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QR Code-Based WeChat Channel Education for Post-Prostatectomy Incontinence: A Retrospective Cohort Study

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Abstract: *Objective:* To investigate the effects of health education via WeChat Channel (WeChat video account accessed by QR code) on pelvic floor muscle training (PFMT) adherence and urinary continence recovery in patients with urinary incontinence after robot-assisted laparoscopic radical prostatectomy (RALP). *Methods:* Clinical data of 120 patients who underwent RALP in our hospital between January 2024 and January 2026 were retrospectively analyzed. Patients were divided into a control group (routine care + verbal education, n = 58) and a WeChat Channel group (routine care + WeChat Channel education via QR code, n = 62). The WeChat Channel group scanned a QR code at discharge to access systematic PFMT instructional videos (anatomical explanations, contraction demonstrations, phased training plans), with 2–3 videos pushed weekly, backend viewing monitoring, and one weekly telephone reminder, until 3 months postoperatively. Urinary continence recovery rate, PFMT adherence score, ICI-Q-SF score, and SAS score were compared at 1, 3, and 6 months postoperatively. *Results:* Continence recovery rates at 1, 3, and 6 months were higher in the WeChat Channel group than in the control group (38.7% vs 22.4%, 67.7% vs 44.8%, 85.5% vs 69.0%; all $p < 0.05$). Multivariate logistic regression identified WeChat Channel education as an independent protective factor for 3-month continence recovery (OR = 2.89, 95% CI 1.42–5.87, $p < 0.01$). At 3 and 6 months, ICI-Q-SF and SAS scores were significantly lower in the WeChat Channel group ($p < 0.01$), as was the 6-month anxiety positivity rate (14.5% vs 31.0%, $p = 0.028$). *Conclusion:* WeChat Channel education via QR code significantly improves PFMT adherence, accelerates continence recovery, and alleviates anxiety after radical prostatectomy, representing a simple and effective continuous nursing intervention worthy of clinical promotion.

Keywords: WeChat Channel; Pelvic floor muscle training; Post-prostatectomy; Urinary incontinence; Rehabilitation adherence; Remote guidance

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1. Introduction

Prostate cancer is one of the most common malignancies in men, and radical prostatectomy (RP) is an

important treatment modality [1]. Although robot-assisted technology has significantly improved perioperative safety, post-prostatectomy incontinence (PPI) remains the most common complication affecting quality of life, with an early incidence of 20–80%, and may induce anxiety and depression [2].

Pelvic floor muscle training (PFMT) is recommended by international guidelines as first-line conservative treatment for PPI, with efficacy confirmed by randomized controlled trials and systematic reviews [3]. However, its efficacy depends heavily on technique standardization and long-term adherence, and patient adherence is generally insufficient, becoming a major bottleneck limiting rehabilitation outcomes.

Digital health interventions show promise for improving PFMT adherence. Buhas et al. confirmed that a digital perioperative prehabilitation program was superior to routine care in early continence recovery [4]; Shen et al. found that a WeChat platform combined with PFMT improved continence recovery after surgery [5]. WeChat Channel offers zero cost, low operational threshold, and support for repeated viewing and social sharing, making it suitable for health education in middle-aged and elderly patients. However, reports on its impact on PFMT adherence and continence recovery in PPI remain scarce.

Therefore, this retrospective cohort study analyzed 120 patients who underwent robot-assisted laparoscopic radical prostatectomy in our hospital between January 2024 and January 2026, aiming to evaluate the effects of WeChat Channel education via QR code on PFMT adherence, continence recovery, and psychological status, and to provide evidence for a simple, effective, and low-cost continuous nursing intervention.

2. Materials and methods

2.1. Study population

Clinical data were retrospectively collected from patients with prostate cancer who underwent robot-assisted laparoscopic radical prostatectomy (RARP) in the Department of Urology of our hospital between January 2024 and January 2026.

2.1.1. Inclusion criteria

(1) Pathologically confirmed prostate adenocarcinoma with clinical stage ≤ T3aN0M0;
(2) Age ≤ 75 years;
(3) First-time RARP;
(4) Urinary incontinence on day 2 after catheter removal (1-hour pad test > 1 g or use of ≥ 1 pad per day);
(5) Normal cognition and ability to use a smartphone.

2.1.2. Exclusion criteria

(1) Preoperative urinary incontinence or neurogenic bladder;
(2) History of pelvic radiotherapy;
(3) Severe cardiovascular, cerebrovascular, or psychiatric disease;
(4) Positive surgical margins requiring adjuvant radiotherapy.

2.1.3. Study design

Of 168 initially screened patients, 48 were excluded (preoperative urinary incontinence, n = 12; pelvic radiotherapy history, n = 8; severe cardiovascular or cerebrovascular disease, n = 16; positive margins, n

= 9; incomplete data, n = 3), leaving 120 patients who were divided into a control group (n = 58) and a WeChat Channel group (n = 62). Age, body mass index, preoperative PSA, Gleason score, operative time, and intraoperative blood loss did not differ significantly between the two groups (all $p > 0.05$), indicating comparability (**Table 1**). This study was approved by the Ethics Committee of our hospital (approval no. KY2026-111-01), and informed consent was waived owing to the retrospective design. See **Table 1**.

Table 1. Comparison of general characteristics and perioperative indicators between the two groups

Item	Control group (n = 58)	WeChat channel group (n = 62)	Statistic	*p* value
Age (years, $\bar{x} \pm s$)	66.5 ± 7.2	65.8 ± 8.1	$t = 0.52$	0.604
Body mass index (kg/m², $\bar{x} \pm s$)	24.1 ± 3.0	23.8 ± 2.9	$t = 0.55$	0.583
Preoperative PSA (ng/mL,M (P_{25}, P_{75}))	8.5 (5.2,13.1)	9.1 (5.6,14.0)	$Z = -0.41$	0.682
Gleason score (points, $\bar{x} \pm s$)	7.1 ± 1.2	7.3 ± 1.1	$t = -0.95$	0.344
Operative time (min, $\bar{x} \pm s$)	145.5 ± 30.2	150.3 ± 28.7	$t = -0.89$	0.378
Intraoperative blood loss (mL, M (P_{25},P_{75})	200.0 (150.0,300.0)	220.0 (160.0,320.0)	$Z = -0.73$	0.466

Note: PSA, prostate-specific antigen; M (P_{25}, P_{75}), median (25th percentile, 75th percentile).

2.2 Intervention

Both groups received routine postoperative care: verbal instruction on PFMT by the primary nurse with a printed educational leaflet, and weekly telephone follow-up every Friday for 6 months (24 sessions). The WeChat Channel group additionally received education via a WeChat Channel accessed by QR code:

2.2.1. Video production

A standardized video series (reviewed by a chief urologist and a rehabilitation therapist) was produced covering six topics:

(1) Pelvic floor muscle anatomy and function;
(2) Correct contraction techniques (including contraction-relaxation rhythm demonstration);
(3) Preoperative prehabilitation training;
(4) Phased training plans at 1 week, 1 month, and 3 months postoperatively;
(5) Bladder training and lifestyle management;
(6) Rehabilitation case sharing.

Each video lasted 3–5 minutes. Topic (2) guided a "quick contraction-relaxation-sustained contraction" cyclic training, and topic (4) adjusted training frequency and intensity according to postoperative time.

2.2.2. Delivery and use

Videos were integrated into the hospital's official WeChat Channel, and a dedicated QR code was generated and printed on the educational leaflet and bedside card. At the first education session, the primary nurse instructed patients to scan the QR code, follow the channel, and watch at least one video, and demonstrated how to bookmark, forward, and set viewing reminders; patients could access all content at any time after discharge.

2.2.3. Interaction and supervision

Nurses posted a training reminder in the comment section once weekly; patients could ask questions via

private message or comments, which were answered by dedicated nurses within 24 hours; nurses periodically reviewed backend viewing records and, for those with no viewing record for 3 consecutive days, provided reminders via telephone or WeChat private message to ensure adherence.

The active intervention lasted until 3 months postoperatively, after which videos remained openly accessible, with follow-up until 6 months postoperatively.

2.3. Outcome measures

2.3.1. Baseline data

Age, body mass index (BMI), preoperative prostate-specific antigen (PSA), Gleason score, operative time, and intraoperative blood loss were collected from the hospital electronic medical record system.

2.3.2. Primary outcomes

(1) Urinary continence recovery rate

Continence recovery was defined as using 0 or only 1 safety pad per day. Assessments were performed at 1, 3, and 6 months postoperatively via outpatient follow-up, and the number and percentage of patients achieving continence were recorded at each time point. Data were obtained from the standardized follow-up registry of the Department of Urology and entered into the electronic medical record system by dedicated outpatient nurses using standardized forms.

(2) PFMT adherence score

Assessed using the PFMT adherence scale, with a total score of 0–10; higher scores indicate better adherence [6]. Cronbach's α in this study population was 0.86. Assessments were performed at 3 and 6 months postoperatively.

2.3.3. Secondary outcomes

(1) Severity of urinary incontinence

Assessed using the International Consultation on Incontinence Questionnaire-Short Form (ICI-Q-SF), with a total score of 0–21; higher scores indicate more severe incontinence. Assessments were performed at 1, 3, and 6 months postoperatively [7].

(2) Anxiety

Assessed using the Self-Rating Anxiety Scale (SAS), with a standard score ≥ 50 defined as presence of anxiety [8]. Assessments were performed at 1 and 6 months postoperatively.

2.3.4. WeChat channel usage (WeChat Channel group only)

The following indicators were recorded within 3 months postoperatively:

(1) Video completion rate = number of patients who completely watched all 6 thematic videos / total number of patients in the WeChat Channel group × 100%;

(2) Number of interactions = total number of patient comments in the comment section and private messages to nurses. Data were obtained from the backend viewing logs and interaction records of the WeChat Channel.

2.3.5. Data sources and extraction

All data were obtained from the hospital electronic medical record system and standardized outpatient

follow-up records. Two trained researchers independently extracted and cross-checked the data, with discrepancies resolved through discussion with a third researcher. Data extractors did not participate in group management or intervention implementation to minimize information bias. Retrospective data extraction was completed in July 2026 (after follow-up of the last patient).

2.4. Statistical analysis

Data were analyzed using SPSS 26.0. Continuous variables were tested for normality using the Shapiro-Wilk test. Normally distributed variables are expressed as mean ± standard deviation ($\bar{x} \pm s$) and compared between groups using the independent-samples t-test; non-normally distributed variables are expressed as median (interquartile range) [M (P_{25}, P_{75})] and compared using the Mann-Whitney U test. Categorical variables are expressed as n (%) and compared using the χ^2 test, with Fisher's exact test applied when any expected frequency was < 5.

Repeated-measures data (ICI-Q-SF and SAS scores) were analyzed using repeated-measures ANOVA to examine time, group, and interaction effects. When the interaction effect was statistically significant, simple effects analysis was performed for pairwise comparisons, with *p* values adjusted using the Bonferroni method. For the primary outcomes, between-group comparisons of urinary continence recovery rates at three time points and PFMT adherence scores at two time points were adjusted using the Bonferroni method, with adjusted significance levels set at $p < 0.017$ and $p < 0.025$, respectively.

Multivariate logistic regression was used to identify independent factors influencing urinary continence recovery at 3 months postoperatively. Variables with $p < 0.10$ in univariate analysis were entered into the multivariate model using a forward stepwise approach, and results are expressed as odds ratios (ORs) with 95% confidence intervals (CIs). $p < 0.05$ was considered statistically significant.

3. Results

3.1. Comparison of urinary continence recovery rates between the two groups

The urinary continence recovery rates in the WeChat Channel group at 1, 3, and 6 months postoperatively were 38.7% (24/62), 67.7% (42/62), and 85.5% (53/62), respectively, all higher than those in the control group [22.4% (13/58), 44.8% (26/58), and 69.0% (40/58)], with statistically significant differences ($\chi^2 = 4.12$, 6.89, and 4.68, respectively; all $p < 0.05$). Kaplan-Meier survival analysis showed that the median time to continence recovery was 2.5 months (95% CI 2.1–2.9) in the WeChat Channel group, shorter than 4.0 months (95% CI 3.4–4.6) in the control group, with a statistically significant difference (Log-rank $\chi^2 = 5.84$, $p < 0.05$) (**Table 2**).

3.2. Comparison of PFMT adherence scores between the two groups

At 3 months postoperatively, the PFMT adherence score in the WeChat Channel group was higher than that in the control group [(7.8 ± 1.6) vs (5.3 ± 2.1) points, $t = 6.72$, $p < 0.001$]; at 6 months postoperatively, the score in the WeChat Channel group remained higher than that in the control group [(7.1 ± 1.9) vs (4.8 ± 2.4) points, $t = 5.91$, $p < 0.001$] (**Table 2**).

3.3. Comparison of urinary incontinence severity between the two groups

At 1 month postoperatively, there was no statistically significant difference in ICI-Q-SF scores between the

two groups (t = 1.26, p = 0.211). At 3 months postoperatively, the ICI-Q-SF score in the WeChat Channel group was lower than that in the control group [(6.2 ± 3.4) vs (8.9 ± 4.1) points, t = 3.98, p < 0.001]; at 6 months postoperatively, the score in the WeChat Channel group remained lower than that in the control group [(3.5 ± 2.8) vs (5.8 ± 3.6) points, t = 3.41, p < 0.01] (**Table 2**).

3.4. Comparison of anxiety between the two groups

At 1 month postoperatively, there was no statistically significant difference in SAS standard scores between the two groups (t = 1.76, p = 0.081). At 6 months postoperatively, the SAS standard score in the WeChat Channel group was lower than that in the control group [(42.5 ± 8.1) vs (49.7 ± 9.6) points, t = 4.53, p < 0.001]; the anxiety positivity rate (SAS ≥ 50) in the WeChat Channel group was also lower than that in the control group [14.5% (9/62) vs 31.0% (18/58), χ^2 = 4.82, p < 0.05] (**Table 2**).

Table 2. Comparison of outcome measures at each time point between the two groups

Indicator	Time point (postoperatively)	WeChat channel group (n = 62)	Control group (n = 58)	Statistic	*p* value
Urinary continence recovery rate [n (%)]	1 month	24 (38.7)	13 (22.4)	χ^2 = 4.12	0.042
	3 months	42 (67.7)	26 (44.8)	χ^2 = 6.89	0.009
	6 months	53 (85.5)	40 (69.0)	χ^2 = 4.68	0.030
PFMT adherence score ($\bar{x}\pm s$)	3 months	7.8 ± 1.6	5.3 ± 2.1	t = 6.72	< 0.001
	6 months	7.1 ± 1.9	4.8 ± 2.4	t = 5.91	<0.001
ICI-Q-SF score ($\bar{x}\pm s$)	1 month	10.5 ± 3.8†	11.2 ± 4.2†	t = 1.26	0.211
	3 months	6.2 ± 3.4	8.9 ± 4.1	t = 3.98	< 0.001
	6 months	3.5 ± 2.8	5.8 ± 3.6	t = 3.41	0.001
SAS standard score ($\bar{x}\pm s$)	1 month	53.7 ± 7.5†	56.2 ± 8.1†	t = 1.76	0.081
	6 months	42.5 ± 8.1	49.7 ± 9.6	t = 4.53	< 0.001
Anxiety positivity rate [n (%)]	6 months	9 (14.5)	18 (31.0)	χ^2 = 4.82	0.028

Note: † indicates that ICI-Q-SF and SAS scores at 1 month postoperatively did not differ significantly between the two groups (both p > 0.05), suggesting comparable baseline severity of urinary incontinence and anxiety status. Bonferroni correction was applied to the three comparisons of urinary continence recovery rate (α' = 0.017); the p value at 6 months postoperatively was 0.030 > 0.017, and the difference was not statistically significant after correction. For the two comparisons of PFMT adherence score, the corrected α' was 0.025, and the corrected p values at all time points were < 0.001. PFMT, pelvic floor muscle training; ICI-Q-SF, International Consultation on Incontinence Questionnaire-Short Form; SAS, Self-Rating Anxiety Scale

3.5. Multivariate analysis

With urinary continence recovery at 3 months postoperatively as the dependent variable (recovered = 1, not recovered = 0), variables with p < 0.10 in univariate analysis were entered into a multivariate logistic regression model, including age, BMI, Gleason score, operative time, receipt of WeChat Channel education (yes = 1, no = 0), preoperative PFMT prehabilitation (yes = 1, no = 0), and preoperative pelvic floor muscle strength. The results showed that receipt of WeChat Channel education (OR = 2.89, 95% CI 1.42–5.87, p = 0.003) and preoperative PFMT prehabilitation (OR = 2.12, 95% CI 1.08–4.15, p = 0.031) were independent protective factors for urinary continence recovery at 3 months postoperatively (**Table 3**).

Table 3. Logistic regression analysis of factors influencing urinary continence recovery at 3 months postoperatively

Variable	β	Wald χ^2	OR	95% CI	*p* value
Receipt of WeChat Channel education	1.061	8.87	2.89	1.42–5.87	0.003
Preoperative PFMT prehabilitation	0.751	4.63	2.12	1.08–4.15	0.031
Age	−0.042	2.10	0.96	0.91–1.01	0.147
BMI	−0.035	0.58	0.97	0.89–1.05	0.446
Gleason score	0.089	0.92	1.09	0.91–1.31	0.337
Operative time	−0.003	0.15	0.997	0.98–1.01	0.699
Preoperative pelvic floor muscle strength	0.112	1.75	1.12	0.95–1.32	0.186

Note: Variables with $p < 0.10$ in univariate analysis (age, BMI, Gleason score, operative time, receipt of WeChat Channel education, preoperative PFMT prehabilitation, and preoperative pelvic floor muscle strength) were included in the multivariate logistic regression using a forward stepwise approach. OR, odds ratio; CI, confidence interval; PFMT, pelvic floor muscle training.

3.6. WeChat channel usage

Among the 62 patients in the WeChat Channel group, 48 (77.4%) completed viewing all 6 thematic videos within 3 months postoperatively, and 58 (93.5%) viewed at least 3 videos; the mean number of views per patient was 8.5 ± 3.2, and 37 patients (59.7%) had interacted with nurses via comments or private messages.

4. Discussion

This retrospective cohort study evaluated WeChat Channel education via QR code in PFMT for patients with urinary incontinence after prostate cancer surgery. WeChat Channel education significantly improved PFMT adherence, accelerated continence recovery, and alleviated anxiety.

4.1. Mechanisms improving PFMT adherence

Poor PFMT adherence remains a clinical challenge, limited by patients' understanding, motivation, and correct execution, while traditional verbal and printed education is bulky, easily forgotten, and non-intuitive [9]. WeChat Channel education overcomes these barriers through:

(1) Visualization and standardization, intuitively demonstrating correct contraction and avoiding maneuvers such as breath-holding or abdominal straining;
(2) Repeatability, allowing review at any time (mean 8.5 ± 3.2 views per patient);
(3) Phased guidance, with targeted content pushed by postoperative period to enable progressive rehabilitation without information overload;
(4) Social support, with comment interaction and case sharing creating peer support (59.7% of patients interacted).

4.2. Impact on continence recovery

In this study, the WeChat Channel group had significantly higher 3-month postoperative continence recovery than controls (67.7% vs 44.8%), reaching 85.5% at 6 months, consistent with multiple high-quality studies[10], comparable to the app-based PFMT program in the PELVINTENSE trial (approximately 65% at 3 months) [11]. Multivariate analysis confirmed that both preoperative prehabilitation (OR = 2.12) and WeChat Channel education (OR = 2.89) were independent protective factors for 3-month continence recovery, with a

synergistic effect. Notably, comparable outcomes were achieved without expensive biofeedback or electrical stimulation, suggesting that for mild-to-moderate PPI, high-quality education and improved adherence may be more critical than technological means. This aligns with the meta-analysis conclusion that "structured, supervised training" is the core guarantee of efficacy, a model achieved at low cost by WeChat Channel education [13].

4.3. Impact on psychological status

Postoperative urinary incontinence is often accompanied by anxiety and shame. At 6 months, the anxiety score was significantly lower in the WeChat Channel group than in the control group [(42.5 ± 8.1) vs (49.7 ± 9.6)], with the anxiety positivity rate decreasing from 31.0% to 14.5%. As chain mediation analysis showed that eHealth literacy and PFMT adherence fully mediate the relationship between incontinence severity and anxiety, WeChat Channel education may act by enhancing disease cognition (reducing uncertainty about a common, reversible complication) and self-efficacy (building confidence through cases and training progress), while comment-section interaction provides timely professional answers [14].

4.4. Cost-effectiveness and accessibility

Compared with dedicated applications or biofeedback devices, WeChat Channel education is nearly zero-cost and widely accessible, addressing the main barriers to PFMT implementation—limited medical resources and poor adherence [15]. Requiring only a QR code scan without additional downloads, it greatly reduces the digital divide for elderly patients. In this study, 93.5% of patients viewed at least 3 videos and 77.4% completed all 6, demonstrating high feasibility in real clinical settings.

4.5. Limitations

(1) The retrospective non-concurrent historical control design introduces period effect bias, as advances in surgical techniques and perioperative management during the study period may have positively affected continence recovery, and surgical time-series variables were unavailable for adjustment, possibly overestimating the net intervention effect;

(2) Key confounders were missing, including preoperative SAS baseline, postoperative complications, adjunctive medications, and neurovascular bundle preservation grading;

(3) Loss to follow-up rate and reasons were not reported, and the sample size was not pre-estimated, risking follow-up bias and insufficient power for secondary outcomes;

(4) The single-center design and 6-month follow-up limit generalizability and long-term assessment;

(5) Non-specific intervention effects: the control group's verbal education plus telephone follow-up itself constitutes an active intervention, and the two groups' contact frequency and emotional support were not fully equivalent, so improvements may partly reflect additional attention (Hawthorne effect);

(6) Continence recovery was mainly self-reported, lacking objective urodynamic indicators, resulting in recall bias. Thus, this study is exploratory, and conclusions require validation through multicenter, prospective, concurrent randomized controlled trials.

5. Conclusion

As a low-cost, highly accessible digital health intervention, WeChat Channel education via QR code

effectively improves PFMT adherence, accelerates continence recovery, and alleviates anxiety in patients with urinary incontinence after prostate cancer surgery. It is recommended for promotion in qualified institutions as a standardized component of postoperative rehabilitation nursing, and can be combined with preoperative prehabilitation, wearable monitoring, and phased online assessment to build a closed-loop "education-training-monitoring-feedback" system for whole-course rehabilitation management.

Disclosure statement

The authors declare no conflict of interest.

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