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ORIGINAL RESEARCH

Fear of Cancer Recurrence and Its Associated Factors in Bladder Cancer Patients of Different Age Stages: A Cross-Sectional Study

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Objective: To investigate the level of fear of cancer recurrence (FCR) in bladder cancer patients across different age groups and to identify associated sociodemographic, clinical, and psychosocial factors. This study aims to provide an evidence base for developing age-specific psychological interventions.

Methods: A cross-sectional survey was conducted among 322 bladder cancer patients primarily diagnosed with non-muscle invasive bladder cancer (NMIBC) at Hebei General Hospital between January 2020 and December 2022. Patients were categorized into a younger group (18–59 years) and an older group (≥60 years). Data were collected using a general information questionnaire, the Fear of Progression Questionnaire-Short Form (FoP-Q-SF), the Social Support Rating Scale (SSRS), and the Simplified Coping Style Questionnaire (SCSQ). Descriptive statistics, t-tests, ANOVA, Pearson correlation, and multiple linear regression analyses were performed.

Results: The mean FCR scores were significantly higher in the younger group (33.46 ± 7.62) compared to the older group (28.93 ± 8.58) ($P<0.001$). Multiple linear regression analysis ($R^2=0.500$, $F=31.075$, $P<0.001$) identified several significant predictors of FCR: younger age ($\beta=-0.100$, $P=0.022$), lower per capita monthly family income ($\beta=-0.171$, $P<0.001$), advanced tumor TNM stage ($\beta=0.207$, $P<0.001$), poorer doctor-patient communication ($\beta=0.112$ for "General" vs "Very Satisfied", $P=0.013$), more tumor recurrences ($\beta=0.100$, $P=0.023$), less use of positive coping strategies ($\beta=-0.100$, $P=0.029$), more use of negative coping strategies ($\beta=0.241$, $P<0.001$), and lower social support ($\beta=-0.232$, $P<0.001$).

Conclusion: Bladder cancer patients experience considerable FCR, with younger patients exhibiting significantly higher levels than older patients. Factors such as age, socioeconomic status, disease severity, communication, coping styles, and social support are crucial determinants of FCR. Early identification of these factors and the implementation of tailored, age-appropriate interventions are recommended to alleviate FCR in this population.

Keywords: bladder cancer, fear of cancer recurrence, influencing factors, social support, coping styles, age groups, psychosocial oncology

Introduction

Bladder cancer is one of the most common malignancies of the urinary system, with non-muscle invasive bladder cancer (NMIBC) accounting for 75–80% of newly diagnosed cases.[1,2] Despite treatment, NMIBC is characterized by a high propensity for recurrence; studies indicate that postoperative recurrence rates for superficial bladder cancer can range from 5.62% to 12.36% within one year, 11.24% to 17.98% within two years, and as high as 31% to 78% within five years.[3,4] This high risk of recurrence and potential for disease progression contributes to a pervasive fear of cancer recurrence (FCR) among bladder cancer survivors.

FCR is defined as the "fear, worry, or concern relating to the possibility that cancer will come back or progress".[5] It is a significant component of psychological distress in cancer survivors, distinct from general anxiety or depression.[6] FCR exists on a spectrum, where lower levels may be adaptive, motivating adherence to follow-up care, while higher levels can

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become clinically significant, leading to functional impairment.[6,7] For context, studies in other urological malignancies show varying FCR levels; for instance, patients with low-risk small renal masses may report lower FCR compared to those with higher-risk upper tract urothelial carcinoma, reflecting the perceived threat of recurrence and prognosis.[8] While a moderate level of FCR can be adaptive, encouraging vigilance for recurrence signs and adherence to medical follow-up schedules,[6] excessive and persistent FCR can become a chronic psychological burden, negatively impacting patients' quality of life and daily functioning.[6,7] Research suggests that FCR does not necessarily diminish over time post-treatment.[9]

With the rising incidence and a trend towards younger age at diagnosis for bladder cancer, the psychosocial needs of patients across different age groups are becoming increasingly distinct.[10] Existing research on FCR in bladder cancer patients often provides a general overview without detailed analysis of specific age-related differences.[11–13] Furthermore, there is a need to better understand how FCR levels vary across age cohorts and what specific factors contribute to these variations. Therefore, this cross-sectional study aimed to investigate the current status of FCR in younger and older bladder cancer patients and to identify its influencing factors, thereby providing an empirical basis for developing targeted and precise psychological interventions.

Materials and Methods

Study Design and Participants

A cross-sectional survey design was employed. This study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies.[14] Using convenience sampling, bladder cancer patients who were treated at the Department of Urology, Hebei General Hospital, between January 2020 and December 2022, were invited to participate. The study population predominantly consisted of patients with non-muscle invasive bladder cancer (NMIBC, stages Ta, T1), but also included a smaller number of patients with muscle-invasive disease (T2-T4) to capture a broader spectrum of patient experiences. A total of 334 questionnaires were distributed, and 322 valid questionnaires were returned, yielding an effective response rate of 96.4%. Based on a power analysis using G*Power 3.1, aiming to detect a medium effect size ($f^2 = 0.15$) in a multiple regression model with up to 10 predictors at an alpha of 0.05 and a power of 0.95, a minimum sample size of 178 was required. Our sample of 322 is therefore considered adequate.

Inclusion criteria were: ① pathologically confirmed diagnosis of bladder cancer; ② age ≥18 years; ③ ability to communicate verbally and comprehend the questionnaire; ④ provided informed consent to participate.

Exclusion criteria were: ① presence of other cancers or more severe underlying diseases; ② a documented history of severe psychiatric disorders (eg, schizophrenia, bipolar disorder) or cognitive impairment that would preclude informed consent or accurate self-report; ③ a documented pre-cancer diagnosis of an anxiety or depressive disorder requiring ongoing psychiatric medication; ④ hearing or speech impairments.

Patients were divided into two age groups for comparative analysis: a younger group (18–59 years) and an older group (≥60 years).

Ethical Considerations

This study was approved by the Ethics Committee of Hebei General Hospital (Approval No. K-2023-2222). The study was conducted in accordance with the Declaration of Helsinki. All participants were informed about the study's purpose, procedures, and their right to withdraw at any time without consequence. Written informed consent was obtained from all participants prior to data collection. Anonymity and confidentiality of data were ensured.

Data Collection Instruments

General Information Questionnaire

This self-designed questionnaire, developed after a literature review, collected sociodemographic data (eg, gender, age, education level, marital status, occupation, per capita monthly family income, medical payment method) and disease-related information (eg, first-time treatment, time since diagnosis, pathological type, TNM stage, treatment modality, doctor-patient communication satisfaction, number of recurrences, metastasis status). It comprised 15 items.

Fear of Progression Questionnaire-Short Form (FoP-Q-SF)

Originally developed by Mehnert et al[15] and validated in Chinese by Wu et al,[16] this 12-item scale measures fear of disease progression. It uses a 5-point Likert scale (1=never to 5=always), with total scores ranging from 12 to 60. Higher scores indicate greater FCR. The Chinese version has demonstrated good reliability (Cronbach's $\alpha = 0.886$).

Social Support Rating Scale (SSRS)

Developed by Xiao,[17] this 10-item scale assesses three dimensions of social support: subjective support (4 items), objective support (3 items), and support utilization (3 items). Total scores range from 12 to 66, with higher scores indicating better social support.

Simplified Coping Style Questionnaire (SCSQ)

Developed by Xie,[18] this 20-item questionnaire assesses coping styles through two subscales: positive coping (12 items) and negative coping (8 items). Each item is rated on a 4-point scale (0=never to 3=often). Positive coping scores range from 0 to 36 (higher is better), and negative coping scores range from 0 to 24 (lower is better). The scale has shown good reliability (Cronbach's $\alpha = 0.90$).

Data Collection Procedure

After obtaining approval from relevant hospital departments and head nurses, data were collected by the primary researcher and a postgraduate student. Potential participants were approached, the study's purpose and procedures were explained, and informed consent was obtained. Questionnaires were administered in a one-on-one setting, with researchers providing standardized instructions and assistance if needed, ensuring objective responses. Completed questionnaires were checked for completeness on-site. Disease-related information not self-reported was extracted from patients' electronic medical records by the researchers.

Statistical Analysis

Data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, means, standard deviations [SD]) were used to summarize sociodemographic characteristics, disease-related variables, and scale scores. Independent samples t-tests or one-way analysis of variance (ANOVA) with post-hoc tests (eg, LSD or Bonferroni where appropriate) were used for univariate analysis to compare FCR scores across different categorical groups. Pearson correlation analysis was employed to examine the relationships between FCR scores and continuous variables such as social support and coping style scores. Finally, multiple linear regression analysis (enter method) was conducted to identify independent predictors of FCR. Variables that were statistically significant in the univariate analyses ($P<0.05$) were included in the regression model. A two-sided P-value < 0.05 was considered statistically significant for all analyses.

Results

Sociodemographic and Clinical Characteristics of Participants

A total of 322 bladder cancer patients were included. The majority were male (83.2%) and in the older age group (≥60 years, 75.2%). Most participants had a junior high school education or lower (84.1%). Retired individuals constituted the largest occupational group (56.5%). Regarding marital status, 15.5% were married, 20.2% were unmarried, and a combined 64.3% were divorced/separated or widowed, reflecting the older demographic of the cohort. The most common per capita monthly family income was 3000–3999 RMB (32.6%). Medical expenses were predominantly covered by medical insurance (89.1%) (Table 1).

Disease-related characteristics showed that 72.4% were receiving first-time treatment. Most patients (71.7%) were diagnosed within the past year. A high proportion (75.2%) reported being satisfied or very satisfied with communication with their attending physician. The majority had experienced one recurrence (67.1%), and 88.8% had no metastasis (Table 2).

Table 1 Sociodemographic Characteristics of Bladder Cancer Patients (N=322)

Characteristic	Category	n	%
Gender	Male	268	83.2
	Female	54	16.8
Age Group (years)	Younger (18–59)	80	24.8
	Older (≥60)	242	75.2
Education Level	Primary school or below	126	39.1
	Junior high school	145	45.0
	Senior high school/Vocational college	48	14.9
	Bachelor's degree or above	3	0.9
Occupational Status	Employed	105	32.6
	Retired	182	56.5
	Unemployed	35	10.9
Marital Status	Unmarried	65	20.2
	Married	50	15.5
	Divorced/Separated	188	58.4
	Widowed	19	5.9
Per Capita Monthly Family Income (RMB)	<2000	45	14.0
	2000-2999	67	20.8
	3000-3999	105	32.6
	4000-4999	72	22.4
	≥5000	33	10.2
Medical Payment Method	Medical insurance	287	89.1
	Self-pay	34	10.6
	Other	1	0.3

Table 2 Disease-Related Characteristics of Bladder Cancer Patients (N=322)

Characteristic	Category	n	%
First-time Treatment	Yes	233	72.4
	No	89	27.6
Time Since Diagnosis	<3 months	113	35.1
	3 months - 1 year	118	36.6
	1 year - 3 years	50	15.5
	3 years - 5 years	15	4.7
	≥5 years	26	8.1
Pathological Type	Urothelial carcinoma	284	88.2
	Squamous cell carcinoma	37	11.5
	Adenocarcinoma	1	0.3
Pathological TNM Stage	Ta	213	66.1
	T1	52	16.1
	T2	23	7.1
	T3	14	4.3
	T4	20	6.2
Treatment Modality	Transurethral resection of bladder tumor (TURBT)	248	77.0
	Partial cystectomy	72	22.4
	Other	2	0.6
Doctor-Patient Communication Satisfaction	General	80	24.8
	Satisfied	149	46.3
	Very satisfied	93	28.9

(*Continued*)

Table 2 (Continued).

Characteristic	Category	n	%
Number of Recurrences	1	216	67.1
	2	83	25.8
	≥3	23	7.1
Metastasis Status	Yes	36	11.2
	No	286	88.8

Scores on FCR, Social Support, and Coping Styles

The mean score for positive coping was 22.05 ± 8.37 (range 3–33), and for negative coping was 9.03 ± 4.63 (range 2–23). The mean social support score was 36.21 ± 6.67 (range 22–53). The mean total FCR (FoP-Q-SF) score for the entire sample was 30.06 ± 8.56 (range 15–45), indicating a generally moderate to high level of FCR among bladder cancer patients (Table 3).

Univariate Analysis of FCR Scores

Influence of Sociodemographic Factors on FCR

Significant differences in FCR scores were found based on age group, occupational status, and per capita monthly family income (all P<0.05). Gender, education level, marital status, and medical payment method did not show a significant association with FCR scores (P>0.05). Younger patients (18–59 years) reported significantly higher FCR scores (33.46 ± 7.62) than older patients (≥60 years) (28.93 ± 8.58) (t=4.206, P<0.001). Unemployed patients had the highest FCR scores (33.69 ± 7.75), followed by employed patients (30.39 ± 8.47), and retired patients had the lowest scores (29.17 ± 8.61) (F=4.283, P=0.015). Per capita monthly family income was inversely related to FCR scores (F=12.372, P<0.001); patients with an income <2000 RMB/month had the highest FCR scores (34.31 ± 6.95), while those with ≥5000 RMB/month had the lowest (25.70 ± 8.51) (Table 4).

Influence of Disease-Related Factors on FCR

Pathological TNM stage, satisfaction with doctor-patient communication, and number of recurrences significantly influenced FCR scores (all P<0.001). Whether it was the first treatment, time since diagnosis, pathological type, treatment modality, and metastasis status did not show significant associations with FCR (P>0.05). FCR scores increased with advancing pathological stage: Ta (28.01 ± 7.57), T1 (29.75 ± 8.71), T2 (35.04 ± 9.03), T3 (38.93 ± 7.14), and T4 (40.75 ± 3.21) (F=20.611, P<0.001). Higher satisfaction with doctor-patient communication was associated with lower FCR scores: general satisfaction (33.96 ± 7.78), satisfied (29.89 ± 8.49), very satisfied (26.97 ± 8.06) (F=15.729, P<0.001). FCR scores increased with the number of recurrences: 1 recurrence (28.48 ± 8.05), 2 recurrences (32.20 ± 8.71), ≥3 recurrences (37.13 ± 7.70) (F=15.377, P<0.001) (Table 5). The distribution of FCR scores by age group and pathological TNM stage is visually represented in Figure 1, illustrating higher median scores and greater variability in younger patients and those with advanced disease.

Table 3 Descriptive Statistics of Key Study Variables (N=322)

Variable	Minimum	Maximum	Mean	Standard Deviation (SD)
Positive Coping Score (SCSQ)	3	33	22.05	8.37
Negative Coping Score (SCSQ)	2	23	9.03	4.63
Social Support Score (SSRS)	22	53	36.21	6.67
FCR Total Score (FoP-Q-SF)	15	45	30.06	8.56

Table 4 Univariate Analysis of FCR Scores by Sociodemographic Characteristics (Mean ± SD)

Characteristic	Category	n	FCR Score (Mean ± SD)	F/t value	P-value
Gender	Male	268	29.66 ± 8.56	t=−1.850	0.065
	Female	54	32.02 ± 8.40		
Age Group (years)	Younger (18–59)	80	33.46 ± 7.62	t=4.206	<0.001
	Older (≥60)	242	28.93 ± 8.58		
Education Level	Primary school or below	126	30.88 ± 8.58	F=0.928	0.427
	Junior high school	145	29.37 ± 8.22		
	Senior high school/Vocational college	48	30.23 ± 9.32		
	Bachelor's degree or above	3	26.00 ± 13.00		
Occupational Status	Employed	105	30.39 ± 8.47	F=4.283	0.015
	Retired	182	29.17 ± 8.61		
	Unemployed	35	33.69 ± 7.75		
Marital Status	Unmarried	65	30.52 ± 8.79	F=0.267	0.849
	Married	50	30.68 ± 8.94		
	Divorced/Separated	188	29.70 ± 8.56		
	Widowed	19	30.37 ± 7.10		
Per Capita Monthly Family Income (RMB)	<2000	45	34.31 ± 6.95	F=12.372	<0.001
	2000-2999	67	33.93 ± 6.56		
	3000-3999	105	29.22 ± 8.72		
	4000-4999	72	27.03 ± 8.54		
	≥5000	33	25.70 ± 8.51		
Medical Payment Method	Medical insurance	287	30.07 ± 8.60	F=1.593	0.205
	Self-pay	34	29.53 ± 8.04		
	Other	1	45.00 ± N/A		

Table 5 Univariate Analysis of FCR Scores by Disease-Related Characteristics (Mean ± SD)

Characteristic	Category	n	FCR Score (Mean ± SD)	F/t value	P-value
First-time Treatment	Yes	233	30.21 ± 8.47	t=0.512	0.609
	No	89	29.66 ± 8.85		
Time Since Diagnosis	<3 months	113	30.17 ± 8.43	F=0.213	0.931
	3 months - 1 year	118	30.46 ± 9.01		
	1 year - 3 years	50	29.58 ± 8.31		
	3 years - 5 years	15	29.00 ± 7.24		
	≥5 years	26	29.31 ± 8.73		
Pathological Type	Urothelial carcinoma	284	30.19 ± 8.64	F=0.325	0.723
	Squamous cell carcinoma	37	29.03 ± 8.14		
	Adenocarcinoma	1	32.00 ± N/A		
Pathological TNM Stage	Ta	213	28.01 ± 7.57	F=20.611	<0.001
	T1	52	29.75 ± 8.71		
	T2	23	35.04 ± 9.03		
	T3	14	38.93 ± 7.14		
	T4	20	40.75 ± 3.21		
Treatment Modality	TURBT	248	29.95 ± 8.57	F=0.125	0.883
	Partial cystectomy	72	30.39 ± 8.62		
	Other	2	32.00 ± 9.90		
Doctor-Patient Communication Satisfaction	General	80	33.96 ± 7.78	F=15.729	<0.001
	Satisfied	149	29.89 ± 8.49		
	Very satisfied	93	26.97 ± 8.06		

(*Continued*)

Table 5 (Continued).

Characteristic	Category	n	FCR Score (Mean ± SD)	F/t value	P-value
Number of Recurrences	1	216	28.48 ± 8.05	F=15.377	<0.001
	2	83	32.20 ± 8.71		
	≥3	23	37.13 ± 7.70		
Metastasis Status	Yes	36	28.72 ± 8.67	t=−0.994	0.321
	No	286	30.23 ± 8.55		

Correlation Analysis of FCR with Coping Styles and Social Support

FCR total score was significantly negatively correlated with positive coping (r=−0.399, P<0.01) and social support (r=−0.495, P<0.01). It was significantly positively correlated with negative coping (r=0.470, P<0.01). Positive coping was positively correlated with social support (r=0.376, P<0.01), while negative coping was negatively correlated with social support (r=−0.290, P<0.01) (Table 6).

Multiple Linear Regression Analysis of Factors Influencing FCR

Multiple linear regression analysis was performed with FCR score as the dependent variable. The final model was statistically significant (F(9, 312)=31.075, P<0.001) and explained 50.0% of the variance in FCR scores (Adjusted R^2=0.486). Significant predictors of higher FCR included: being in the younger age group, lower per capita monthly family income, higher pathological TNM stage, poorer doctor-patient communication, more recurrences, lower positive coping scores, higher negative coping scores, and lower social support scores (Table 7).

Discussion

This study investigated fear of cancer recurrence (FCR) in bladder cancer patients, comparing younger and older age groups, and identified several key influencing factors. The findings indicate that FCR is a prevalent concern, with younger patients (18–59 years) experiencing significantly higher levels of FCR than older patients (≥60 years). The mean

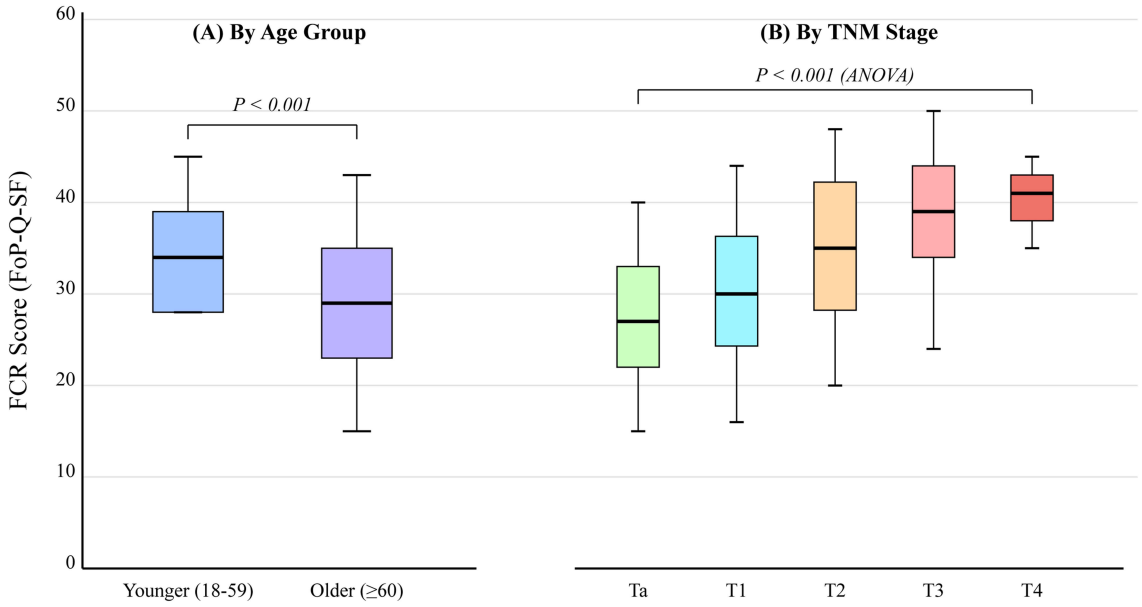

Figure 1 Boxplot distribution of Fear of Cancer Recurrence (FCR) scores. (**A**) Comparison of FCR scores between younger (18–59 years) and older (≥60 years) age groups. (**B**) FCR scores distributed by pathological TNM stage. The box represents the interquartile range (IQR), the horizontal line inside the box indicates the median, whiskers extend to 1.5 times the IQR, and individual points represent outliers.

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Table 6 Pearson Correlation Coefficients Between FCR, Coping Styles, and Social Support

Variable	FCR Total Score	Positive Coping Score	Negative Coping Score	Social Support Score
FCR Total Score	1			
Positive Coping Score	−0.399**	1		
Negative Coping Score	0.470**	−0.224**	1	
Social Support Score	−0.495**	0.376**	−0.290**	1

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Table 7 Multiple Linear Regression Analysis of Factors Predicting FCR (Dependent Variable: FCR Total Score)

Predictor Variable	B	Std. Error (SE)	Beta (β)	t	P-value	95% Confidence Interval for B	
						Lower	Upper
(Constant)	42.116	2.936		14.345	<0.001	36.338	47.894
Age Group (Ref: Younger 18–59)							
Older (≥60 years)	−1.889	0.819	−0.100	−2.307	0.022	−3.500	−0.278
Per Capita Monthly Family Income[a]	−1.236	0.308	−0.171	−4.009	<0.001	−1.842	−0.629
Pathological TNM Stage[b]	1.530	0.335	0.207	4.570	<0.001	0.872	2.188
Doctor-Patient Communication (Ref: Very Satisfied)[c]							
General	2.378	0.950	0.112	2.503	0.013	0.509	4.247
Satisfied	1.193	0.880	0.059	1.356	0.176	−0.538	2.924
Number of Recurrences[d]	1.347	0.591	0.100	2.278	0.023	0.183	2.510
Positive Coping Score	−0.125	0.057	−0.100	−2.188	0.029	−0.237	−0.013
Negative Coping Score	0.474	0.090	0.241	5.243	<0.001	0.296	0.652
Social Support Score	−0.300	0.059	−0.232	−5.043	<0.001	−0.417	−0.183

Notes: $R^2 = 0.500$; Adjusted $R^2 = 0.486$; $F(9, 312) = 31.075$, $P < 0.001$.[a] Coded as an ordinal variable where higher values indicate higher income.[b] Coded as an ordinal variable where higher values indicate more advanced stage.[c] Dummy coded variable with "Very Satisfied" as the reference category.[d] Coded as an ordinal variable where higher values indicate more recurrences.

FCR score in the younger group (33.46) is clinically relevant when contextualized with the FoP-Q-SF scale's range (12–60), suggesting a substantial psychological burden that warrants clinical attention.

Age-Related Differences in FCR

The observation that younger bladder cancer patients report higher FCR aligns with previous research across various cancer types, including international studies on bladder cancer survivors.[19–21] A large population-based cohort study of young adult cancer survivors (15+ years post-diagnosis) found that 69–75% reported some degree of FCR, with younger age being a significant predictor, particularly among those diagnosed with bladder cancer or malignant melanoma.[21] Further supporting this, a 2022 study focusing specifically on bladder cancer patients aged ≤40 years highlighted that while tumors in this group are often low-stage and low-grade, advanced disease features (eg, tumor size >30mm) correlate with poor prognosis, exacerbating FCR due to longer life expectancy and heightened disruption to career and family-building stages.[20] Younger individuals are often in crucial stages of career development, family building, and have longer life expectancies, making the threat of cancer recurrence particularly disruptive and distressing.[22] They may face greater uncertainty regarding future plans, fertility, and socioeconomic stability. Conversely, older patients, while potentially having higher comorbidity burdens, might possess different coping mechanisms developed through life experiences or a different perspective on mortality, leading to comparatively lower FCR levels.[19] This underscores the necessity for age-stratified psychological support tailored to the unique concerns of each age cohort.

Factors Influencing FCR

Our multivariate analysis confirmed that several factors independently predict FCR.

Sociodemographic Factors

Lower per capita monthly family income was strongly associated with higher FCR, consistent with findings by Chen et al[11] and international literature showing a link between socioeconomic distress and psychological morbidity.[23,24] The financial toxicity of cancer treatment, especially for a disease like NMIBC which often requires long-term surveillance and repeated interventions,[25] can impose substantial economic burdens, exacerbating psychological distress.[23]

Clinical Factors

Advanced pathological TNM stage and a higher number of recurrences were significant predictors of increased FCR, which is consistent with existing literature.[13,26] Higher tumor stage and recurrence signal a more aggressive disease and poorer prognosis, naturally leading to heightened fear.[27] Furthermore, poorer communication with the attending physician was linked to higher FCR. Effective doctor-patient communication is fundamental in cancer care; it can enhance understanding, build trust, and alleviate anxiety.[28,29] Studies by Milzer et al have highlighted existing communication barriers perceived by patients.[30]

Psychosocial Factors

Social support demonstrated a protective effect against FCR, with higher support correlating with lower fear, corroborating previous studies.[12] This finding is robust across cultures, though the specific mechanisms of social support may differ. In some collectivist cultures, family support is paramount, while in individualistic societies, peer support groups might play a larger role.[31] Social support can buffer stress and enhance coping abilities.[32] Coping styles also played a crucial role: positive coping was associated with lower FCR, while negative coping correlated with higher FCR. This aligns with research indicating that adaptive coping strategies can mitigate distress.[33,34] Interventions fostering hope and positive coping, such as mindfulness or exercise programs, have shown promise in reducing FCR.[35,36] The strong predictive power of psychosocial variables like coping and social support ($\beta = -0.100$ and -0.232, respectively) relative to age ($\beta = -0.100$) suggests that while age is a significant demographic marker, psychosocial factors are equally, if not more, potent targets for intervention.

Implications for Clinical Practice

The findings highlight the need for routine screening for FCR in bladder cancer patients, particularly among younger individuals and those with identified risk factors (low income, advanced stage, multiple recurrences, poor social support, or maladaptive coping). Healthcare providers should: 1. Implement age-specific psycho-oncological support programs. 2. Address financial concerns by providing information on available resources and advocating for affordable care. 3. Enhance doctor-patient communication, ensuring patients are well-informed and their concerns are addressed empathetically. 4. Promote positive coping strategies through counseling, cognitive-behavioral therapy, or support groups. 5. Facilitate access to social support networks, involving family and peers in the care process. For patients with recurrent disease, providing realistic information about surveillance, managing expectations, and reinforcing the importance of adherence to follow-up are crucial to mitigate FCR. Evidence-based interventions like cognitive-behavioral therapy (CBT) have proven effective in reducing FCR by addressing maladaptive cognitions and behaviors, with contemporary CBT approaches showing superior outcomes in managing FCR severity and associated distress.[37–39] Additionally, mindfulness-based stress reduction (MBSR) can help patients manage uncertainty and worry associated with potential recurrence through mechanisms such as enhancing present-moment awareness and reducing cognitive reactivity to stressors.[40,41] Integrating such programs into standard urological cancer care pathways could significantly improve patient outcomes.

Strengths and Limitations

This study contributes to understanding FCR in a specific cancer population by focusing on age-related differences and a comprehensive set of influencing factors. The use of validated questionnaires strengthens the reliability of our findings.

However, several limitations should be noted. First, the cross-sectional design precludes causal inferences and does not capture the dynamic nature of FCR over time, for instance, how it might fluctuate around follow-up appointments like cystoscopies. Second, convenience sampling from a single tertiary hospital in China may limit generalizability, as

cultural context can influence coping and support systems. Third, self-report measures are susceptible to recall and social desirability bias. Fourth, the dichotomization of age into two groups (18–59 vs ≥60) may oversimplify the complex relationship between age and FCR; treating age as a continuous variable or using finer stratification in future studies could yield more nuanced insights. Additionally, the exclusion of patients with a pre-cancer history of diagnosed anxiety or depression, while intended to isolate cancer-specific fear, may have underestimated the true prevalence and severity of FCR in the broader patient population, as these individuals may be more vulnerable. Fifth, we did not collect data on specific psychological interventions patients might have been receiving concurrently. Future research should employ longitudinal designs, multi-center and cross-cultural sampling, and include objective measures where possible to further explore the trajectory of FCR and the efficacy of targeted interventions.

Conclusion

Fear of cancer recurrence is a significant issue for bladder cancer patients, with younger patients demonstrating higher vulnerability. Age, socioeconomic status, disease severity, doctor-patient communication, coping mechanisms, and social support are critical determinants of FCR. Healthcare professionals should proactively identify patients at high risk for FCR and implement tailored, age-appropriate psychological and supportive care interventions to reduce this burden and improve overall well-being.

Data Sharing Statement

The datasets generated and analyzed during the current study are available from the corresponding author (Shoubin Li) on reasonable request.

Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of Hebei General Hospital (Approval No. K-2023-2222). The study was conducted in accordance with the Declaration of Helsinki. All participants were informed about the study's purpose, procedures, and their right to withdraw at any time without consequence. Written informed consent was obtained from all participants prior to data collection. Anonymity and confidentiality of data were ensured.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

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