Original Article

The Effect of an Information Support Program on Self-Efficacy of Prostate Cancer Patients during Hormonal Therapy

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ABSTRACT

Objective: This study was conducted to evaluate the effect of an information support program on the self-efficacy (SE) of prostate cancer (PCa) patients receiving hormonal therapy (HT). **Methods:** Based on the information support program constructed in a previous study, a randomized controlled trial was conducted in a cancer hospital in Shanghai, China. One hundred subjects were randomly divided into two groups. The control group was provided routine care and communication, and the experimental group participated in an informational support program. Three months later, the following outcomes were compared between the two groups: information acquisition, disease knowledge mastery, SE, healthy behavior adherence, health-related quality of life (HRQoL), and serum prostate-specific antigen (PSA) levels. *t*-test and Wilcoxon rank-sum test were used to compare the differences between the two groups, and intention-to-treat analysis was used to increase the reliability of the results. **Results:** After the intervention, information acquisition, disease knowledge mastery, and the SE and healthy behavior adherence of the experimental group were significantly increased compared with the control group, whereas the HRQoL and PSA did not significantly differ from that observed in the control group. **Conclusions:** The results showed that information support programs improve information acquisition, disease knowledge mastery, SE, and healthy behavior adherence among PCa patients receiving HT.

Key words: Hormonal therapy, information support, prostate cancer, self-efficacy

Introduction

Compared with developed countries, the incidence rate of prostate cancer (PCa) in China is relatively low. However, a sustained and rapid increase in PCa incidence has occurred in recent years in China, increasing from 4.62/10 million in 2000 to 21.62/10 million in 2014 with an average annual increase of approximately 11.5%.[1] This rate will continue to increase with the aging of the population and westernization of lifestyles.[2] Compared with other malignant tumors, the development of PCa is relatively slow, the survival rate of patients is relatively higher, and the survival time is relatively longer. Even for distant metastatic PCa, the 5-year relative survival rate can reach 30%, while for nonmetastatic PCa, the rate can reach more than 99%.[3] Therefore, the quality of life (QoL) of PCa patients has attracted more and more attention.

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PCa is an androgen-related tumor, and hormonal therapy (HT) is one of the basic treatments for advanced PCa.[4] HT can be used alone or combined with chemotherapy for systemic treatment of advanced metastatic PCa, or combined with radical prostatectomy or radiotherapy for adjuvant or neoadjuvant treatment of localized or locally advanced PCa.[5] The majority of PCa patients are diagnosed with advanced or metastatic disease in China. Specifically, a multicenter study[6] showed that 68% of PCa patients were in an advanced stage at the time of diagnosis, whereas >80% of PCa patients received HT as the main treatment. HT is widely used in the treatment of PCa in China. However, HT can cause a series of adverse reactions related to a significant decrease in androgens, such as hot flashes, fatigue, sexual dysfunction, and osteoporosis, which increase patients' symptom burden and affect treatment adherence and QoL.[7,8] Therefore, providing information and guidance on disease, treatment, symptom management, and self-care for PCa patients receiving HT should be considered.

Studies[9-11] have shown that information demand is one of the most common needs of PCa patients; however, at present, PCa patients, especially those who receive HT, generally face the imbalance of high information demand and low information acquisition.[12,13] However, information acquisition is closely related to PCa patients' overall health as well as their physiological, emotional, social, role, and other functions.[12,14] Those who lack information, especially information on treatment-related adverse reactions and supportive care, may have a higher level of uncertainty, anxiety, and depression[15] but lower health-related QoL (HRQoL)[16] and treatment adherence.[13] Therefore, meeting the information needs of patients in a timely manner is of great importance.

Information support refers to providing knowledge, guidance, and information consultation to help individuals cope with stress,[17] which is an essential part of social support and plays an important role in helping individuals relieve stress and improve their health. A large number of studies[18-20] have shown that providing information and guidance on disease knowledge, symptom management, life care, and other aspects to PCa patients receiving HT can reduce bad emotions, such as uncertainty, anxiety, and depression; increase confidence in coping with the disease, decision-making, and treatment adherence; and improve healthy behavior, self-care ability, and QoL. The American Cancer Society PCa Survivorship Care Guidelines[21] recommend that patients' information needs for PCa and its treatment, side effects, other health concerns, and available support services be regularly evaluated and met. In contrast to surgery, radiotherapy, chemotherapy, and other

inhospital treatments, PCa patients receiving HT often take medicine at home and follow-up at the outpatient clinic every 1–3 months. Generally in China, outpatient doctors will adjust the treatment plan or prescribe drugs according to the patient's condition, but there is little time and energy for life, self-care, and other aspects of individual guidance. However, nurses seldom participate in the follow-up, and no medical care team or community organization is involved in their follow-up. The limited communication time at the outpatient clinic, the lack of access to information outside the hospital, and the inability to make professional judgments and screen the information obtained are common problems for such patients. In addition, prostate-specific antigen (PSA) is an important part of patients' regular follow-up, and it is also one of the clinical indicators that patients and their families need to monitor regularly and pay the most attention to. It is necessary to provide patients with follow-up examination-related information, help them correctly understand PSA and other indicators, improve the medication and follow-up compliance, and ensure the treatment effect and the decline of PSA. Therefore, how to provide effective information support for such patients who are receiving outpatient follow-up or taking medicine at home is an urgent problem to be solved.

The concept of self-efficacy (SE) was first proposed by Bandura, who defined SE as the judgment, confidence, and belief of an individual himself or herself regarding the ability to complete a specific behavioral goal,[22] thereby reflecting the degree of self-confidence of an individual when facing a behavioral goal or a difficult situation. In this study, SE was defined as the self-confidence of PCa patients during HT in self-management of disease, symptoms, or other changes and taking healthy behaviors when facing difficult situations such as disease, treatment, physiological symptoms, and psychosocial changes. Cancer patients with a high level of SE are more willing to engage in healthy behaviors, and their self-management (e.g., communication, exercise, and information seeking) is also better[23,24] and further affects their decision-making participation behavior and overall satisfaction.[25] According to Bandura, the formation and change of SEs are influenced by information sources, including direct experience, indirect experience, verbal persuasion, and physical and psychological states.[26] When patients are confronted with physiological, psychological, social, and other problems caused by disease or treatment, their self-confidence in coping is affected by their own experience and various external information. Studies[27,28] also confirmed that patients' SE was positively correlated with their information acquisition. Therefore, according to the theoretical model of SE, we assumed that providing information support to patients can help improve

SE, enhance confidence in self-management and coping with difficulties to improve adherence to healthy behaviors, and further improve HRQoL [Figure 1].

In summary, this study focused on the information needs of PCa patients receiving HT and intended to provide systematic information support program interventions to meet patients' information needs to increase their knowledge related to the disease and self-management, thus improving confidence and SE in coping with the disease, increasing healthy behavior adherence and coping ability, reducing psychological and symptom burden, and further improving HRQoL. In addition, this study hoped to provide the basis for establishing the best path or strategy of information support for PCa patients receiving HT in China.

Methods

Previous research

In the preliminary study,[29] we conducted a cross-sectional survey on 251 patients and a qualitative interview with 19 patients. After systematic literature retrieval, 9 articles were included for content analysis and information extraction. Based on the above results, the indicators and items of the program were initially determined. Then, we invited 13 experts from urology clinical, nursing, nursing research, and nursing management to form an expert group to demonstrate and revise the program. A 5-point Likert scale was also used to score the importance of each indicator and item. Specifically, 5-1 points were assigned from "very important" to "very unimportant," respectively, and the results were all >4.8. Thus, the information support program for PCa patients during HT was finally formed, including 5 first-class and 18 second-class indicators [Figure 2].

Participants

Based on convenient sampling, 100 PCa patients receiving HT were selected in the urology outpatient and ward of a cancer hospital in Shanghai from July to October 2019. Researcher staff conducted face-to-face talks with the patients who met the study standards in a separate meeting room. Those who were willing to participate signed a consent form approved by the Medical Ethics Committee. After providing informed consent, patients were included in the study until the required sample size was collected. Inclusion criteria: (1) pathologically diagnosed as PCa by biopsy or operation; (2) at the initial stage of HT for PCa (0–3 months); (3) estimated HT time >6 months; (4) master basic operation skills of the app "WeChat" or can simply use the app after learning; (5) primary school education or above; (6) age <80 years old; (7) clear consciousness and have certain reading, understanding, and communication ability; and (8) willing to participate in this study and signed the informed consent form. Exclusion criteria: (1) underwent castration operation; (2) combined with other tumors; (3) combined with other serious endocrine diseases; and (4) have serious diseases in heart, brain, lung, or other important organs that prevent participation in the study or completion of follow-up. The subjects were numbered 1–100 according to the order of enrollment. Then, 100 random numbers were generated by Excel and assigned according to the 1–100 number sequence of the subjects. It was specified in advance that subjects assigned odd random numbers enter the experimental group, whereas patients with even numbers enter the control group. Finally, 53 and 47 cases were included in the experimental and control groups, respectively.
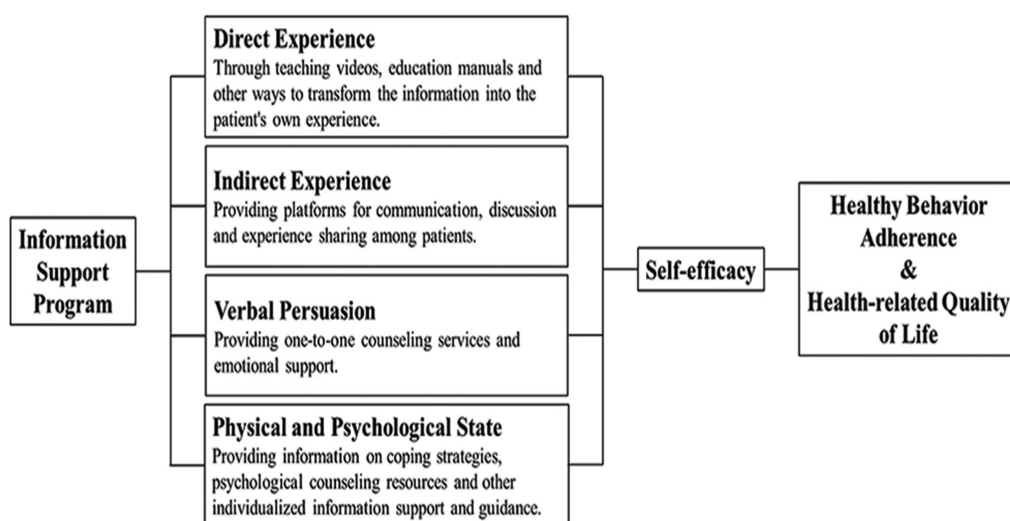

Figure 1: The application of self-efficacy theory model in the study

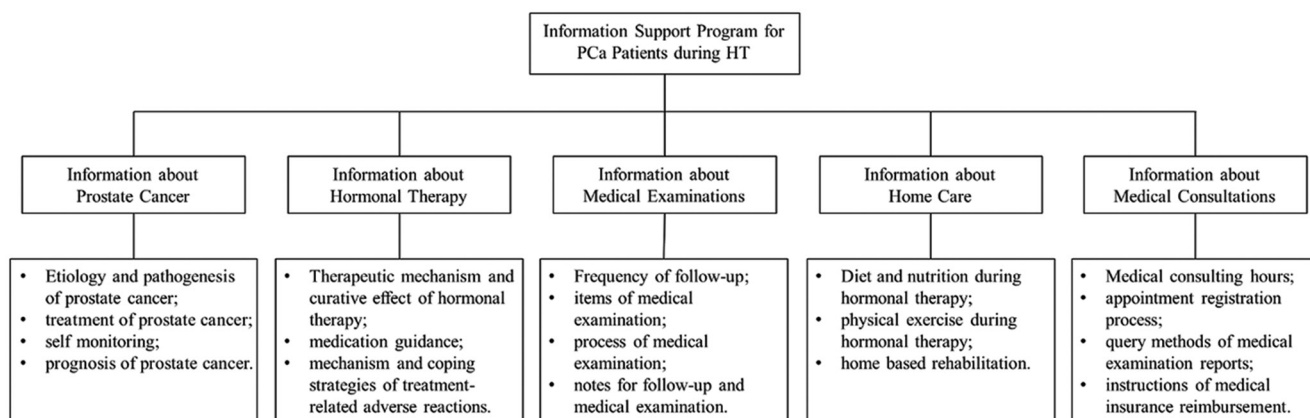**Figure 2:** Information support program for prostate cancer patients during hormonal therapy. HT: Hormonal therapy, PCa: Prostate cancer
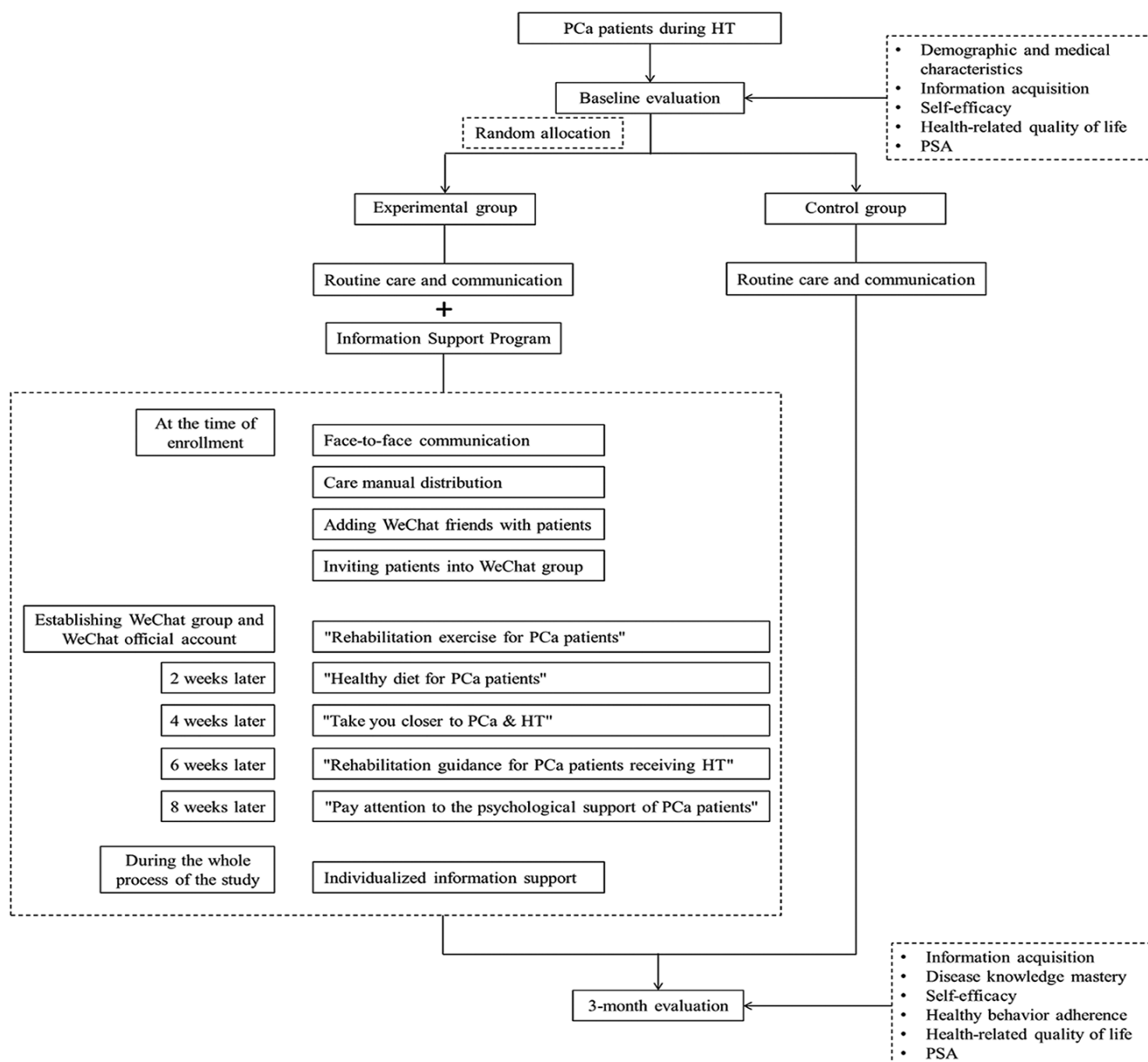

Figure 3: Technology roadmap. HT: Hormonal therapy, PCa: Prostate cancer, PSA: Prostate-specific antigen

Procedures

In a previous study,[29] an information support program for PCa patients receiving HT was constructed. In this study, the effect of this program was evaluated in a randomized controlled trial [Figure 3]. The project was led by nurses, and an information support team including nurses, doctors, and volunteers was established. Urology nurses with master's degrees were the main implementers of the intervention, including patient management, dissemination of educational materials, provision of consultation services, and participation in the follow-up of patients. Subjects were recruited from the urology clinic and ward of a cancer hospital in Shanghai. After obtaining informed consent, patients were included in the study. The baseline evaluation was conducted using a questionnaire survey. The subjects were randomly divided into two groups. The control group received routine care and communication, whereas the experimental group participated in an information support program. Three months later, WeChat was used to send questionnaires to patients to evaluate the prognosis of the trial.

Routine care and communication

The control group was provided routine care and communication. The medical staff explained the treatment plan, medication method, and precautions and introduced possible adverse reactions and some simple coping methods during HT to the patients. The official WeChat account was also available. Patients could seek medical information about the disease by reading the articles published on the official account, for example, "What is PCa?" and "What are the adverse effects of HT?" In addition, the hospital also has a rehabilitation club, which held lectures irregularly by doctors that focused on general science with Q and A sessions. Patients can sign up for the lectures themselves.

Information support program interventions

The experimental group participated in an information support program on the basis of routine care and communication and was provided with continuous information support outside of the hospital. The intervention measures under the guidance of the program provided are as follows at specific time points:

At the time of enrollment

When the patients were included in the study, the researcher used consistent words to communicate with them face to face for 20–30 min, including medication guidance, and informed the patients of the possible adverse reactions, the symptoms, impact and duration of these adverse reactions, and how to deal with them. Finally, the researcher answered the patients' questions. A care manual for PCa patients receiving HT was also sent to the patient at the time of enrollment. The manual included the following sections: "Outpatient and Medical Insurance," "Understanding PCa," "Hormonal Therapy," "Coping with Treatment-Related Adverse Reactions," "Follow-up Review," and "Home Care." WeChat was also used in the study. WeChat is a widely used Chinese multipurpose messaging social media app that provides basic functions, including adding friends, sending voice, video, pictures, and text messages. The WeChat group supports group chat, and official WeChat accounts support broadcast messages. The researcher retained the contact information of the subjects, added WeChat friends to the accounts of the patients and their main caregivers, and reminded them to participate in face-to-face consultations and communication via WeChat, telephone, text messages, and other methods during the entire trial.

During the study

During the trial, researchers provided individualized information support to the subjects in various ways to provide patients with coping information and psychological counseling and relevant referral information if necessary. Researchers also conducted monthly follow-up assessments to obtain patients' reexamination results, changes in the state of illness, changes in the treatment plan, current medication, physiological symptoms, and psychological status or determine whether other problems occurred to obtain patients' feedback and to conduct individualized guidance according to their feedback. Each patient received 3 months of intervention and follow-up evaluation.

In addition, the WeChat group and a new specific official WeChat account were established for the distribution of education materials, such as education articles and teaching videos. The WeChat account also served as a platform for online Q and A, patient communication, and discussion. A total of 5 education materials were produced, including 1 exercise teaching video, 2 general science videos, and 2 health education articles. The themes and contents were as follows: (1) "rehabilitation exercise for PCa patients," an instructional video of resistance exercise for PCa patients that was recorded by urology nurses under the guidance of rehabilitation physicians. The video was divided into two parts: resistance exercise and stretching exercise. The video sections were approximately 5 min and 3 min, respectively. The methods and precautions of resistance exercise were introduced when the video was distributed, and the importance of exercise was also emphasized. (2) "Healthy diet for PCa patients," this article mainly summarized the common problems of patients in daily diet and introduced factors that patients should pay attention to in diet. The full text was approximately 2400 words. (3) "Take you closer to PCa and HT," a general science

video on PCa information that was presented and recorded by the deputy chief urologist of a cancer hospital. The video mainly introduced basic knowledge of the prostate, PCa, HT, and new treatment advancements. The video time was approximately 23 min. (4) "Rehabilitation guidance for PCa patients receiving HT," a general science video of HT knowledge that was presented and recorded by researchers. The video mainly focused on the self-monitoring, caring, and coping of various common adverse reactions caused by HT, including hot flashes, sexual dysfunction, bone complications, fatigue, adverse reactions of metabolism and cardiovascular system, male breast development, anemia, memory or attention loss, emotional change, and psychological problems. The video was approximately 23 min. (5) "Pay attention to the psychological support of PCa patients," this article mainly introduced the possible psychological problems and psychological support measures for PCa patients in different stages of diagnosis and treatment, the necessity of and methods used for seeking professional psychological help. A free psychological hotline and other resources were provided. The full text was approximately 1600 words. The above education materials were distributed in the WeChat group through the official WeChat account every 2 weeks. The content and distribution frequency of education materials for every patient were consistent. In addition, 1–2 days after every distribution, the researcher and subjects agreed on the time and conducted online Q and A and discussion sessions through the WeChat group.

Primary outcomes

Information acquisition

The EORTC QLQ-INFO25[30] was used to evaluate information acquisition before and after the intervention. The scale included 25 items that were divided into 4 dimensions (disease information, medical examination information, treatment information, and other service information) and 8 single items (medical service place information, self-care information, information acquisition method, information quality evaluation, etc.). According to the EORTC manual,[31] the score of the scale was linearly converted to 0–100 points. The higher the score, the higher the patient's medical information acquisition and satisfaction. The Cronbach's α coefficients of the total scale and the subscales were >0.70, and the retest reliability was >0.70.[30]

Self-efficacy

Strategies Used by People to Promote Health[32] were used to evaluate patients' SE before and after intervention. The Chinese version was translated by Qian and Yuan in 2011 and has become one of the most widely used SE assessment scales for cancer patients in China.[33] After deleting one item

with low content validity, the assessment tool comprised a total of 28 items, including 3 dimensions of positive attitude, self-decision making, and self-decompression.[33] The scale used a 5-point scoring method with 1–5 points indicating no confidence to very confident, respectively. The total score was between 28 and 140. The higher the score, the stronger the individual's SE. The Cronbach's α coefficients of the total scale and the subscale were 0.849–0.970, and the Guttman half coefficient was 0.803–0.937.[33]

Secondary outcomes

Disease knowledge mastery

The self-designed disease knowledge questionnaire was used to evaluate the disease knowledge mastery after intervention. The questionnaire comprised 18 items, including basic knowledge of PCa, follow-up, HT and its adverse reactions, and healthy lifestyle. The items were yes/no questions, including positive and negative scoring questions. A "do not know" response option was added to each question. Patients received 1 point for a correct answer and no points for an incorrect or "do not know" answer. The total score was 18. The higher the score, the better the patient's disease knowledge mastery. The content validity of the questionnaire was 0.97.

Healthy behavior adherence

The self-designed healthy behavior adherence questionnaire was used to evaluate healthy behavior adherence after intervention. The questionnaire comprised 10 items, including bad habits, diet, exercise, medication, and follow-up adherence. The questionnaire included multiple-choice questions, including positive and negative scoring questions. The options were "never," "occasionally," "sometimes," "often," and "always." The scores were 0, 0.25, 0.5, 0.75, and 1 point, respectively, while the scores of the negative scoring questions were the opposite. The total score was 10. The higher the score, the better the patient's healthy behavior adherence. The content validity of the questionnaire was 1.00.

The two questionnaires mentioned above were self-designed by the research group based on a literature review and relevant guidelines, and 10 urology clinical and nursing experts were invited to review and revise the questionnaires. Then, we selected 15 PCa patients during HT as the pretest objects. The results showed that all the patients could understand the content and purpose of the items and complete the questionnaires.

Health-related quality of life

The Aging Males' Symptoms Scale (AMS)[34] was used to evaluate the HRQoL of patients before and after intervention. The scale comprised 17 items, including

3 dimensions (psychological symptoms, physical symptoms, and sexual symptoms). The items were divided into 5 grades (asymptomatic, mild, moderate, severe, and very serious) that were administered 1–5 points, respectively, and the total score was between 17 and 85 points. The higher the score, the more serious the androgen deficiency symptoms, and the lower the HRQoL of the patients. In a previous study,[35] the reliability and validity of the simplified Chinese version of the AMS and its applicability in PCa patients during HT were tested. The results showed that the content validity of the scale was 0.95, the Cronbach's α coefficients of the total scale and the subscale were 0.764–0.871, and the Guttman half coefficient was 0.730–0.751. The simplified Chinese version of AMS was suitable for the assessment of androgen deficiency and HRQoL in PCa patients during HT.

Prostate-specific antigen

PSA is a specific glycoprotein produced by prostatic acini and ductal epithelium.[36] PSA is the most important and accurate tumor marker of PCa at present and is often used as one of the important indicators to assist in the determination of the prognosis, recurrence, metastasis, and treatment effect of PCa.[37,38] PSA is one of the clinical indicators that patients need to monitor regularly and pay attention to. PSA level or PSA monitoring itself can impact the mental health and QoL of PCa patients.[39] Therefore, after obtaining informed consent from the patients, PSA data before and after the intervention were recorded.

Statistical analyses

SPSS 22.0 (IBM Corp, Armonk, NY, US) was used for statistical analysis, and $P < 0.05$ was considered statistically significant. The counting data were described as frequencies and percentages, and the measurement data were described as the mean and standard deviation. The Chi-square test was used for counting data. Fisher's exact method was used when the data did not meet the preconditions of the Chi-square test, and the Wilcoxon rank-sum test was used for rating data. For the comparison of measurement data between the two groups, if the data obeyed a normal distribution and homogeneous variance, two independent sample *t*-tests were used; otherwise, the Wilcoxon rank-sum test was used. For the comparison of measurement data at different time points, if the data obeyed a normal distribution, then the paired sample *t*-test was used; otherwise, the paired sample Wilcoxon rank-sum test was used. In this study, intention-to-treat analysis was used. It was assumed that all the patients who were lost to follow-up had the worst outcome, and the patients did not receive any information support after the loss of visits. The questionnaire data were analyzed and discussed based on this assumption. If there was a missing value of PSA data, it was completed based on the latest test results of the patient.

Ethical approval

This study has been registered in Clinical Trials (Registered No. NCT04340713), and approved by the Ethics Committee of Fudan University Shanghai Cancer Center (Approval No. 1805185-14).

Results

Sample description

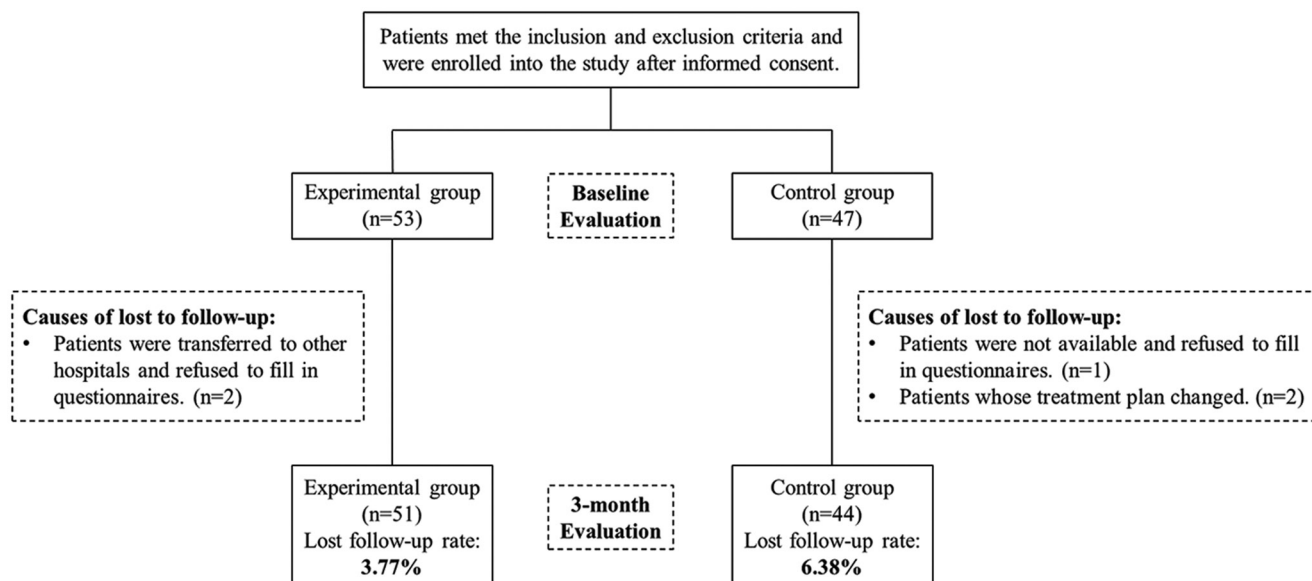One hundred patients were enrolled in the study after informed consent was obtained, including 53 in the

Figure 4: Sample inclusion and loss

Characteristics	Control group (*n*=47), *n* (%)	Experimental group (*n*=53), *n* (%)	$t/Z/\chi^2$	*P*
Table 1: Demographic and medical characteristics of sample				
Age (years), mean (SD)	67.94 (5.87)	66.11 (7.92)	1.294[a]	0.199
Residence				
Urban	27 (57.45)	35 (66.04)	0.780[c]	0.377
Rural	20 (42.55)	18 (33.96)		
Religion				
Yes	4 (8.51)	4 (7.55)	-	1.000[d]
No	43 (91.49)	49 (92.45)		
Working status				
On the job	10 (21.28)	9 (16.98)	0.299[c]	0.585
Off the job	37 (78.72)	44 (83.02)		
Marital status				
Married	43 (91.49)	51 (96.23)	-	0.416[d]
Never married/widowed	4 (8.51)	2 (3.77)		
Income				
<3000	8 (17.02)	9 (16.98)	−0.958[b]	0.338
3001-5000	19 (40.43)	28 (52.83)		
>5000	20 (42.55)	16 (30.19)		
Course of disease (months)				
<1	22 (46.81)	17 (32.08)	−1.568[b]	0.117
1-2	13 (27.66)	15 (28.30)		
2-3	5 (10.64)	11 (20.75)		
>3	7 (14.89)	10 (18.87)		
Stage				
T2	20 (42.55)	20 (37.74)	−0.068[b]	0.946
T3	19 (40.43)	27 (50.94)		
T4	8 (17.02)	6 (11.32)		
Gleason score				
≤7	17 (36.17)	17 (32.08)	−1.431[b]	0.152
8	16 (34.04)	11 (20.75)		
9	12 (25.53)	18 (33.96)		
10	2 (4.26)	7 (13.21)		
Tumor metastasis				
Yes	15 (31.91)	18 (33.96)	0.047[c]	0.828
No	32 (68.09)	35 (66.04)		
PSA (ng/ml), mean (SD)	106.07 (395.34)	70.11 (311.93)	−1.039[b]	0.299
Testosterone (ng/ml), mean (SD)	3.23 (3.45)	2.61 (3.13)	−1.445[b]	0.148
Surgery				
Yes	41 (87.23)	47 (88.68)	0.049[c]	0.824
No	6 (12.77)	6 (11.32)		
Course of HT (months)				
About to start	21 (44.68)	22 (41.51)	−0.577[b]	0.564
<1	14 (29.79)	13 (24.53)		
1-2	1 (2.13)	3 (5.66)		
2-3	11 (23.40)	15 (28.30)		
Combined disease				
Yes	29 (61.70)	29 (54.72)	0.499[c]	0.480
No	18 (38.30)	24 (45.28)		

[a]*t*-test; [b]Wilcoxon rank-sum test; [c]Chi-square test; [d]Fisher's exact method. SD: Standard deviation; PSA: Prostate-specific antigen; HT: Hormonal therapy

experimental group and 47 in the control group. At the endpoint of the follow-up, 2 patients in the experimental group refused to complete the questionnaire after transfer to another hospital. In the control group, 1 patient refused to complete the questionnaire due to the lack of time, and 2 patients' treatment plans were changed. In the end, 95 subjects completed the 3-month follow-up and all data collection with a total lost follow-up rate of 5.0% [Figure 4]. The results of the baseline evaluation revealed comparability between the experimental group and the control group in the baseline demographic and medical characteristics [$P > 0.05$, Table 1].

Table 2: Pre- and post-intervention results

Outcomes	Mean (SD)				P			
	Control group baseline	Experimental group baseline	Control group 3 months	Experimental group 3 months	Baseline[a]	3 months[b]	Control group[c]	Experimental group[d]
Information acquisition								
Total	47.89 (14.87)	49.56 (18.24)	41.87 (18.53)	63.88 (19.23)	0.679	0.000	0.022	0.000
Disease	55.50 (22.20)	56.60 (19.15)	51.95 (28.24)	63.84 (24.62)	0.889	0.034	0.332	0.042
Medical examination	64.07 (28.96)	64.78 (23.54)	60.76 (30.46)	64.36 (27.68)	0.936	0.674	0.559	0.790
Treatment	52.96 (24.29)	50.84 (21.75)	48.58 (26.12)	63.31 (24.00)	0.647	0.009	0.273	0.001
Other services	33.33 (29.18)	33.18 (30.64)	24.11 (26.37)	46.07 (30.95)	0.892	0.000	0.022	0.015
Medical places	52.48 (30.09)	57.86 (28.61)	43.26 (29.42)	59.75 (30.21)	0.337	0.008	0.110	0.826
Self-care	57.45 (27.54)	55.97 (30.50)	46.81 (30.02)	61.01 (30.48)	0.872	0.024	0.056	0.450
Written information	34.04 (47.90)	45.28 (50.25)	44.68 (50.25)	96.23 (19.24)	0.255	0.000	0.251	0.000
Video information	8.51 (28.21)	16.98 (37.91)	8.51 (28.21)	96.23 (19.24)	0.211	0.000	1.000	0.000
Information satisfaction	59.57 (34.00)	54.72 (34.03)	45.39 (32.91)	65.41 (30.64)	0.451	0.003	0.022	0.048
More information	93.62 (24.71)	96.23 (19.24)	72.34 (45.22)	84.91 (36.14)	0.552	0.126	0.008	0.034
Less information	0	0	8.51 (28.21)	1.89 (13.74)	1.000	0.131	0.046	0.317
Information assistance	63.12 (28.85)	62.26 (27.76)	47.52 (30.88)	63.52 (29.43)	0.866	0.011	0.008	0.982
Disease knowledge mastery								
Total			8.66 (4.62)	12.87 (4.01)		0.000		
PCa			2.21 (1.18)	2.93 (1.22)		0.001		
Follow-up review			1.26 (0.71)	1.70 (0.61)		0.000		
HT			2.96 (2.11)	5.15 (1.62)		0.000		
Healthy lifestyle			2.23 (1.56)	3.09 (1.43)		0.006		
Self-efficacy								
Total	102.02 (22.79)	97.19 (25.16)	84.98 (25.09)	96.34 (30.59)	0.319	0.044	0.001	0.864
Positive attitude	55.60 (12.00)	52.70 (13.76)	45.87 (13.41)	51.91 (16.54)	0.267	0.047	0.001	0.772
Self-decompression	10.77 (2.97)	10.94 (2.74)	8.98 (3.21)	10.04 (3.28)	0.757	0.107	0.007	0.097
Self-decision making	35.66 (8.58)	33.55 (9.50)	30.13 (8.91)	34.40 (11.06)	0.248	0.035	0.001	0.642
Healthy behavior adherence								
Total			7.21 (2.34)	7.99 (1.84)		0.026		
Bad habits			1.43 (0.62)	1.69 (0.48)		0.019		
Diet			1.24 (0.48)	1.42 (0.43)		0.038		
Exercise			1.09 (0.56)	1.32 (0.47)		0.026		
Medication			1.76 (0.56)	1.82 (0.43)		0.533		
Follow-up			1.70 (0.55)	1.74 (0.44)		0.950		
HRQoL								
Total	33.38 (10.89)	36.34 (11.72)	40.49 (18.76)	38.55 (12.80)	0.196	0.552	0.018	0.289
Physical symptom	13.40 (4.74)	14.59 (4.75)	16.30 (8.21)	14.77 (5.89)	0.217	0.295	0.027	0.838
Psychological symptom	8.17 (3.86)	9.15 (3.87)	9.81 (5.85)	9.15 (4.61)	0.208	0.532	0.104	1.000
Sexual symptom	11.81 (4.37)	12.60 (5.17)	14.38 (5.87)	14.62 (4.67)	0.411	0.823	0.017	0.036
PSA (ng/ml)	106.07 (395.34)	70.11 (311.93)	4.35 (19.73)	10.09 (47.69)	0.299	0.747	0.000	0.000

[a]Baseline comparison between the control group and the experimental group; [b]Comparison of the control group and the experimental group after 3 months; [c]Changes of the control group before and after intervention; [d]Changes of the experimental group before and after intervention. SD: Standard deviation; PSA: Prostate-specific antigen; HT: Hormonal therapy; HRQoL: Health-related quality of life; PCa: Prostate cancer

Study outcomes

Table 2 shows the study outcomes. The original scores of all scales and single items of the EORTC QLQ-INFO 25 were converted into 0–100 points after linear transformation. After the 3-month intervention, the information acquisition of the experimental group was significantly higher than that of the control group ($P < 0.05$), and the information acquisition of disease, treatment, and other services was also significantly increased compared with that of the control group ($P < 0.05$). In addition, at 3-month follow-up, the information acquisition of the control group was significantly lower than its baseline level ($P < 0.05$), while that of the experimental group was significantly higher than its baseline level ($P < 0.05$).

Regarding SE, the experimental group showed significantly higher SE than the control group after the intervention ($P < 0.05$) except for the decision-making dimension ($P > 0.05$). In addition, at 3-month follow-up, the SE, positive attitude, and self-decompression of the control group were significantly lower than its baseline level ($P < 0.05$), while the SE of the experimental

group had no significant difference before and after the intervention ($P > 0.05$).

After the 3-month intervention, the disease knowledge mastery of the experimental group was significantly greater than that of the control group ($P < 0.05$), and the healthy behavior adherence was also significantly better than that of the control group ($P < 0.05$) except for the medication adherence and follow-up adherence dimensions ($P > 0.05$). However, no significant differences in HRQoL were noted between the two groups ($P > 0.05$). Compared with the baseline, the control group showed a significantly lower HRQoL but worse physical and sexual symptoms ($P < 0.05$). Although the sexual symptoms of the experimental group were also worse than noted before the intervention ($P < 0.05$), there was no significant difference in the overall HRQoL and other symptoms compared with the baseline ($P > 0.05$). The PSA of the two groups was significantly lower than their baseline levels ($P < 0.05$), however, no significant difference in PSA was noted between the two groups at the endpoint of the visit ($P > 0.05$).

Discussion

Information acquisition

In contrast to inpatients, PCa patients receiving HT mainly take medication and participate in outpatient follow-up at home; however, access to information outside the hospital is limited. Therefore, if patients lack information during the administration of medication at home, they may not receive timely and professional help. Traditional methods of information acquisition, such as television, newspapers, and books, have some problems, such as minimal individualization and lack of pertinence. Furthermore, PCa is more common in the elderly in China,[1] and the elderly use the Internet less often compared with young populations.[40] Even if elderly populations obtain information through the Internet, some problems, such as uneven information sources and lack of professional judgment, still exist. It has been reported that approximately one-third (31.7%) of PCa survivors have negative information-seeking experiences when looking for information.[41] Our study also showed that information acquisition in the control group was significantly lower compared with the baseline level at the 3-month follow-up.

Therefore, to improve information acquisition by patients, this study provided information support using a variety of methods. A one-to-one consultation service was also provided throughout the trial to meet the individual information needs of patients. Three months after the intervention, the experimental group obtained significantly more written and video information (excluding patients who were lost to follow-up) regarding disease acquisition, treatment, other services, medical office locations, self-care, and other aspects compared with the control group, and the information satisfaction was also significantly higher, indicating that the information support program is effective and necessary to improve the information acquisition and satisfaction of PCa patients receiving HT.

Disease knowledge mastery

Understanding disease knowledge provides the basis for patients to understand their disease or health status. Providing disease-related information can help patients better understand the disease, reduce uncertainty, promote their participation in decision-making, and improve treatment satisfaction and coping ability.[18] However, at present, patients generally have poor disease knowledge. Our study showed that the disease knowledge mastery of the control group was only at a medium level, and less than half of patients demonstrated mastery of HT-related knowledge. However, patients who lack information on HT-related adverse reactions typically do not take preventive or mitigation measures, which can lead to a significant decline in the QoL of patients themselves and even their partners.[42]

In this study, that after the intervention, the overall disease knowledge mastery of the experimental group was significantly higher than that of the control group, indicating that patients can effectively master the knowledge after obtaining relevant information and significantly improve knowledge of disease, treatment and adverse reactions, follow-up, and healthy lifestyle.

Self-efficacy

Previous studies[43,44] have shown that providing information support and guidance to PCa patients can help to improve their SE. According to the theoretical model of SE, the formation of and changes in SE are influenced by four types of information sources, including direct experience, alternative experience, verbal persuasion, and physiological and psychological states. Therefore, this study provided patients with multichannel information support to help them learn and master the skills of self-care and self-management and transform the information obtained into their own experience. Through the WeChat group, we provided a platform for communication, discussion, and experience sharing among patients, which also helped them encourage each other. In addition, researchers encouraged patients to strengthen their confidence and positive attitude by providing them with one-to-one counseling services, emotional support, information on coping strategies, psychological counseling resources, and other individualized information support and guidance to reduce the burden of negative emotions and symptoms,

such as anxiety, depression, and tension, and improve their physiological and psychological state.

The results showed that the SE, positive attitude, and self-decompression of the experimental group were significantly improved compared with the control group 3 months later, indicating that the information support program can help improve patient SE, promote the use of positive attitudes when dealing with the difficulties of disease and treatment, and teach patients how to relieve pressure by themselves. In addition, the control group showed a significant decrease in SE after 3 months. These results suggest that in the context of no intervention, patients' SE might decline with time. Other studies[45] have also confirmed that the SE of PCa patients after 6 months of treatment is significantly lower than the baseline level. Therefore, it is necessary to provide information support or other interventions to help improve or maintain patients' SE.

Healthy behavior adherence

According to the theoretical model of SE, the stronger the individual's SE, the stronger his confidence in himself, and the more likely he is to achieve the established behavioral goals. Previous studies[46] have also shown that enhancing patients' SE can help to improve their willingness to engage in healthy behaviors. We provided patients with healthy lifestyle guidance, and the results showed that the overall healthy behavior adherence and the adherence of bad habits, diet, and exercise were significantly improved in the experimental group compared with the control group after the intervention.

In addition, no significant differences in medication and follow-up adherence were noted between the two groups after the intervention. However, the score of the two dimensions in both groups was >80%. Other studies[47,48] also showed that PCa patients exhibited good medication compliance and adherence to HT. Therefore, this result is explained by the fact that patients exhibit good medication and follow-up adherence. According to the analysis, maintaining medication and follow-up adherence and improving healthy lifestyle adherence of patients are issues worthy of addressing in future nursing practices.

Health-related quality of life

The results revealed no significant difference in HRQoL between the two groups after 3 months. Compared with that at baseline, the HRQoL of the experimental group decreased, but the difference was not significant ($P > 0.05$). In contrast, the sexual symptoms were significantly worse than those noted before the intervention ($P < 0.05$). In the control group, the HRQoL decreased significantly at the 3-month follow-up, and the physical and sexual symptoms were also significantly worse than those before the intervention.

These results suggest that in the context of no intervention, patients' symptoms showed an increasing trend, and the HRQoL showed a downward trend. The decline in patients' HRQoL may be explained by the fact that HT-related adverse reactions, such as sexual dysfunction, typically begin to appear within 3–6 months of the treatment and are gradually increased and aggravated,[49-52] which may lead to more symptoms and psychosocial burden and lower HRQoL. This notion has also been confirmed by other studies,[45,53] and the QoL and physiological function of PCa patients showed a downward trend with the time of diagnosis and treatment.

HT can lead to a series of adverse reactions caused by a significant reduction in androgens, such as hot flashes, fatigue, sexual dysfunction, osteoporosis, and decreased muscle strength, which increases patients' symptom burden and affects their treatment adherence and QoL.[7,8] A large number of studies[12,14,16] have shown that PCa patients' information acquisition is closely related to their overall QoL and their physical, psychological, social, and functional health status. Therefore, this study provided information support for patients to help them correctly understand the disease and treatment to reduce uncertainty, anxiety, depression, and other adverse emotions and improve their mental health status. We also provided information and guidance on symptom identification and management as well as a healthy lifestyle to help patients master self-care and self-management skills to achieve early prevention, early recognition, and early treatment of adverse reactions caused by HT to improve patients' HRQoL. Our study showed that after 3 months, the HRQoL of the control group significantly declined, but there was no significant change in the experimental group. This result suggests that it is necessary to provide information support to help patients maintain HRQoL. However, no significant difference was observed between the two groups after the intervention potentially due to the short follow-up time, and it is necessary to extend the follow-up time for further verification and discussion in future studies.

Prostate-specific antigen

According to the literature, the serum PSA of approximately 80% of PCa patients decreased by 84%–90.6% 1–3 months after HT.[36] The results of this study were similar to these data. After 3 months of HT, the serum PSA levels decreased significantly in the two groups ($P < 0.05$). However, no significant difference was noted between the two groups after the intervention, suggesting that the effect of the information support program on PSA may not be obvious.

PSA is an important component of follow-up for PCa patients, and it is also one of the most commonly used clinical indicators that patients should regularly monitor

and pay attention to. Our program provided patients with follow-up and medical examination information, emphasized the importance of adhering to treatment and regular follow-up, and helped them correctly understand PSA to improve their medication and follow-up adherence and to ensure the treatment effect and decrease PSA levels. However, this study revealed no significant difference in PSA between the two groups after 3 months. The reason may be related to the patients' good medication and follow-up adherence as described above. Considering that long-term PSA monitoring can increase patient anxiety and affect their mental health and QoL,[39] it is still necessary to help patients correctly understand PSA, recognize the importance of regular PSA monitoring, and be familiar with follow-up and medical examination processes. However, the effect of information support programs on PSA still needs further verification and discussion.

Limitations

This study focused on the information needs of PCa patients during HT. A randomized controlled trial of information support for PCa patients during HT was conducted that can also provide guidance for the continuous nursing of patients outside the hospital. Through the implementation of a systematic information support program and the establishment of a multidisciplinary information support team, this study provided the basis for standardizing the optimal path of information support for PCa patients during HT.

However, there were some limitations of this study. In view of the optimal time period of patients' information needs and the time limit of the study, the follow-up time was short, and the long-term results were not observed. We suggest increasing the intervention and follow-up time in future studies to explore the long-term effect and impact of the information support program. In addition, this study was conducted in the same hospital, which might produce certain biases. Intervention studies with larger sample sizes should be performed in different regions and hospitals in future to verify the effectiveness of the information support program.

Conclusions

The information support program combined group and individual programs through the use of manuals, videos, the Internet, social media, and personalized consultation to ensure the popularization of basic information and the provision of individualized information. According to the study results, the information support program can help to improve the information acquisition and disease knowledge mastery of PCa patients during HT and improve the SE and healthy behavior adherence of patients. This program

was conducive to relieving the pressures of treating a large number of patients. In future, we will train more urology nurses to implement the program in clinical practice and explore the establishment of a multidisciplinary information support team to serve more patients individually.

Implications for nursing practice

According to the study, we propose the following suggestions for nursing practice: (1) PCa patients during HT need information support, and further implementation of the information support program is needed to form a standardized information support path and process; (2) an information support network platform is suggested to regularly send and update health education materials, unify the management of HT patients, and continuously provide nursing support outside the hospital; (3) the "outpatient/off-hospital follow-up nurse" can post information to manage outpatient follow-up or home-based treatment and rehabilitation patients, improve the acquisition of information by patients outside the hospital, manage patients throughout the whole process management, and provide long-term follow-up for patients; (4) a multidisciplinary information support team is also suggested to improve the quality and efficiency of information support and meet the individual information needs of patients in a timely manner.

Conflicts of interest

The corresponding author, Prof. Zhenqi Lu, is an editorial board member of *Asia-Pacific Journal of Oncology Nursing*. The article was subject to the journal's standard procedures, with peer review handled independently of Prof. Lu and their research groups.

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