.org/10.1002/pon.5770>.

[18] Hydzik P, Kolarczyk E, Kustrzycki W, Kubiela G, Kałużna-Oleksy M, Szczepanowski R, et al. Readiness for Discharge from Hospital after Myocardial Infarction: A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*. 2021; 18: 6937. <https://doi.org/10.3390/ijerph18136937>.

[19] Religioni U, Czerw A, Badowska-Kozakiewicz AM, Deptała A. Assessment of Pain, Acceptance of Illness, Adjustment to Life, and Strategies of Coping with Illness among Patients with Gastric Cancer. *Journal of Cancer Education*. 2020; 35: 724–730. <https://doi.org/10.1007/s13187-019-01519-0>.

[20] Qian J, Qian M, Ren Y, Ye L, Qian F, Jin L, et al. Readiness for hospital discharge and influencing factors: a cross-sectional study on patients discharged with tubes from the department of hepatobiliary surgery. *BMC Surgery*. 2021; 21: 121. <https://doi.org/10.1186/s12893-021-01119-0>.

[21] Zeng F, Sun M, Li Y, Fan T, Wu X, Wang L, et al. Current Status and Influencing Factors of Readiness for Hospital Discharge of Lung Cancer Patients Receiving ERAS-Guided Postoperative Management. *Cancer Control*. 2024; 31: 10732748241287011. <https://doi.org/10.1177/10732748241287011>.

[22] Wang J, Rao Q, Zhou L, Xiang L, Xi M. The correlation between the need for continuing care services, influencing factors, and social support and discharge readiness among discharged patients with pulmonary tuberculosis in China: A cross-sectional study. *Applied*

- Nursing Research. 2024; 77: 151789. <https://doi.org/10.1016/j.apnr.2024.151789>.
- [23] Okamura M, Fujimori M, Sato A, Uchitomi Y. Unmet supportive care needs and associated factors among young adult cancer patients in Japan. *BMC Cancer*. 2021; 21: 17. <https://doi.org/10.1186/s12885-020-07721-4>.
- [24] Bottaro R, Craparo G, Faraci P. What is the direction of the association between social support and coping in cancer patients? A systematic review. *Journal of Health Psychology*. 2023; 28: 524–540. <https://doi.org/10.1177/13591053221131180>.
- [25] Lee J. Prediction Model of the Quality of Life for Patients with Pancreatic Cancer. *Healthcare*. 2022; 10: 1973. <https://doi.org/10.3390/healthcare10101973>.
- [26] Wu DL, Luo CL, Du X, Li PP, Jiang M, Liu T, et al. Current Status and Influencing Factors of Readiness for Discharge of Elderly Patients with Chronic Obstructive Pulmonary Disease. *Patient Preference and Adherence*. 2023; 17: 1323–1333. <https://doi.org/10.2147/PPA.S410725>.
- [27] Gündüz ES, Durmaz M, Aydin BK. The Predictive Effect of the Level of Psychological Resilience on the Level of Readiness for Discharge in Patients Undergoing Orthopaedic Surgery. *Journal of Clinical Nursing*. 2025; 34: 1398–1408. <https://doi.org/10.1111/jocn.17454>.
- [28] Min H, Rong M. The intermediary effect of perceived social support on the psychological resilience and discharge readiness among gynecological patients of childbearing age. *Medicine*. 2025; 104: e42415. <https://doi.org/10.1097/MD.00000000000042415>.

© 2026 The Author(s).

