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Current Status of Supportive Care Needs among Cancer Patients with PICC Lines and Associated Factors

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Abstract: *This study was conducted to explore the current status of supportive care needs among cancer patients undergoing PICC therapy and relevant influencing factors, providing a reference for the formulation of supportive care strategies for cancer patients. From October 2025 to February 2026, 125 cancer patients receiving PICC maintenance care at the PICC Outpatient Clinic of the First Affiliated Hospital of Air Force Medical University were selected using convenience sampling. Data were collected using a demographic questionnaire, the PICC Supportive Care Needs Scale for Cancer Patients, the General Self-Efficacy Scale, and the Social Support Rating Scale. Group comparisons were made using t-test or ANOVA. Pearson correlation analysis was used to assess variable correlations. Multiple linear regression analysis was applied to identify influencing factors. The total score for PICC supportive care needs among cancer patients was (83.79 ± 12.13) points, with the highest score (20.32 ± 3.21) observed in the information needs dimension. Multiple linear regression analysis revealed that the method of medical cost payment and the frequency of maintenance were the primary factors influencing PICC supportive care needs among cancer patients ($P < 0.05$); patients paying out-of-pocket had higher levels of need than those covered by medical insurance, and the frequency of maintenance was inversely associated with the level of need; social support and self-efficacy were not correlated with the total need score but showed a significant correlation with the psychological dimension ($P < 0.05$). The demand for PICC supportive care among cancer patients is at a moderate level, with medical cost payment methods and the number of maintenance sessions being the primary influencing factors. Clinically, priority should be given to the group of self-paying patients, standardizing catheter maintenance procedures, and simultaneously enhancing psychological support for patients in a targeted manner.*

Keywords: *Cancer patients; PICC; Supportive care; Influencing factors*

1. Introduction

According to data from the International Agency for Research on Cancer (IARC), the number of new cancer cases worldwide is projected to exceed 35 million annually by 2050, representing a 77% increase from 2022, as the global burden of cancer continues to rise[1]. Peripherally inserted central catheters (PICCs), serving as a vital access route for intravenous therapy and nutritional support in cancer patients, offer the advantages of long indwelling times and high safety and are widely used in clinical oncology nursing[2]. However, during PICC indwelling, cancer patients are prone to catheter-related complications[3,4], insufficient self-management skills, psychological stress, and a lack of care resources. Consequently, their needs for PICC supportive care remain inadequately met[5,6]. This not only significantly weakens cancer patients' ability to cope with their disease and treatment but also exacerbates their mental and psychological burdens, leading to reduced treatment adherence, increased risk of complications, a significant deterioration in quality of life, and even adverse effects on disease prognosis[7,8].

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In recent years, numerous studies both domestically and internationally have focused on the supportive care needs of the general cancer population. Research indicates that such needs are prevalent among patients with various types of cancer and throughout the entire disease course, and that the level of need remains consistently high. These needs are widely observed in patients with various solid tumors, including liver cancer[8], advanced gynecological cancer[9], esophageal cancer[10-12], breast cancer[13-15], and bladder cancer[16]. However, research specifically addressing the PICC-related supportive care needs of this unique subgroup of cancer patients with indwelling PICC lines remains scarce. Therefore, this study aims to analyze the current status of PICC-related supportive care needs among cancer patients and their influencing factors, providing a theoretical basis for future efforts to reduce the level of these needs and thereby improve patients' quality of life.

2. Subjects and Methods

2.1. Subjects

This study was approved by the Ethics Committee of the First Affiliated Hospital of Air Force Medical University (XJYY-LLFJ-029).Sample size = [maximum number of dimensions × 20] + [total number of entries × 15%]. Taking into account a 15% attrition rate, the final sample size for this study was determined to be 125 cases. Convenience sampling was used to select 125 cancer patients who underwent PICC line maintenance at the PICC Outpatient Clinic of the First Affiliated Hospital of Air Force Medical University between October 2025 and February 2026 as study subjects. Inclusion criteria: (1) Patients diagnosed with malignant tumors via pathological examination and with a catheter(PICC) in the upper limb; (2) Age: 18–70; (3) Karnofsky Performance Status (KPS) score ≥ 60, capable of performing normal activities; (4) Alert and able to complete the questionnaire independently or with assistance; (5) Informed consent. Exclusion criteria: (1) Patients with cognitive or psychiatric disorders; (2) Patients in critical condition with a projected survival of < 3 months; (3) Patients concurrently participating in other clinical trials.

2.2. Survey Methods

2.2.1. Demographic Questionnaire

The investigator developed this questionnaire based on a literature review, research hypotheses, and study objectives. It covers demographics, disease status, PICC placement, and digital information.

2.2.2. Cancer Patient PICC Placement Supportive Care Needs Scale (CPICCNS)

This scale[17]is used to assess the supportive care needs of cancer patients with PICC lines and comprises six dimensions: informational, physiological, psychological, emotional, spiritual, and social needs. The scale consists of 29 items and employs a 5-point Likert scale, ranging from "no need at all" (1) to "extremely high need" (5). The total score ranges from 29 to 145 points. A higher score indicates that the patient has more unmet needs. The Cronbach's α coefficients for each dimension of the scale range from 0.720 to 0.900.

2.2.3. General Self-Efficacy Scale (GSES)

This scale[18]is used to assess patients' levels of self-efficacy. It is a unidimensional scale consisting of 10 items. Each item uses a 4-point Likert scale, ranging from "completely disagree" to "completely agree," scored 1–4 points respectively. The total score ranges from 10 to 40 points; a higher score indicates higher general self-efficacy. The overall Cronbach's α coefficient for the scale ranges from 0.870 to 0.957.

2.2.4. Social Support Rating Scale (SSRS)

This scale[19]is used to assess patients' levels of social support and comprises three dimensions: objective support, subjective support, and utilization of support. The scale consists of 10 items. The total scale score ranges from 12 to 66 points, with the following rating criteria: ① <33 points (poor); ② 33–45 points (average); ③ >45 points (good). A higher total score indicates better current social support for the research subject. The scale's overall Cronbach's α coefficient is 0.844.

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2.3. Survey Methodology

Prior to the survey, the investigator provided informed consent to the patients. Questionnaires were distributed only after the patients had personally signed the informed consent form. After the patients completed the questionnaires, the investigator checked the completeness of the responses, promptly filled in any omitted or missing items, collected the questionnaires, and marked them accordingly. A total of 134 questionnaires were distributed, and 125 valid questionnaires were recovered, resulting in a valid questionnaire recovery rate of 93.28%.

2.4. Statistical Methods

Statistical analysis was performed using SPSS 27.0 software. Categorical data were described using frequency and percentage; continuous data were described using mean ± standard deviation ($x \pm s$). T-tests and one-way analysis of variance (ANOVA) were used for statistical inference; multiple linear regression analysis was employed to identify factors influencing the need for supportive care. The significance level was set at $\alpha = 0.05$.

3. Results

3.1. Comparison of PICC Supportive Care Needs Scores among Cancer Patients with Different Demographic Characteristics

A comparison of the mean scores on the PICC Supportive Care Needs Scale among cancer patients with different payment methods for medical expenses, frequency of follow-up visits, level of knowledge about PICC, sources of information (nurses), and willingness to accept digital PICC revealed statistically significant differences at the $\alpha = 0.10$ level. The results are shown in Table 1.

Table 1: Comparison of PICC supportive care needs scores among cancer patients with different demographic characteristics.

Item	Group	Total need score(points,$\bar{x}\pm s$)	*t/F*	*P*
Age	18-39	84.27±14.51	0.900	0.409
	40-59	85.09±11.18		
	60-75	81.89±12.08		
Gender	Male	82.88±12.24	-0.771	0.442
	Female	84.56±12.07		
BMI(Kg/m^2)	Underweight	85.13±8.37	0.252	0.860
	Normal weight	83.56±12.79		
	Overweight	84.40±11.63		
	Obese	81.00±11.73		
Educational level	Junior high school or below	83.55±11.54	0.078	0.925
	High school/technical secondary school	83.33±11.74		
	College/bachelor's degree or above	84.36±13.23		
Marital status	Unmarried	83.00±12.27	0.228	0.796
	Married	83.55±12.13		
	Divorced/widowed	85.69±12.68		
Place of residence	Rural	83.73±10.97	-0.029	0.977
	Urban	83.81±12.46		
Medical payment method	Employee medical insurance	82.54±12.25	4.091	0.008
	Resident medical insurance	82.38±10.66		
	New Rural Cooperative Medical Scheme	90.00±12.68		
	Self-payment	99.50±13.77		
Monthly per capita household income	≤3000 RMB	81.34±10.99	1.083	0.342
	3001-4999 RMB	84.47±12.07		
	≥5000 RMB	85.83±14.27		
Disease group	Gastrointestinal cancer	83.16±11.92	0.677	0.668
	Breast cancer	85.38±4.69		
	Gynecologic cancer	88.00±9.68		

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	Head and neck cancer	79.92±7.57		
	Bone and soft tissue sarcoma	82.81±15.93		
	Hematologic and lymphatic cancer	87.27±14.23		
	Other solid tumors	82.63±14.84		
Hypertension	Yes	84.62±13.19	0.419	0.676
	No	83.54±11.85		
Diabetes mellitus	Yes	81.80±10.55	-0.374	0.709
	No	83.88±12.22		
Cardiovascular disease	Yes	93.50±14.85	1.143	0.255
	No	83.63±12.09		
Expected treatment duration	<3 months	82.92±11.77	0.126	0.881
	3-6 months	84.36±12.48		
	＞6 months	83.38±12.01		
History of ipsilateral upper extremity th-rombosis or vascular surgery	Yes	81.00±5.63	-0.625	0.533
	No	83.96±12.4		
Number of catheterizations	1 time	83.92±11.84	0.634	0.527
	2 times	80.00±21.18		
Number of maintenance sessions	≤10 times	88.87±13.27	5.193	<0.001
	＞10 times	78.63±8.14		
Catheter insertion site	Basilic vein	83.87±12.22	0.089	0.915
	Median cubital vein	79.00±0.00		
	Brachial vein	83.14±12.23		
Catheterized arm	Left upper extremity	84.50±11.62	0.366	0.715
	Right upper	83.57±12.33		
Catheter lumen count	Single lumen	83.64±11.99	-1.083	0.281
	Double lumen	93.00±22.63		
Level of understanding of PICC	Not familiar	88.00±12.65	3.374	0.021
	Moderately familiar	83.75±12.09		
	Fairly familiar	79.84±9.01		
	Very familiar	66.00±9.90		
Use of mobile phone	Yes	83.87±12.14	0.810	0.420
	No	74.00±0.00		
Willingness to learn PICC maintenance knowledge via mobile phone/WeChat	Willing	84.19±12.23	1.429	0.244
	Uncertain	80.33±9.58		
	Unwilling	71.00±4.24		
Nurses	Yes	82.52±12.50	-1.794	0.075
	No	86.71±10.83		
Physicians	Yes	83.78±14.73	-0.004	0.997
	No	83.79±11.54		
Physicians	Yes	83.57±10.60	-0.246	0.806
	No	84.12±14.22		
WeChat Official Accounts/Video Accounts	Yes	86.82±17.34	1.110	0.269
	No	83.31±11.13		
Short-video platforms	Yes	84.84±12.33	0.869	0.387
	No	82.94±11.98		
Sharing by fellow patients	Yes	82.71±17.62	-0.241	0.810
	No	83.86±11.83		
Willingness to accept digital PICC guidance	Willing	84.35±12.19	1.844	0.068
	Uncertain	75.71±8.40		
	Unwilling	75.00±0.00		

Note:α = 0.10 is used as the criterion for selecting variables to include in multiple regression.

3.2. Current Status of PICC Supportive Care Needs Scores among Cancer Patients

The PICC supportive care needs scores for the 125 cancer patients ranged from 29 to 145 points, with a mean score of (83.79 ± 12.13) points. Among them, 88.0% of patients scored between 68 and 106 points, indicating that their PICC supportive care needs were at a moderate level. The specific scores for each dimension are shown in Table 2.

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Table 2: Total and dimensional scores of supportive care needs in cancer patients with PICC.

Item	Score range (points, $\bar{\chi}$±s)	Score (points, $\bar{\chi}$±s)	Mean per item(points, $\bar{\chi}$±s)
Information needs dimension	13~28	20.32±3.21	2.90±0.46
Psychological needs dimension	7~22	13.94±2.69	2.79±0.54
Physiological needs dimension	10~29	17.66±3.51	2.94±0.59
Spiritual needs dimension	6~18	10.73±2.36	2.68±0.59
Social needs dimension	10~25	15.24±2.94	3.05±0.59
Practical needs dimension	2~10	5.90±1.56	2.95±0.78
Total CPISSNS score	53~113	83.79±12.13	84.00±12.00

Note: $\bar{x}$, mean; s, standard deviation; CPISSNS, Cancer Patients with PICC Supportive Care Needs Scale.

3.3. Current Status of General Self-Efficacy and Social Support among Cancer Patients

The general self-efficacy scores of the 125 cancer patients ranged from 11 to 36 points, with a mean score of (17.86 ± 4.58) points and a mean item score of (1.79 ± 0.46) points; The social support scores for the 125 cancer patients ranged from 18 to 49 points, with a mean score of (33.00 ± 6.00) points. Among the three dimensions, the highest score was for the subjective support dimension (18.95 ± 4.16 points), followed by the objective support dimension (8.39 ± 1.42 points) and the utilization of support dimension (5.68 ± 1.61 points); See Table 3 for specific scores.

Table 3: Scores of social support and general self-efficacy in cancer patients.

Scale and dimension		Score range	Score($\bar{x}$±s)	Mean per item ($\bar{x}$±s)
Total SSRS score		18~49	33.00±6.00	3.30±0.60
	Objective support	4~12	8.39±1.42	2.80±0.47
	Subjective support	10~31	18.95±4.16	4.74±1.04
	Utilization of support	3~10	5.68±1.61	1.89±0.54
Total GSES score		11~36	17.86±4.58	1.79±0.46

Note: SSRS, Social Support Rating Scale; GSES, General Self-Efficacy Scale.

3.4. Current Correlation Analysis of PSSS, GSES, and PICC Supportive Care Needs among Cancer Patients

General Self-Efficacy Scale (GSES) showed a significant negative correlation with the psychological needs dimension of PICC supportive care needs ($r = -0.284$, $P < 0.01$); The objective support dimension of social support (PSSS) also showed a significant negative correlation with the psychological needs dimension ($r = -0.262$, $P < 0.01$). However, the correlations between GSES, total social support scores, and other dimensions with the various dimensions and total scores of PICC needs were not statistically significant (all $P > 0.05$). See Table 4 for specific results.

Table 4: Correlation analysis results of SSRS, GSES and PICC-related needs in cancer patients.

	Information needs dimension	Psychological needs dimension	Physiological needs dimension	Spiritual needs dimension	Social needs dimension	Practical needs dimension	CPICCNS score
GSES	0.135	-.284**	0.031	-0.004	-0.014	-0.093	-0.034
SSRS	0.091	-0.157	0.022	-0.022	0.127	-0.023	0.019
Objective	-0.045	-.262**	-0.099	-0.093	0.022	-0.109	-0.125
Subjective	0.105	-0.129	0.060	0.048	0.143	0.039	0.066
Utilization	0.112	-0.028	0.018	-0.125	0.091	-0.090	0.015

Note: ** indicates P<0.01;SSRS,Social Support Rating Scale; GSES, General Self-Efficacy Scale; CPICCNS, Cancer Patients with PICC Supportive Care Needs Scale.

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3.5. Multiple Linear Regression Analysis of Factors Influencing the Need for PICC Supportive Care among Cancer Patients

The payment method (self-pay) and the number of maintenance sessions were identified as significant factors influencing the total PICC need score ($P < 0.05$). See Tables 5-6.

Table 5: Assignment of independent variables and setting of dummy variables.

Independent variable	Assignment
Medical payment method	Employee medical insurance (X1=0, X2=0, X3=0); Resident medical insurance (X1=1, X2=0, X3=0); New Rural Cooperative Medical Scheme (X1=0, X2=1, X3=0); Self-payment (X1=0, X2=0, X3=1)
Number of maintenance sessions	Less than 10 times (X1=0); More than 10 times (X2=1)
Level of understanding of PICC	Not familiar=1, Moderately familiar=2, Fairly familiar=3, Very familiar=4
Nurses	Yes=1, No=2
Willingness to accept digital PICC guidance	Willing=1, Uncertain=2, Unwilling=3

Table 6: Results of multiple linear regression analysis for total PICC-related needs score in cancer patients.

Variable	β	S.E.	Standardized β	*t*	*p*	VIF
(Constant)	100.947	5.993	—	16.843	0.000	—
Resident medical insurance	-0.656	2.068	-0.027	-0.317	0.752	1.158
New Rural Cooperative Medical Scheme	5.194	3.319	0.131	1.565	0.120	1.144
Self-payment	12.524	5.692	0.182	2.200	0.030	1.118
Number of maintenance sessions	-7.118	2.221	-0.295	-3.205	0.002	1.374
Level of understanding of PICC	-2.868	1.660	-0.156	-1.728	0.087	1.323
Nurses	3.624	2.090	0.138	1.734	0.086	1.030
Willingness to accept digital PICC guidance	-5.837	3.338	-0.139	-1.749	0.083	1.028

Note: $F=6.511$, $P<0.001$, $R2=0.280$, Adjusted $R^2=0.237$.

4. Discussion

4.1. Current Status of PICC Supportive Care Needs among Cancer Patients

The results of this study indicate that the total score for PICC supportive care needs among 125 cancer patients was (83.79 ± 12.13) points, indicating a moderate level of need. This finding is largely consistent with the conclusions of Tao Ling's[20]survey. This study found that the most pressing need among cancer patients was for information regarding PICC.

4.2. Multiple Factors Influencing PICC Supportive Care Needs among Cancer Patients

This study indicates that the method of medical cost payment is a significant factor influencing the demand for PICC supportive care among cancer patients ($P < 0.05$). This finding is consistent with the conclusions of studies by RVDKS[21]and others on the relationship between payment methods and care needs among cancer patients. The key to addressing this issue lies in the continuous improvement of China's medical insurance system and healthcare service infrastructure. The frequency of maintenance is also a significant factor influencing the demand for PICC supportive care among cancer patients ($P < 0.05$). This is consistent with the research logic of Li Xiaomei[22]. Patients undergoing their first PICC maintenance typically have relatively limited knowledge of PICC and self-management skills; coupled with poor adaptation in areas such as psychological adjustment and role transition among some patients, their need for supportive care is higher. As the number of maintenance sessions increases, patients' disease knowledge and skill sets also grow, leading to a corresponding decrease in their need for supportive care. Therefore, healthcare professionals should prioritize assessing the supportive care needs of patients undergoing their first PICC maintenance and provide them with targeted health education.

Social support and self-efficacy can significantly reduce patients' psychological care needs by alleviating negative emotions and enhancing psychological coping abilities[23]. The findings of this study are consistent with trends in research on the psychological needs of cancer patients, suggesting that

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psychological support plays a crucial role in reducing the extent of patients' need for supportive care[24].

Furthermore, this study indicates that variables such as patients' willingness to accept digital guidance and their preferred channels for information retrieval also show potential influence. This suggests that future research could further explore strategies for optimizing digital interventions and providing personalized information to meet the diverse needs of PICC patients. In recent years, studies have shown[25,26] that establishing digital online platforms can better promote health education and meet the needs of PICC patients for continuous care services, allowing patients to access knowledge about catheter maintenance through multiple channels.

The results of this study indicate that cancer patients have high needs for PICC supportive care, with information needs ranking highest. The frequency of maintenance and psychological support are significant factors influencing the supportive care needs of breast cancer patients. Healthcare providers should focus on providing targeted support to address the information needs of cancer patients with PICC lines at different stages of catheter use, while also prioritizing the assessment and intervention of patients' psychological well-being. This approach aims to deepen patients' understanding of their disease, reduce their need for PICC supportive care, and thereby improve their quality of life. As the sample in this study was drawn from a single-center hospital, its representativeness is limited. Future research could increase the sample size and conduct multi-center studies, while incorporating qualitative research methods to thoroughly analyze the factors influencing PICC supportive care needs among cancer patients and design and implement more targeted intervention programs.

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