



# Extended nursing for the recovery of urinary functions and quality of life after robot-assisted laparoscopic radical prostatectomy: a randomized controlled trial

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## Abstract

**Purpose** The purpose of this work is to explore the effects of continuing nursing care intervention on postoperative urinary control and quality of life among patients with prostate cancer.

**Methods** This was a single-center, parallel, and randomized controlled trial that was carried out at the Department of Urology, the First Affiliated Hospital of Anhui Medical University, China. The participants underwent robot-assisted laparoscopic radical prostatectomy (RARP) between October 2014 and April 2016. The patients were randomized to the experimental and control groups ( $n=37/\text{group}$ ). Patients in the control group received routine nursing care, while patients in the experimental group received continuing nursing care. During the 6-month follow-up, each patient was invited at the hospital discharge and at 1, 3, and 6 months to fill the ICI-Q-SF and SF-36 questionnaires.

**Results** The scores of urinary incontinence were improved in the intervention group compared with controls at 3 and 6 months after discharge (both  $P < 0.01$ ). The scores of quality of life in the experimental group were significantly higher than control group at 1, 3, and 6 months (all  $P < 0.01$ ). Adverse events were mild or moderate in intensity and were resolved in all patients. All adverse events were related to RARP.

**Conclusions** Continuing nursing care intervention had significant beneficial effects on urinary functions and quality of life in patients with prostate cancer after RARP. This approach warrants to be promoted in the clinical setting.

**Keywords** Nursing · Prostate cancer · Urinary function · Quality of life

## Introduction

Prostate cancer is one of the most common malignant tumors in males. According to large-scale epidemiological studies, incidence and morbidity of prostate cancer are high in Europe and the USA [1]. With aging of the population and improvements of quality of life and diet, the prevalence of prostate cancer has been rising each year worldwide [2, 3], including in Asia [1].

Currently, the main treatment of prostate cancer is radical prostatectomy [4, 5]. With the continuous development of surgical skills and medical equipment, especially robot-assisted laparoscopy, current occurrence rates of postoperative

complications of radical resection of prostate cancer are lower than ever [4, 6]. Nevertheless, incidence of postoperative urinary incontinence cannot be ignored. Although the occurrence of urinary control disorder after radical prostatectomy differs among countries and studies [7, 8], overall incidence of this postoperative complication is higher than other side effects [8]. When postoperative urinary incontinence occurs, patients frequently develop psychological problems, including decreased self-esteem, irritability, and fear, which severely impair their quality of life [9].

The greatest alteration of the strength and endurance of pelvic floor muscles occurs 3–6 months after prostatectomy; the highest occurrence rate of urinary incontinence occurs during the first month after surgery [10]. It has been found that greater preoperative pelvic floor muscle strength is associated with a lower postoperative incidence of urinary incontinence [10, 11]. Therefore, nursing interventions aiming to strengthen the pelvic floor muscles may reduce incidence of urinary incontinence.

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In 1947, the concept of continuing nursing care was first proposed in the USA; it emphasizes on treatment and nursing from the hospital to the family and community [12]. It is defined as a “system of receiving nursing care from an appropriate person at the time and in the place necessary for the individual concerned” [12]. The definition of continuing nursing care proposed by the American Geriatrics Society in 2003 was that “through the design of a series of actions, different levels of coordinated and continuous cares were ensured for patients in different health care facilities (such as from the hospital to the family) and the same health care facility (such as different departments in the hospital)” [13, 14]. Continuing nursing care has been gradually studied and successfully adopted by nurses in many diseases, such as diabetes mellitus, chronic nephropathy, and COPD [15].

To date, it remains unknown whether an extended nursing intervention after robot-assisted laparoscopic radical prostatectomy (RARP) could improve the morbidity and prognosis of patients with prostate cancer. Therefore, the present study aimed to explore the effects of extended/continuing nursing care intervention on the postoperative urinary control and quality of life among prostate cancer patients.

## Methods

### Study design

A single-center, parallel, and randomized controlled trial was carried out in the First Affiliated Hospital of Anhui Medical University, China. The participants underwent RARP between October 2014 and April 2016. At 6-month follow-up, these patients were invited to fill the ICI-Q-SF and SF-36 questionnaires to assess the recovery of urinary functions and quality of life.

The Chinese version of the International Consultation on Incontinence Questionnaire Short Form (ICI-Q-SF) was used [16]. Patients with urinary incontinence were guided by professional health education nurses for subjective scoring according to their situations, including frequency, amount, and effects of urine leakage. The scoring interval of this table is 0–21. Urine leakage frequency was scored as (0) never, (1) about once a week or less often, (2) two or three times a week, (3) about once a day, (4) several times a day, and (5) all the time. Urine leakage amount was scored as (0) none, (2) a small amount, (4) a moderate amount, and (6) a large amount. The assessment of the urine leakage amount was based on the degree of wet pads soaked with leaked urine. These criteria were standardized for patients before hospital discharge. The impact of urine leakage on patients’ daily lives was classified into a series of digital intervals, from 0 (no effect) to 10 (great influence). The three scores were summed to obtain the global ICI-Q-SF score.

The 1-h urinal pad method was used for the evaluation of urinary incontinence [17, 18]. The urinary continence status was recorded at each follow-up. The presence of urinary incontinence was determined by more than 1 g of weight difference of the urine pad after 1 h. The urinary continence rate was calculated as  $[1 - (\text{number of patients with urinary incontinence} / \text{total number of patients in this group})] \times 100\%$ . The effectiveness of the intervention was represented by the urinary continence rates of patients at different time points.

The Chinese version of the standard evaluation scale for quality of life SF-36 was used for the self-scoring [19].

This study was approved by the Ethics Committee of Anhui Medical University (ID 20170398). All patients were provided a signed informed consent.

### Patients

Inclusion criteria were the following: (1) diagnosis with prostate cancer, (2) treatment at the Department of Urology of this hospital, (3) reading and writing abilities, and (4) ability to complete questionnaires and receive telephone follow-up.

Exclusion criteria were the following: (1) history of urinary incontinence, (2) any serious physical illnesses (such as heart failure, stroke, etc.), (3) any malignant tumor metastasis, (4) refusal to participate or submit the study procedures and schedule, and (5) urinary incontinence caused by other reasons (such as trauma, etc.) after discharge.

### Sample size

The sample size was calculated using:  $N = Z^2 \times [P \times (1-P)] / E^2$ , where  $N$  is the sample size;  $Z = 1.96$  when the confidence level is 95%;  $E$  is the error value, taken as 10%; and  $P$  is the probability value. The variability in the incidence of postoperative urinary incontinence after the radical prostatectomy of prostate cancer is large (0.3–65.6%) [20]. Using  $P$  values of 9–30%, this study required 31–81 patients. Supposing that the  $P$  value was 10%, 74 patients had to be included in this study.

### Randomization

Patients received a sequential number according to their order at study entry. A random number table used to assign subjects to the extended nursing group (experimental group) and the control group ( $n = 37/\text{group}$ ).

### Standard postoperative care

The control group received routine discharge education. The discharge notice, time for outpatient follow-up, and the department’s follow-up telephone number were indicated on the discharge summary sheet. Besides, these patients could visit the outpatient department when necessary.

## Continuous nursing care

The continuing nursing team consisted of seven team members: one co-chief superintendent nurse responsible for overall control, organizing, and managing the nursing plans; one senior paramedic from the Department of Urology responsible for discharged patients' health education and information; one interventional colostomy expert responsible for guidance on the relevant professional knowledge for discharged patients with urinary incontinence; four primary nurses (all were nurses-in-charge). Team members all received relevant continuing nursing care training courses, and all passed the theoretical and practical examinations. All members of the team were responsible for the follow-up work of discharged patients, and all carried out follow-up supervisions on a regular interval to determine patient compliance after discharge and to ensure successful continuing nursing care.

The continuous nursing care intervention was divided into two stages. The first stage began 3 days before discharge and was implemented by the health education nurses and primary nurses. Nurses filled in the general patient information and explained requirements for filling the questionnaires about urinary incontinence, urinary continence rate, and quality of life. They clarified the needs of the patients and gave targeted health education and guidance. The nursing prescription was made on the day of discharge and included the timing and frequency of pelvic floor muscle training.

The second stage was carried out after patient discharge by members of the continuing nursing team. Follow-ups within 6 months included telephone calls, group teaching, home visits, etc. Urinary incontinence, urinary continence rate, and quality of life were assessed at 1, 3, and 6 months after hospital discharge.

One professional health education nurse was designated for the 1, 3, and 6-month telephone follow-up. Problems reported by patients were recorded, and appropriate guidance was given. Guidance included diet, prevention of complications, recommendations for daily activities, and pelvic floor muscle training methods [21]. For patients with urinary incontinence, the frequency of telephone follow-up calls was increased to once a week until the problem was reduced and solved. At the same time, psychological nursing was provided, and pelvic floor muscle exercises were supervised over the telephone.

For patients with problems that could not be solved over the telephone, home visits were carried out at their convenience. Visiting personnel were nursing worker with professional knowledge and skills, as well as excellent communication skills. Home visits included noting the occurrence of complications, reviewing the performance of the functional exercise, teaching methods for pelvic floor muscle training, and assessing patients' psychological conditions. Personnel taught and corrected how patients performed pelvic floor muscle and bladder function exercises using professional guidance and written instructions.

The Department of Urology offered group teaching the first Tuesday of every month. Health care providers, patients, and their families were invited. Content of the group teaching included preventive intervention guidance for possible complications; guidance for functional exercise of pelvic floor muscles; emphasis on the necessity and importance of functional exercises; information about the correct treatments for relevant complications; onsite psychological nursing for patients with urinary incontinence; information about the transiency of urinary incontinence to enhance patients' confidence. For patients with poor understanding abilities and insufficient implementation capacities, the helping mode was carried out as a "one to one" intervention.

For patients with corresponding network application abilities, their network contacts were recorded using QQ (version 5.3.1; Tencent, Shenzhen, China) and WeChat (version 6.0.0.50; Tencent, Shenzhen, China). At the same time, WeChat or QQ groups were set up for regular information update about the knowledge and preventive measures of urinary incontinence, and to answer questions raised by the patients.

## Outcomes

Data were collected on the day of removing urinary catheterization, including scores of urinary incontinence and quality of life. One study personnel contacted the patients 1, 3, and 6 months after discharge to make an appointment to arrange the time and place for the collection of relevant information.

## Statistical analysis

SPSS 17.0 (IBM, Armonk, NY, USA) was used for statistical analysis. Continuous data were presented as mean  $\pm$  standard deviation and analyzed using the Student's *t* test. Categorical data were presented as frequencies and analyzed using the chi-square test. Two-sided *P* values  $< 0.05$  were considered to be statistically significant.

## Results

### Baseline characteristics of the participants

Baseline characteristics were similar between groups (Table 1). There were no significant differences in the comparison of social characteristics such as education, marital status, family income, and residency. Serum PSA, Gleason score, prostate volume, and TNM stage were similar between the experimental and control group.

In the experimental group, 35 patients (94.6%) completed the study, with one refusing home visits and one

**Table 1** Baseline characteristics of participants

		Experimental group	Control group
Age (years)		69.2 ± 6.7	70.1 ± 5.0
Degree of education	Illiteracy	3	2
	Elementary school	12	14
	Middle school	11	13
	High school and above	11	8
Domicile	Rural area	16	14
	City	21	23
Marital status	Married	34	35
	Single	3	2
Medical insurance	Rural health insurance	29	27
	Other forms of medical insurance	7	10
	No medical insurance	1	0
Family income/year	≤ 10,000	0	1
	10,000–50,000	19	15
	50,000–100,000	14	17
	> 100,000	4	4
Living alone	Not alone	35	36
	Alone	2	1
Serum PSA (µg/L)		21.8 ± 10.3	19.9 ± 9.9
Gleason score		6.77 ± 1.06	6.69 ± 1.04
Prostate volume (ml)		55.5 ± 20.7	51.4 ± 19.8
TNM	T1N0M0	8	6
	T2aN0M0	10	12
	T2bN0M0	15	16
	T2cN0M0	4	3
The time of prostate cancer diagnosis (month)		3.58 ± 1.12	3.53 ± 1.09

All  $P > 0.05$

not completing the questionnaires. In the control group, 35 patients (94.6%) completed the study, with one patient lost to follow-up and one missing the questionnaires (Fig. 1).

### Primary outcome: urinary incontinence

Scores of urinary incontinence before discharge were not significantly different between the two groups ( $P > 0.05$ ), nor were they statistically different 1 month after discharge ( $P > 0.05$ ). However, scores of urinary incontinence in the experimental group at 3 and 6 months were higher than those in the control group ( $P < 0.05$ , Table 2).

The general status of urinary incontinence rates of patients after discharge was compared between the two groups. The effectiveness of the intervention was represented by the urinary continence rates at different time points, which were significantly higher in the experimental group compared to

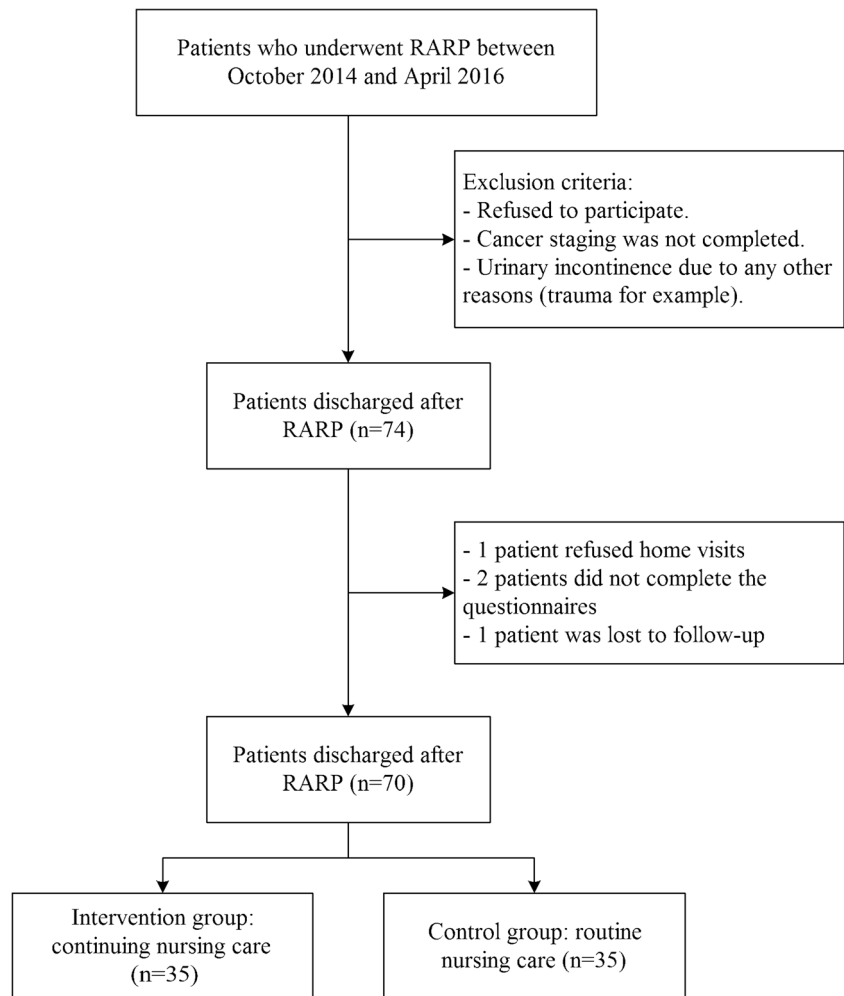
the control group at 1, 3, and 6 months after discharge ( $P < 0.05$ , Table 3).

### Secondary outcome: quality of life

While scores of quality of life before discharge were not statistically different between the two groups ( $P > 0.05$ ), they were significantly higher in the experimental group when compared to the control group at 1, 3, and 6 months after discharge ( $P < 0.05$ , Table 4).

### Adverse events

In the experiment group, two patients presented infection after discharge. One recovered outside the hospital after receiving antibiotics; the other was re-admitted and recovered after using antibiotics. One patient complained about urination pain after catheter removal; the symptom improved with at home

**Fig. 1** Patient flowchart

guidance. One patient showed erectile dysfunction, but he improved after psychological guidance.

In the control group, one patient presented penile swelling when the catheter was indwelled; he recovered after catheter removal. One patient showed thin urine flow; this symptom improved after urethral dilation. Two patients who exhibited erectile dysfunction improved after psychological guidance.

## Discussion

Up to date, no studies have shown whether a continuing nursing care intervention after RARP can improve the

morbidity and the prostate cancer prognosis. Therefore, this study aimed to explore the effects of continuing nursing care intervention on the postoperative urinary control and patients' quality of life. The results showed that continuing nursing care intervention had significant beneficial effects on urinary functions (at 3 and 6 months after discharge) and quality of life (at 1, 3, and 6 months after discharge) in patients with prostate cancer after RARP. However, the implementation of continuing nursing care requires prolongation of nursing procedure and superior institutional support, whereas it may lead to an achievement of patient buy-in and long-term compliance. This approach warrants to be promoted in the clinical setting.

**Table 2** Comparison of urinary incontinence scores for patients in the two groups

Group	<i>n</i>	Before *	After * 1 month	3 months	6 months
Experimental group	35	14.39 ± 5.88	12.18 ± 5.68	10.95 ± 3.68	7.63 ± 1.03
Control group	35	14.43 ± 6.58	13.66 ± 3.79	13.43 ± 6.33	8.58 ± 1.73
<i>P</i> value		0.489	0.102	0.024	0.003

\*Before/after the day of removing urinary catheterization

**Table 3** Urinary incontinence rates of patients in the two groups

Time	Experimental group		Control group		P
	n	%	n	%	
1 month after discharge	24	68.57%	15	42.86	0.030
3 months after discharge	30	85.71	21	60.00	0.016
6 months after discharge	33	94.29	24	68.57	0.006

The incidence of prostate cancer shows a rising trend in China. With the improvement of surgical approaches for the treatment of prostate cancer, the occurrence of postoperative urinary incontinence for patients with prostate cancer is decreasing [22]. Nevertheless, it has been demonstrated that the rate of temporary urinary incontinence after surgery in patients with prostate cancer was still as high as 6–20% [23], severely affecting patients' quality of life after discharge, decreasing their confidence and social skills. Urinary incontinence can be restored for patients with prostate cancer within 1 year after surgery [24].

The functional training of pelvic floor muscle was reported to have positive effects on the prevention and alleviation of urinary symptoms [25]. Besides, it has been widely recognized that the standardized functional training for pelvic floor muscle was sufficient on temporary postoperative urinary incontinence in clinical practice [26, 27]. Relevant studies showed that the effectiveness of pelvic floor muscle function training with professional guidance was better than the practice carried out by patients themselves [28]. Nevertheless, the functional exercise of pelvic floor muscle worked slowly, resulting in difficulties for patients to adhere to the exercise. Currently, there is no standardized approach for pelvic exercises in China. Patients often encounter unexpected problems during the exercise of pelvic floor muscle after discharge. In the present study, our department provided continuous guidance for 6 months after discharge using the WeChat and QQ software. Patients were supervised and guided for pelvic floor muscle function training, and problems were solved timely. Psychological care was also provided to enhance their confidence to fight against the disease. It was found that continuing nursing care out of the hospital can

improve patients' urinary incontinence and reduce complications of RARP, whereas the timing of pelvic floor muscle training also has an impact on postoperative urinary incontinence. Moreover, Centemero et al. [29] found that patients who started pelvic floor muscle function exercise before radical prostatectomy had better urinary incontinence rates 3 months after operation (59.3 vs. 37.3%).

Quality of life also affects the overall survival of patients with prostate cancer. The World Health Organization defines the quality of life as individuals' life experiences related to their goals, expectations, standards, and concerns in different cultural value systems. Continuing nursing is a reflection of the whole nursing and can serve as a medical care service model. Prostate cancer causes not only physical issues, such as sexual dysfunction, exhaustion, vasomotor symptoms, cardiovascular side reactions, and gastrointestinal reactions but also mental distress [30]. It was demonstrated that psychological intervention had a great significance for the improvement of the patients' subjective feelings and quality of life [30, 31]. In the current study, we provided timely nursing guidance for discharged patients with complications by continuing nursing care measures such as telephone follow-up, onsite guidance, etc., as well as appropriate psychological intervention for patients with negative emotions. The results showed that this approach improved quality of life of patients with prostate cancer after RARP.

However, the study design was not double blind and the sample size was relatively small. In addition, the follow-up was too short to observe the long-term effect of the continuing nursing care. Further double-blind research with large sample size and long-time follow-up would allow the identification of the effects of continuing nursing care in patients with prostate cancer after RARP.

## Conclusion

Continuing nursing care emphasizing pelvic floor muscle exercise can effectively improve the urinary incontinence during the rehabilitation of patients after RARP, as well as the quality of life. Therefore, continuing nursing care can

**Table 4** Quality of life scores of patients in the two groups

	n	Before *	After * 1 month	3 months	6 months
Experimental group	35	66.83 ± 7.63	75.41 ± 8.19	79.89 ± 6.08	85.77 ± 7.42
Control group	35	68.71 ± 6.89	71.09 ± 7.11	75.73 ± 5.93	79.96 ± 6.78
P value		0.142	0.011	0.003	0.0005

\*Before/after the day of removing urinary catheterization



be suitable for use in the clinical setting, especially for patients after RARP.

#### Compliance with ethical standards

**Conflict of interest** The authors declare that there is no conflict of interest.

**Research involving human participants** This study was approved by the ethics committee of Anhui Medical University (ID 20170398).

**Informed consent** All patients provided a signed informed consent.

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