

ORIGINAL RESEARCH

Effect of extended intervention on perceived stress, voiding function and self-management ability in prostate cancer patients treated with I¹²⁵ seed implantation under medical community model: a randomized clinical trial

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Abstract

Background: To investigate the effect of extended intervention on perceived stress, voiding function and self-management ability in prostate cancer patients treated with I¹²⁵ seed implantation under medical community model. **Methods:** The clinical data of 116 patients with I¹²⁵ seed implantation for prostate cancer admitted to our hospital from February 2022 to February 2024 were selected and randomly divided into the study group (conventional care intervention + extended intervention under medical community model, 58 cases) and the control group (conventional care intervention, 58 cases). The perceived stress, voiding function, self-care ability and satisfaction were observed and compared between the two groups. **Results:** Before the intervention, there was no significant difference in tension, loss of control, self-concept, health knowledge level, self-responsibility, self-care skill score, residual urine volume, maximum urinary flow rate, detrusor pressure at maximum urinary flow rate and bladder compliance between the two groups ($p > 0.05$); after the intervention, the tension, loss of control score, residual urine volume were lower, detrusor pressure at maximum urinary flow rate and maximum urinary flow rate, bladder compliance, self-concept, health knowledge level, self-responsibility, self-care skill score and total satisfaction rate were higher in the study group with significant differences ($p < 0.05$). **Conclusions:** Extended intervention under medical community mode in prostate cancer patients with I¹²⁵ seed implantation can effectively reduce perceived stress, improve voiding function, enhance self-care ability and improve satisfaction. **The ISRCTN Registration:** This study was registered in ISRCTN (registration number: ISRCTN30921569) and can be found at <https://www.isrctn.com/ISRCTN30921569>.

Keywords

Medical community; Extended intervention; I¹²⁵ seeds; Prostate cancer; Perceived stress; Voiding function; Self-management ability

1. Introduction

As one of the common malignant tumors in males [1], prostate cancer emerges as a serious threat to the life and health and quality of life of patients. I¹²⁵ seed implantation [2] performs precise local irradiation of prostate cancer tissues [3] by continuously releasing low doses of radiation, which can effectively control the growth and spread of prostate cancer tissues. However, patients experience increased perceived stress, voiding dysfunction, and inadequate self-management after receiving treatment. Therefore, effective care interventions must be taken. Routine care interventions can provide patients with basic medical services, but there are often problems such as spatial limitations during care interventions, lack of personal-

ized interventions [4] and insufficient extended interventions. It is difficult to meet the long-term rehabilitation needs of patients, especially in the community and home care link after discharge [5]. Current clinical research mostly focuses on the improvement of treatment techniques, and less attention is paid to the optimization of postoperative comprehensive care system. In terms of medical service delivery, there is insufficient coordination among medical institutions at all levels, and community medical resources are not fully integrated into the rehabilitation process of prostate cancer patients [6]. To better cope with these problems and bridge the gap, the medical community model came into being [7]. Under the medical community model, medical institutions at all levels establish nursing intervention teams through coordination, expand the

scope and depth of medical services, strengthen community and family extended care, and provide continuous psychological counseling, rehabilitation function training and self-care ability training for patients, which greatly improves patients [8, 9]. In light of this, this study will investigate the effect of extended intervention in the medical community model on perceived stress, voiding function, and self-management ability in patients with prostate cancer underwent I¹²⁵ seed implantation. It is expected to construct and improve the nursing model to find a combination of medical service provision and clinical patient rehabilitation, and then improve the quality of life and rehabilitation effect of patients. It is reported as follows.

2. Materials and methods

2.1 Study subjects

Our study was registered in ISRCTN (registration number: ISRCTN30921569) and can be found at <https://www.isrctn.com/ISRCTN30921569>.

2.2 General information

116 patients with prostate cancer treated with I¹²⁵ seed implantation in the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou from February 2022 to February 2024 were selected as the study subjects and divided into study group (n = 58) and control group (n = 58). The study has been reviewed by the Ethics Committee of our hospital.

2.3 Inclusion and exclusion criteria

2.3.1 Inclusion criteria

① According to the criteria of “Chinese Guidelines for the Diagnosis and Treatment of Urological Diseases” [10], the diagnosis of prostate cancer was confirmed by magnetic resonance imaging (MRI), prostate biopsy and other examinations (Prostate-Specific Antigen (PSA) Testing: PSA testing is primarily used for screening and monitoring, but elevated PSA levels may suggest prostate cancer and require further examination for confirmation. Ultrasound Examination: Transrectal ultrasound (TRUS) can help doctors observe the morphology of the prostate and combined with biopsy, it can improve the diagnostic rate of prostate cancer. Molecular Biomarker Testing: Certain genetic tests (such as Oncotype DX, Decipher, *etc.*) can assess the biological characteristics of tumors, aiding in determining the presence of prostate cancer); ② No bone metastasis was found by bone scan; ③ The expected survival time of the patients was ≥ 2 years; ④ The patients agreed to participate in this study and signed the informed consent form.

2.3.2 Exclusion criteria

① Suffering from mental disorders; ② Combined with coagulation dysfunction; ③ Heart, brain, kidney and other organ dysfunction; ④ Combined with severe liver, kidney, blood system and other primary diseases and malignant tumors.

2.4 Method

2.4.1 Grouping method

In this study, 116 patients were divided into study group and control group by random number table. The steps were as follows, the patients who met the inclusion criteria were first numbered according to the order of presentation, and then the patients corresponding to the numbers were randomly assigned to the two groups using a random number table generated by computer [11]. Patients with odd numbers entered the study group and even numbered patients entered the control group, with 58 patients in each group.

2.4.2 Nursing intervention methods

In this study, a randomized controlled trial was designed to determine the effect of extended intervention in the medical community model on perceived stress, voiding function, and self-management ability in patients with prostate cancer I¹²⁵ seed implantation. By setting up a control group and study group, we compared the effect of conventional care intervention and extended intervention under medical community model integrated with conventional care. During the study, the subjects were selected in strict accordance with the established inclusion and exclusion criteria to ensure the homogeneity and representativeness of the study samples. For the two groups of patients, different interventions were implemented, and a series of observation indicators were set for quantitative assessment. We used professional statistical methods to analyze the collected data, which is expected to accurately reveal the role of extended intervention in the treatment and rehabilitation of prostate cancer patients under the medical community model, providing a scientific basis for optimizing the clinical nursing program. Specific intervention measures are shown in **Supplementary material** [12–17].

2.5 Outcome measures

(1) Perceived stress. Patients' perceived stress was assessed using the Chinese Perceived Stress Scale (CPSS), which has two dimensions, mainly including feeling of tension and feeling of loss of control, with 14 items. The Likert 5-level scoring method was utilized with higher scores indicating greater stress.

(2) Voiding function. The changes of residual urine volume, maximum urinary flow rate, detrusor pressure at maximum urinary flow rate and bladder compliance were observed and compared before and after intervention.

(3) Self-care ability. Self-care ability was assessed using the Exercise of Self-care Agency (ESCA) scale, which has 4 dimensions, mainly including self-concept, health knowledge level, self-responsibility and self-care skills with 43 items. Each item using the Likert 5-level scoring method, and the higher the score, the better the self-care ability.

(4) Satisfaction. Patient satisfaction was assessed using a self-made satisfaction questionnaire for care interventions [18], which consists of four dimensions, mainly including care techniques, service quality, humanistic care and health education with 0 to 10 points in each dimension. ≥ 35 points: very satisfied; 30–35 points: satisfied; 20–30 points: basically satisfied; < 20 points: dissatisfied.

2.6 Statistics

SPSS 24.0 (IBM, Armonk, NY, USA) statistical software was applied for analysis, t test was utilized to test measurement data while χ^2 test was employed to test enumeration data. Differences were significant if $p < 0.05$.

3. Results

3.1 Comparison of general data between the two groups

There was no significant difference in general data between the two groups ($p > 0.05$), with comparability. See Table 1.

3.2 Comparison of perceived stress between the two groups

Before intervention, there was no significant difference in tension and loss of control scores between the two groups ($p > 0.05$); after intervention, the tension and loss of control scores were lower in the study group, and the differences were significant ($p < 0.05$). The results were demonstrated in Table 2.

3.3 Comparison of voiding function between the two groups

Before intervention, there was no significant difference in residual urine volume, maximum urinary flow rate, detrusor pressure at maximum urinary flow rate and bladder compliance between the two groups ($p > 0.05$); after intervention, the study group had lower residual urine volume, higher maximum urinary flow rate, detrusor pressure at maximum urinary flow rate, as well as bladder compliance. The differences were significant ($p < 0.05$). The results were implied in Table 3.

3.4 Comparison of self-care ability between the two groups

Before the intervention, there was no significant difference in the scores of self-concept, health knowledge level, self-responsibility and self-care skills between the two groups ($p > 0.05$); after the intervention, the scores of self-concept, health knowledge level, self-responsibility and self-care skills were higher in the study group, and the differences were conspicuous ($p < 0.05$). The outcomes were unveiled in Table 4.

3.5 Comparison of satisfaction between the two groups

After the intervention, the overall satisfaction rate was higher in the study group, and the difference was notable ($p < 0.05$). The outcomes were revealed in Table 5.

4. Discussion

According to data, a large number of new prostate cancer patients are afflicted with the disease every year in China [19], and I¹²⁵ seed implantation therapy makes it possible for patients to eradicate the disease [20]. By implanting a miniature radioactive source inside and around the tumor and continuously releasing low-energy gamma rays, tumor cells are irradiated at close range, thereby effectively killing cancer cells [21]. Although this treatment is less invasive, patients will still experience a certain degree of psychological stress and physical stress. Radiation enteritis, cystitis and other complications will occur [22]. Therefore, sustained and effective care interventions are necessary. Routine care intervention mostly focuses on the observation of patients' condition during hospitalization and basic care but often ignores the

TABLE 1. General data between the two groups.

Group	Case	Age (yr, $\bar{x} \pm s$)	BMI (kg/m ² , $\bar{x} \pm s$)	PSA (ng/mL, $\bar{x} \pm s$)	Gleason score (point, $\bar{x} \pm s$)
Study group	58	63.17 \pm 6.47	23.68 \pm 2.43	8.21 \pm 0.84	6.56 \pm 0.69
Control group	58	63.24 \pm 6.44	23.74 \pm 2.38	8.26 \pm 0.81	6.71 \pm 0.64
χ^2/T value	-	0.050	0.134	0.326	1.214
p value	-	0.960	0.447	0.373	0.116

PSA: Prostate-Specific Antigen; BMI: Body Mass Index.

TABLE 2. Comparison of perceived stress between the two groups ($\bar{x} \pm s$, point).

Group	Tension				Loss of control			
	Before intervention	After intervention	t	p	Before intervention	After intervention	t	p
Study group (n = 58)	18.36 \pm 1.94	14.29 \pm 1.43	12.861	<0.001	21.18 \pm 2.25	15.36 \pm 1.54	16.256	<0.001
Control group (n = 58)	18.53 \pm 1.86	16.22 \pm 1.63	7.113	<0.001	21.50 \pm 2.16	18.39 \pm 1.84	8.374	<0.001
t	0.482	6.779			0.806	9.617		
p	0.316	<0.001			0.212	<0.001		

TABLE 3. Comparison of voiding function between the two groups ($\bar{x} \pm s$).

Group	Residual urine volume (mL)				Maximum urinary flow rate (mL/s)			
	Before intervention	After intervention	<i>t</i>	<i>p</i>	Before intervention	After intervention	<i>t</i>	<i>p</i>
Study group (n = 58)	122.65 ± 13.26	45.95 ± 4.62	41.599	<0.001	6.48 ± 0.71	18.63 ± 1.79	48.052	<0.001
Control group (n = 58)	123.43 ± 12.65	71.66 ± 7.25	27.041	<0.001	6.53 ± 0.65	12.69 ± 1.32	31.884	<0.001
<i>t</i>	0.324	22.776			0.396	20.340		
<i>p</i>	0.374	<0.001			0.347	<0.001		
Group	Detrusor pressure at maximum urinary flow rate (cmH ₂ O)				Bladder compliance (mL/cmH ₂ O)			
	Before intervention	After intervention	<i>t</i>	<i>p</i>	Before intervention	After intervention	<i>t</i>	<i>p</i>
Study group (n = 58)	40.63 ± 4.23	92.48 ± 9.31	38.615	<0.001	23.64 ± 2.56	44.65 ± 4.52	30.803	<0.001
Control group (n = 58)	41.06 ± 4.11	75.61 ± 7.63	30.361	<0.001	24.02 ± 2.49	32.69 ± 3.32	15.911	<0.001
<i>t</i>	0.555	10.673			0.810	16.241		
<i>p</i>	0.291	<0.001			0.211	<0.001		

TABLE 4. Comparison of self-care ability between the two groups ($\bar{x} \pm s$, point).

Group	Self-concept				Health knowledge level			
	Before intervention	After intervention	<i>t</i>	<i>p</i>	Before intervention	After intervention	<i>t</i>	<i>p</i>
Study group (n = 58)	15.68 ± 1.71	19.36 ± 1.94	10.837	<0.001	45.38 ± 4.72	51.24 ± 5.03	6.470	<0.001
Control group (n = 58)	15.83 ± 1.64	17.24 ± 1.69	4.560	<0.001	45.59 ± 4.57	47.63 ± 4.77	2.352	0.012
<i>t</i>	0.482	6.275			0.243	3.966		
<i>p</i>	0.316	<0.001			0.404	<0.001		
Group	Self-responsibility				Self-care skills			
	Before intervention	After intervention	<i>t</i>	<i>p</i>	Before intervention	After intervention	<i>t</i>	<i>p</i>
Study group (n = 58)	15.86 ± 1.65	18.39 ± 1.84	7.796	<0.001	29.35 ± 3.06	35.62 ± 3.54	10.205	<0.001
Control group (n = 58)	15.93 ± 1.62	17.16 ± 1.68	4.014	<0.001	29.78 ± 3.02	32.95 ± 3.23	5.460	<0.001
<i>t</i>	0.231	3.760			0.762	4.243		
<i>p</i>	0.409	<0.001			0.225	<0.001		

TABLE 5. Comparison of satisfaction between the two groups (n, %).

Group	Case	Very satisfied	Satisfied	Basically satisfied	Dissatisfied	Overall response
Study group	58	24, 41.38	18, 31.03	13, 22.41	3, 5.17	55, 94.83
Control group	58	19, 32.76	17, 29.31	12, 20.69	10, 17.24	48, 82.76
χ^2 value	-			-		4.245
<i>p</i> value	-			-		0.039

rehabilitation needs and psychological support of patients after discharge. To optimize the patient's intervention cycle and improve their quality of life, extended interventions emerged in the medical community model [23]. The leading hospital and each primary hospital have established an informatization platform through resource and information sharing to strengthen the multidisciplinary collaborative care intervention for patients after discharge. Besides, we targeted rehabilitation guidance and psychological support for patients to enhance their confidence in overcoming the disease while improving their self-management ability.

Because patients lack a full understanding of prostate cancer itself and I¹²⁵ seed implantation therapy, and physical discomfort and other factors will occur during treatment, patients' tension and loss of control are more serious [24]. In this study, patients in the study group had lower scores of tension and loss of control after intervention, and the differences were significant ($p < 0.05$). These results suggest that extended intervention under medical community model can effectively reduce the perceived stress of patients. The reason may be that the extended intervention under the medical community model provides patients with detailed information about the disease and surgery through information promotion, holding lectures, regular follow-up, *etc.* so that patients reduce the fear and tension caused by the unknown; patients can enjoy the personalized services of the home care team under the medical community model [25]. They receive care intervention in a familiar environment, which improves the feelings of concern and care [26], reduces the discomfort to the unfamiliar environment of the hospital, and effectively alleviates the perceived stress; the tiered diagnosis and treatment and resource sharing under the medical community model enable patients to receive reasonable treatment and care between different levels of medical institutions, and the orderly medical service process makes patients feel more at ease; the care intervention team encourages patients' families to actively participate in the care process of patients, and strengthens cooperation with the community to provide community rehabilitation services and social support for patients.

I¹²⁵ seed implantation surgery is invasive and can cause local tissue edema, inflammatory response and pelvic nerve injury, resulting in urethral compression, contraction of the detrusor muscle of the bladder and relaxation of the urethral sphincter, with increased residual urine volume, detrusor pressure at maximum urinary flow rate and decreased bladder compliance [27]. In this study, patients in the study group had lower residual urine volume and higher maximum flow rate, detrusor pressure at maximum flow rate as well as bladder compliance after intervention, and the differences were significant ($p < 0.05$). These results suggest that extended intervention in the medical community model has a positive effect on voiding function in prostate cancer patients treated with I¹²⁵ seed implantation. The reason may be that under the medical community model, the care intervention team and primary hospitals can understand the data information of patients in detail, and carry out targeted intervention for the urination problems of patients; professional rehabilitation guidance in the extended intervention can enhance the strength and coordination of pelvic floor muscles and improve the

systolic and diastolic function of the bladder [28], thereby improving voiding function; the extended intervention under the medical community model focuses on psychological support and helps patients relieve psychological pressure, relieve anxiety, tension and other emotions on voiding function by communicating with patients and providing psychological counseling [29]; multidisciplinary cooperation and resource sharing can enable patients to receive high-quality medical services at any time point, continuous follow-up and supervision can improve patient compliance, and understand their rehabilitation status and find potential problems in the process to ensure that patients receive the best care and treatment.

Prostate cancer and I¹²⁵ seed implantation therapy will reduce the positive cognition of patients, and excessive dependence on family members and medical staff will aggravate the fragile and helpless mood of patients. Insufficient in-depth knowledge as well as self-care skills understanding and application will weaken the self-management level of patients [30], so the self-care ability is generally weak. In this study, patients in the study group had higher scores of self-concept, health knowledge level, self-responsibility, and self-care skills after intervention, and the differences were significant ($p < 0.05$). It suggests that extended intervention in medical community mode can improve patients' self-care ability. The reason may be that the extended intervention under the medical community model provides psychological support through follow-up, patient communication, WeChat video and other means to help patients establish a correct view of the disease, reduce anxiety and fear, and improve self-positive cognition; the extended intervention provides systematic health education, helps patients popularize knowledge and provide personalized guidance by holding expert lectures, door-to-door guidance and other means, and then improves their knowledge needs and comprehension ability [31]; the extended intervention focuses on strengthening family support, and the family members' concern and supervision can enhance the patient' self-responsibility [32]; the extended intervention can provide rehabilitation guidance and practical training, guide patients to carry out correct rehabilitation training in real time, and adjust the patient rehabilitation guidance program through feedback results of follow-up and health data analysis to improve their mastery of self-care skills.

In this study, the overall satisfaction rate after intervention was higher in the study group, and the difference was significant ($p < 0.05$). These results implied that extended intervention in the medical community model has significant advantages in the care of prostate cancer patients treated with I¹²⁵ seed implantation and can better meet the needs of patients. The reason may be that under the medical community model, nursing intervention personnel can receive more professional training and guidance [33], improve the nursing technology level, and ensure that patients can receive professional care at all stages by strengthening multidisciplinary cooperation; under the medical community model, extended intervention optimizes the process of rapid referral channel establishment, simplified inpatient process and provision of door-to-door services [34], so that patients enjoy medical resources more conveniently and improve the quality of services; under the medical community model, the nursing intervention

team can cooperate with medical institutions at all levels to give psychological support such as psychological counseling lectures, patient experience sharing, patient listening and other emotional care to patients, while encouraging patients' families to participate in nursing intervention [35] and improving patients' confidence and courage; under the medical community model, carrying out various forms and rich contents of health education such as patient communication meetings and WeChat videos can improve patients' understanding and acceptance of health knowledge, and then improve their self-care intervention ability.

5. Conclusions

In summary, extended intervention in the medical community mode for prostate cancer patients treated with I¹²⁵ seed implantation can effectively reduce perceived stress, improve voiding function, enhance self-care ability and improve satisfaction. However, this study still has the problems of limited sample size and insufficient long-term effect evaluation of intervention measures. Sample size limitation: Although 116 patients were ultimately analyzed, the sample size is relatively small, which may affect the statistical significance and generalizability of the results. Insufficient long-term effect evaluation: Insufficient long-term effect evaluation: If the follow-up period for prostate cancer patients is not long enough, it becomes difficult to assess the long-term efficacy differences between extended care under the medical community model and conventional care, and it cannot adequately demonstrate its advantages. In the next step, the sample size will be expanded, multicenter medical record collection will be performed, and the follow-up time will be prolonged. Besides, the impact of intervention measures, long-term voiding function, disease recurrence, quality of life and other aspects of patients will be comprehensively evaluated, and the intervention measures will be further refined to optimize the extended intervention under the medical community mode according to different individual characteristics of patients, which improves the quality of research and clinical application value.

AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper and any raw data can be obtained from the corresponding author upon request.

AUTHOR CONTRIBUTIONS

CXC and BCW—designed the research study. CXC—performed the research; analyzed the data. BCW—provided help and advice on methods. CXC, BCW, XF, AJP—wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethics Committee of The Second Affiliated Hospital of Wenzhou Medical University (Children's Hospital Affiliated to Wenzhou Medical University) (Approval no. 2022134). Written informed consent was obtained from a legally authorized representatives for anonymized patient information to be published in this article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at <https://oss.jomh.org/files/article/1916787162539278336/attachment/Supplementary%20material.docx>.

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