

# Study on the Efficacy of “Information Platform + Self-Care Model” on the Health Status of Discharged Patients Following Vaginal Natural Orifice Transluminal Endoscopic Surgery

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**Objective:** To discuss the impact of the “information platform + self-care model” on the health status of discharged patients following vaginal natural orifice transluminal endoscopic surgery (vNOTES).

**Methods:** Patients underwent vNOTES at a tertiary specialized women's and children's hospital in Chengdu. They were randomly assigned to one of two groups—the intervention group (29 patients) and the control group (29 patients). The control group received standard education after discharge, while the intervention group received guidance based on an “information platform + self-care model” on discharge; a questionnaire survey was conducted for both groups one month after discharge.

**Results:** The quality of life score in the intervention group was higher than that in the control group, and the difference was statistically significant ( $P < 0.05$ ); the scores of the intervention group on dimensions such as vitality, general health perceptions, physical role functioning, social role functioning, emotional role functioning, and mental health, except for physical functioning ( $Z = 0.034$ ,  $P = 0.973$ ) and bodily pain ( $Z = 1.470$ ,  $P = 0.141$ ), were higher than those in the control group one month after discharge, and the difference was statistically significant ( $P < 0.05$ ). There was no patient (0) in the intervention group who had an unscheduled visit/admission, and there was 1 patient (3.6%) in the control group who had unscheduled visit/admission; there were no statistical differences between the two groups in the number of patients who had an unscheduled visit/admission 1 month after discharge ( $P = 0.491$ ).

**Conclusion:** The application of the “information platform + self-care model” can, to a certain extent, improve the health status of patients following vNOTES after discharge, and it can also reduce unscheduled visits/admissions, but more research with a larger sample size is required.

**Keywords:** gynecology, health status, information platform, self-care, trans-vaginal natural orifice transluminal endoscopic surgery, vNOTES

## Background

Vaginal natural orifice transluminal endoscopic surgery (vNOTES) refers to a surgical technique in which the target tissue in the abdominal cavity is accessed surgically through the vagina, the natural orifice of the human body,<sup>1</sup> an excellent location for gynecological surgery. Due to gynecologists' familiarity in vaginal and endoscopic procedures, vNOTES has been rapidly adopted for use in both routine<sup>2,3</sup> and complex gynecological procedures.<sup>4-6</sup> The advantages of the technology are gradually being reported.<sup>7,8</sup> However, as an emerging technique, although it can provide shorter surgery duration, lower postoperative

pain scores, shorter hospital stays and better cosmetic outcomes in different types of gynecological surgery,<sup>9–12</sup> vNOTES is still in the initial exploratory stage,<sup>13</sup> and the limitations of surgical instruments and the lack of experience and mature surgical techniques increase the surgical risks,<sup>14</sup> which may lead to postoperative complications.<sup>15</sup> With vNOTES incision in the posterior fornix, patients are concerned that the wound may be painful, the incision infection may be difficult to detect, and even affect sexual life and fertility after surgery, which aggravates the psychological burden of patients.<sup>16</sup> All of these factors contribute to poor patient prognosis and readmission.<sup>17</sup> As a result, health education and guidance prior to discharge are vital to maintain the health status of discharged patients. A review of literature revealed that the current care of patients undergoing vNOTES is focused primarily on the perioperative period,<sup>16</sup> with few studies on the health outcomes of patients in preliminary rehabilitation at home and within their community after discharge. Thus, at this stage, it is critical to focus on guidance and education, as well as establish a follow-up mechanism for early prevention and treatment and strengthen self-care capacity of patients.

Modern consumers value convenience and simplicity when acquiring information and making purchases. Information from the internet is accessible to many individuals via their mobile phones. Thus, using the WeChat public platform, the nursing staff of the hospital can on the one hand, provide health education and guidance with precise expertise to improve work efficiency, and on the other hand, provide continuous care services for discharged patients by releasing disease and health care knowledge to encourage them to strengthen health management.<sup>18</sup> According to the “Orem self-care theory”, each person is responsible for their own health-related self-care behavior, and necessary care intervention is only to assist them in improving their self-care capacity in order to enhance their health and quality of life.<sup>19,20</sup> Consequently, in this study, we developed a “WeChat public platform + self-care model” for the management and intervention of patients after discharge following vNOTES, and to investigate the application effect of the model on the health status of such patients, using network and information technology as the carrier and health education as the core, combining modern information means with the self-care theory.

## Methods

### Study Design and Participants

This study was a prospective randomized controlled trial conducted on patients following vNOTES, who were admitted to the department of gynecology of a tertiary specialized women’s and children’s hospital in Chengdu from May 2022 to July 2022.

### Inclusion and Exclusion Criteria

#### Inclusion Criteria

1. Patients who underwent vNOTES for a routine gynecological procedure and were not transferred to other surgical procedures or had the surgery stopped for other reasons.
2. Patients in stable conditions after surgery and eligible for discharge.
3. Patients aged  $\geq 18$  years.
4. Patients who themselves or their family members have basic Chinese literacy and use WeChat.
5. Patients who volunteered for the study and gave full informed consent.

#### Exclusion Criteria

1. Patients suffering from severe mental or cognitive disorders who were unable to participate in the study.
2. Patients with severe visual and hearing impairment or diagnosed with other systemic malignancies.

#### Rejection Criteria

1. Patients dropping out of the study for any reason.
2. Patients with missing data  $\geq 20\%$ .
3. Patients who did not complete the 4-week follow-up period.

## Calculation of Sample Size

We used the sample size calculation formula  $N = \frac{k+1}{k} \left[ \frac{(\mu_\alpha + \mu_\beta)\sigma}{\delta} \right]^2$ ; the significant level  $\alpha$  was set to 0.05, and the power of test  $1-\beta$  was set to 0.9,  $\mu_{0.05} = 1.6449$ ,  $\mu_{0.10} = 1.2816$ ; according to the findings of Wang,<sup>21</sup>  $\delta = 6.7$ ,  $\sigma^2 = 61.9$ . The sample size for each group was 24. Given the loss to follow-up, we increased the sample size by 20% to 58, with 29 patients in the intervention group and the control group each.

## Grouping and Intervention

### Randomization Scheme and Blinding

Patients in this study were grouped by simple randomization. Researchers used the random number table to generate random numbers, which were then sealed in sequence in opaque numbered envelopes. With 29 numbers in each group, even numbers represented the control group, and odd numbers represented the intervention group. The intervention group received guidance based on the “WeChat public platform + self-care model”, while the control group received routine care intervention. Patients were randomly assigned to one of two groups.

### Treatment in the Control Group

Before discharge, the control group received routine discharge instructions.

1. Initial guidance: Following the doctor’s pre-discharge advice, the responsible nurse distributed paper discharge documents to patients on the day of discharge, and educated patients through both written and oral forms about discharge procedures, instructions for activities of daily life after discharge, disease observation and symptom management, medication and treatment compliance, complication identification, and access to continuous services.
2. Follow-up guidance: The nursing staff kept in touch with patients for four weeks after discharge, and patients could seek advice by telephone/via WeChat from the team of specialist nursing staff, and the latter appropriately increased the number of follow-ups and gave guidance accordingly.

### Treatment in the Intervention Group

The intervention scheme was implemented by the team’s unified trained specialist nursing staff (including education specialist, follow-up specialist, and maintenance specialist). Patients were guided based on the “WeChat public platform + self-care model” scheme both before discharge and for four weeks after discharge.

### Establishment of “Information Platform + Self-Care Model”

1. A standardized self-care model for patients following vNOTES was investigated during the post-discharge transition period, with the goal of developing key guidance content for online vNOTES management.

vNOTES is a novel surgical procedure. At this time, there is no consensus on the self-care model for patients undergoing vNOTES during the post-discharge transition period, as there is no established system and no relevant guidelines and literature. The core guidance content of the “WeChat public platform + self-care model” was gradually established in this study following an evidence-based method, a review of relevant literature, and expert consultation.

2. An information platform was created, and patient follow-up information files were established.

The WeChat official account “Home of Minimally Invasive and Non-invasive Physicians” was used to establish a vNOTES information platform. The WeChat public platform was used for health knowledge education, symptom guidance, postoperative self-care skills training, complication observation and prevention guidance, push notification of re-examination information and follow-up time, consultation and feedback, sharing of the latest information, intermittent article and knowledge sharing on epidemic prevention and control. The management of patients during the post-discharge

transition period was implemented on time by virtue of the internet. Patients who underwent vNOTES and their family members were included in the platform, and relevant personnel were in charge of answering patient questions, providing remote guidance, and advising patients on treatment or additional medical attention based on their condition. At the same time, the team's follow-up specialists initially established a follow-up information database for patients undergoing vNOTES, and data was regularly updated and maintained to ensure the authenticity and accuracy.

### 3. Specific guidance method in the “information platform + self-care model”

The “information platform + self-care model” is patient-oriented and based on the WeChat public account—“Home of Minimally Invasive and Non-invasive Physicians”. It includes discharge education, guidance on health knowledge, training on home-based self-care skills, complication observation, symptom guidance, consultation and feedback, and other aspects. Details are as follows:

1. Initial guidance: Following the doctor's pre-discharge advice, the team's education specialist nurses explained each module to patients and family members through the WeChat public account “Home of Minimally Invasive and Non-invasive Physicians” after surgery, and guided them on the use of these modules, in order to strengthen the guidance on matters and related knowledge during the post-discharge transition period of patients. They also educated and evaluated patients' mastery of post-discharge knowledge and use of the WeChat platform on the day of discharge, including the seven core intervention contents of the WeChat public platform (Table 1).
2. Follow-up guidance: Specialist education nurses transferred all information of discharged patients to specialist follow-up nurses who were in charge of tracking the follow-up details of patients during the post-discharge transition period, contacting and interacting with patients through the WeChat public platform and telephone to regularly learn about the status of patients during the post-discharge transition period, answer questions and motivate patients periodically, and remind and guide patients to read health education content and operation videos; additionally, they appropriately increased the number of telephone follow-ups after consulting the patients and tracked the effect.
3. When patients were discharged, the family members of patients who did not use WeChat were given the above intervention guidance, as well as a paper health guidance manual and oral education.

## Measurement Index

In this study, the primary outcome index was quality of life after discharge; and the secondary outcome index was unscheduled visit/admission after discharge.

## Research methods

1. General data questionnaire: primarily consists of social-demographic data and disease related data.
2. Questionnaire on quality of life one month after discharge: primarily includes psychological and mental health content.

Quality of life after discharge: The Medical Outcomes Study Short Form-36 (SF-36) was used to capture the health status; SF-36 was developed by RAND (USA) to collect data on the general quality of life of patients.<sup>22,23</sup> It is a universal scale with 36 items in 8 dimensions. The scale is widely used and has good reliability and validity.<sup>24,25</sup> In this study, the Chinese scale developed by Sichuan University was used; the Cronbach's  $\alpha$  coefficient of the scale was 0.917, while those of four dimensions were 0.747–0.894.

## Data Collection Method

The participants provided full informed consent and voluntarily participated in the study, and the data were collected independently by the researcher using unified instructions. One month after discharge, data collection was completed on

**Table 1** Core Intervention Content and Guidance Methods of “Information Platform + Self-Care Model”

Core Modules	Specific Module Name	Content	Initial Guidance Methods (See Remarks of the Table)	Follow-Up Guidance Methods
1. Discharge procedures	1) Preparation of objects	Important documents required for handling discharge	①	Regularly evaluate patients' skills before and after discharge, and provide targeted guidance for patients on what they do not understand
	2) Notes for reimbursement	Reimbursement process and precautions		
	3) Notes for medical record copying	Process and precautions of medical record copying		
2. Health education	1) Living guidance	Diet, excretion, bathing, rest, exercise, work, clothing, menstrual cycle changes, sexual life guidance, fertility consultation, and contraindications	①	
3. Learning of self-care skills	1) Canal care	Contents of catheter care, replacement of urinary bag and drainage bag, time of extubation	① ②	
	2) Vulva care	Cleaning and disinfection of vulva		
	3) Thrombosis prophylaxis	Methods of thrombosis prevention exercise	① ③	
	4) Chronic disease guidance	Blood pressure monitoring Blood glucose monitoring		
	5) Post-discharge medication guidance	Methods and cautions for using estrogen, anti-inflammatory suppository, and other drugs and precautions		
4. Observation of complications	1) Observation of complications	Increased vaginal bleeding Abnormal pain, vaginal wall hematoma, etc.	① ③	
5. Symptomatic guidance	1) Symptomatic guidance	Self-examination and initial treatment of general symptoms		
6. Consultation and feedback	1) Consultation	Contact information of nursing staff and official account	④	Follow up patients regularly, the specialist nursing team members answer patients' questions, and consult experts in case of difficult questions
	2) Feedback	Investigate the effect and satisfaction after each consultation		
7. Other aspects	1) Gynecological health tips		①	Intermittent push notification
	2) Article appreciation			
	3) Epidemic prevention and control	Daily protection, and preparation of admission for prevention and control		

**Notes:** Remarks: ① Guide patients to read articles and review pictures on the official account ② Watch videos ③ View examples ④ Contact nursing staff by telephone or via the official account.

site/via WeChat/by telephone. The entire process lasted approximately 10–15 minutes, and 58 questionnaires were eventually distributed. One patient in the intervention group and 2 patients in the control group were lost to follow-up during the study, leading to a 5.2% drop-out rate. There were a total of 55 returned questionnaires, and all were valid.

## Statistical Methods

The SPSS22.0 version was used for statistical analysis. Quantitative data are expressed as medians and quartile intervals; grouped data are expressed as frequency, constituent ratios, and other indicators; comparisons were made between the two groups in general data or quality of life or unscheduled visit/admission: the quantitative data were compared using independent sample *t*-test or nonparametric test; the grouped data were compared using a chi-squared test.

## Research Ethics

This controlled trial was approved by the Ethics Committee of the Chengdu Women's and Children's Central Hospital (No.2021–76), and registered in the Chinese Clinical Trial Register website ([www.chictr.org.cn](http://www.chictr.org.cn), ChiCTR2100044134).

## Results

### Comparison of General Data Between the Intervention Group and the Control Group

The results revealed that there were no statistical differences in general data between the two groups ( $P > 0.05$ ), and the data were comparable (Table 2).

**Table 2** General Data of Patients

Item	Type	n/M (P25, P75)	Proportion (%)
Age (year)	$p < 0.05$	31 (27, 39)	—
Ethnicity	Han	53	96.4
	Minority	2	3.6
Occupation	Unemployed	10	18.2
	Retired/retired for illness	2	3.6
	Government/public institution	11	20
	In business	13	23.6
	Worker/waiter	13	23.6
	Farmer	1	1.8
	Other	5	9.1
Education	Primary school and below	2	3.6
	Junior high school	11	20
	Senior high school or technical secondary school	15	27.3
	Junior college or higher vocational college	16	29.1
	Bachelor's degree or above	11	20

(Continued)

Table 2 (Continued).

Item	Type	n/M (P25, P75)	Proportion (%)
Marital status	Married	45	81.8
	Unmarried	7	12.7
	Divorced	3	5.5
	Widowed	0	0
Fertility	With child	30	54.5
	No child	25	45.5
Number of children	No	29	52.7
	I	21	38.2
	More than I	5	9.1
Pregnancy desire	Strongly desire	29	52.7
	Does not affect	6	10.9
	No intention of becoming pregnant	15	27.3
	Not applicable	5	9.1
Family income and expenditure	Below RMB 1000	2	3.6
	1001–3000	6	10.9
	3001–5000	10	18.2
	5001–7000	17	30.9
	7001–10,000	9	16.4
	More than RMB 10,000	11	20
Family income and expenditure	Sufficient income	4	7.3
	Income and expenses at par	45	81.8
	Expenses more than income	6	10.9
Payment mode (multiple choices)	Self-paying	6	10.9
	Commercial insurance	7	12.7
	Social insurance	49	89.1
Place of residence	Village	11	20
	Township	5	9.1
	County	11	20
	Prefecture-level city and above	28	50.9
Hospital convenient for medical treatment	Yes	51	92.7
	No	2	3.6
	Unclear	2	3.6

(Continued)

**Table 2** (Continued).

Item	Type	n/M (P25, P75)	Proportion (%)
Living mode	Alone	5	9.1
	With family members	49	89.1
	Other	1	1.8
Relationship with primary caregiver	Disharmonious	0	0
	Normal	2	3.6
	Harmonious	52	94.5
	Not applicable	1	1.8
Disease diagnosis	Cervical disease	1	1.8
	Uterine disease	10	18.2
	Fallopian tube disease	27	49.1
	Ovarian disease	17	30.9
Complication (multiple choices)	No	44	80
	Cardiovascular and cerebrovascular diseases	2	3.6
	Hepatic disease	5	9.1
	Other	4	7.3
Surgical duration (min)	$p < 0.05$	78 (65, 120)	—
Type of catheter indwelled after surgery (multiple)	Drainage tube	1	1.8
	Urinary catheter	55	100
Number of postoperative catheters	1	54	98.2
	More than 1	1	1.8
Discharged with catheter	No	53	96.4
	Yes	2	3.6
Type of catheter at discharge (multiple choice)	Discharged with drainage tube	0	0
	Discharged with urinary catheter	2	3.6
Complications during hospitalization (multiple choice)	No	52	94.5
	Abnormal bleeding at vaginal incision or surrounding area	2	3.6
	Poor healing at vaginal incision or stub	1	1.8
Days of hospitalization (d)	$p < 0.05$	4(4, 5)	—

## Comparison of Quality of Life One Month After Discharge Between the Intervention Group and the Control Group

The results revealed statistical differences between the two groups ( $P < 0.05$ ) in the SF-36 total score as well as the scores for each dimension, with the exception of physical functioning ( $Z = 0.034$ ,  $P = 0.973$ ) and bodily pain ( $Z = 1.470$ ,  $P = 0.141$ ). The score of the intervention group was higher than that of the control group (Table 3).



**Table 3** Comparison of Quality of Life Scores One Month After Discharge Between the Intervention Group and the Control Group

SF-36	Intervention Group (n = 28) [ $\bar{X} \pm S/M$ (P25, P75)]	Control Group (n = 27) [ $\bar{X} \pm S/M$ (P25, P75)]	Difference Median 95% CI	Z/t/t'	P
Total Score (TS)	597.76 ± 116.64	463.70 ± 148.34	134 (62, 206)	3.733 <sup>a</sup>	<0.001
Dimension 1 Physical functioning (PF)	80 (62.5, 93.75)	90 (50, 95)	0 (-10, 10)	0.034 <sup>b</sup>	0.973
Dimension 2 Physical role functioning (PRF)	100 (25, 100)	25 (0, 75)	25 (0, 50)	2.679 <sup>b</sup>	0.007
Dimension 3 Bodily pain (BP)	74 (62.5, 84)	74 (62, 74)	0 (0, 10)	1.47 <sup>b</sup>	0.141
Dimension 4 General health perceptions (GHP)	69.64 ± 14.33	48.52 ± 12.92	21.12 (13.74, 28.51)	5.734 <sup>a</sup>	<0.001
Dimension 1–4 Physiological health content (PHC)	284.57 ± 67.18	228.44 ± 69.74	56.13 (19.10, 93.16)	3.04 <sup>a</sup>	0.004
Dimension 5 Vitality (VT)	70.54 ± 15.60	51.85 ± 20.76	18.68 (8.78, 28.59)	3.783 <sup>a</sup>	<0.001
Dimension 6 Social role functioning (SRF)	87.5 (75, 100)	75 (50, 87.5)	12.5 (0, 25)	2.034 <sup>b</sup>	0.042
Dimension 7 Emotional role functioning (ERF)	100 (66.67, 100)	66.67 (0, 100)	33.3 (0, 33.3)	3.19 <sup>b</sup>	0.001
Dimension 8 Mental health (MH)	76.29 ± 15.77	61.19 ± 18.76	15.10 (5.74, 24.46)	3.236 <sup>a</sup>	0.002
Dimension 5–8 Mental health content (MHC)	313.19 ± 59.85	235.26 ± 86.95	77.93 (37.27, 118.59)	3.858 <sup>c</sup>	<0.001

**Note:** Remarks: <sup>a</sup>t-test; <sup>b</sup>Wilcoxon rank-sum test; <sup>c</sup>t-test.

## Discussion

### The Impact of “Information Platform + Self-Care Model” on the Quality of Life of Patients Following vNOTES

The findings of this study revealed that the intervention group scored higher on dimensions such as physical role functioning, general health perceptions, vitality, social role functioning, emotional role functioning, and mental health than the control group, and the difference was statistically significant ( $P < 0.05$ ). There were no statistical differences in physical functioning ( $Z = 0.034$ ,  $P = 0.973$ ) and bodily pain ( $Z = 1.470$ ,  $P = 0.141$ ). The following are the specific reasons: in general health education, patients undergoing vNOTES are only informed of conventional and experiential contents in written and oral forms, and some specific conditions of patients such as age, education, learning time, and learning ability are not taken into account, due to which the education is ineffective. In this study, using the public platform as a carrier, education was provided with the focus on patients through graphics, texts, and videos, and the content could guide patients on self-observation and self-care after discharge, thus realizing an ideal self-care model. Educated using this online model, patients could screen and comprehensively interpret the knowledge they needed at any time and from any location, which could not only save resources, but also improve the learning efficacy of patients. By allowing patients to consult and by providing one-on-one consulting and answering services to patients for various problems, this method upended the conventional model of discharge education, allowing for the early detection and treatment of abnormal problems and better postoperative health guidance for patients. Simply put, switching from the standard mode of discharge education to one based on the “WeChat public platform + self-care model” can speed up a patient’s return to their pre-surgery health and social functioning, allowing them to return to their normal lives sooner

while also allowing for the early detection and treatment of complications to protect them and enhance their quality of life. Education for nurses that is more efficient and effective leads to better output.

The results also indicated that there were no statistical differences in physical functioning and bodily pain ( $P > 0.05$ ). The reason for this is that vNOTES is a minimally invasive surgery that causes little damage to the patient's body, and patients who have no surgical incision on the body surface experience less pain and are thus less affected with respect to their physiological function. This is consistent with the findings of Xie,<sup>26</sup> and Chen et al.<sup>27</sup> Therefore, changes in the health education model have little impact on the two dimensions. A larger sample size may be used for further verification.

## The Impact of “Information Platform + Self-Care Model” on the Number of Unscheduled Visits/Admissions of Patients Following vNOTES One Month After Discharge

There was only 1 patient in the control group who had an unscheduled visit/admission (3.6%) compared to none in the intervention group (0), and there were no statistical differences between the two groups in the number of patients with unscheduled visits/admissions 1 month after discharge ( $P = 0.491$ ). Due to the small trauma, short duration, and low complication rate of vNOTES, fewer patients required revisit/readmission.<sup>28</sup> However, given the smaller sample size and shorter follow-up time in this study, a larger sample size and prolonged follow-up time may be used for future discussion.

## Summary

The “information platform + self-care model” combines modern information and minimally invasive surgery with the ERAS (enhanced recovery after surgery) principle and can help improve the self-care awareness of patients following vNOTES. It provides systemic and individual nursing support to patients, enabling them to master the knowledge about the disease and improve their quality of life after surgery. This study provides empirical evidence for further establishing a mobile health education and post-discharge management scheme for patients following vNOTES.

## Data Sharing Statement

All data generated or analysed during this study are included in this article. Further enquiries can be directed to the corresponding author.

## Ethics Approval and Consent to Participate

The study was conducted in accordance with the Declaration of Helsinki (as was revised in 2013). This controlled trial was approved by the Ethics Committee of the Chengdu Women's and Children's Central Hospital (No.2021-76), and registered in the Chinese Clinical Trial Register website ([www.chictr.org.cn](http://www.chictr.org.cn), ChiCTR2100044134). Written informed consent was obtained from all participants.

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## Disclosure

The authors declare that they have no competing interests in this work.

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