RESEARCH ARTICLE

Application of nursing measures based on authorization theory in patients with initial arteriovenous fistula

Zhen Ji, Shuxia Cheng, Yang Han, Songju Zhang, Xuling Zhang, Fang Ling, Huilan Cai, Jinhua Liu*

Abstract

Objective: To evaluate the application effect of nursing measures based on authorisation theory in patients with initial arteriovenous fistula.

Method: The prospective randomised control study was conducted at Suzhou Kowloon Hospital Shanghai Jiao Tong University School of Medicine, Suzhou, China from March 2023 to March 2024, and comprised patients with initial arteriovenous fistula admitted to the haemodialysis room. They were randomised into research group RG receiving routine nursing and nursing measures based on authorized theory, and control group CG which received routine care. The internal fistula patency rate, self-management ability, negative emotions, quality of life, incidence of complications and satisfaction with nursing in the groups were compared. Data was analysed using SPSS 20.

Results: Of the 76 patients, 38(50%) were in group RG; 21(55.3%) males and 17(44.7%) females with mean age 61.14±6.04 years. There were 38(50%) patients in group CG; 20(52.6%) males and 18(47.4%) females with mean age 61.21±6.13 years. Internal fistula patency rate of RG patients was significantly higher compared to CG patients ($p<0.05$). Post-intervention, the scores of self-concept, health cognition, self-management awareness, and self-management ability in RG patients were significantly higher compared to CG patients ($p<0.05$). After nursing, the scores of anxiety and depression in RG patients were significantly lower compared to CG patients ($p<0.05$). After nursing, the quality of life scores in RG patients were significantly higher compared to CG patients ($p<0.05$). Compared to CG patients, the incidence of complications was significantly lower ($p<0.05$), and satisfaction with nursing was significantly higher in RG patients ($p<0.05$).

Conclusion: The application of nursing measures based on authorisation theory in patients with initial arteriovenous fistula could promote self-management ability, improved the quality of life, and reduced the incidence of complications in the patients.

Keywords: Initial arteriovenous fistula, Nursing, Authorisation theory, Self-management, Complications.

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Introduction

As of 2017, there were 2.9 million patients with end-stage renal disease (ESRD) in China, with the number of new cases growing at an annual rate of 100,000 to 200,000.[1] Patients with stage 4-5 chronic kidney disease (CKD) require kidney replacement therapy, the most common of which is haemodialysis, where blood is drawn from the body through a vascular pathway to a dialyser, where it is dialysed and then returned to the body.[2] Vascular access is a necessary condition for haemodialysis, so it is also known as the lifeline of haemodialysis patients.[3] Autogenous arteriovenous fistula (AVF) is the preferred vascular route for haemodialysis patients, which means that the arteriovenous artery is directly anastomosed to the shallow surface to increase the blood flow of venous vessels, arteriovenous wall arteriogenous, and subcutaneous AVF can be formed.[4] In China, AVF accounts for 80-85% of the utilisation rate of vascular access in dialysis patients.[5] Compared to other vascular access, it has the advantages of long service life, low cost of maintaining vascular access, and low overall mortality.[6] However, the maturity of the internal fistula is too long as it takes 8-12 weeks for the internal fistula vein to complete the arterialisation under the impact of arterial flow after AVF operation, that is, the maturity of the internal fistula. Besides, there is a high maturity failure rate.[7] Studies have shown that 20-60% of AVF cannot mature, 20-50% of AVF cannot support adequate dialysis, and the primary patency rate within 1 year is 64%, with the secondary patency rate being 79%.[8] The reason is that postoperative complications, such as vascular stenosis, acute thrombosis, venous hypertension and aneurysm, are easy to occur after AVF.[9]

Internal fistula tremor and reduced vascular noise may indicate vascular stenosis.[10] Acute thrombosis can be caused by tight local bandaging, haematoma compression, improper body position, intravenous (IV) hypertonic drug injection, and systemic related factors, including hypercoagulability and hypotension.[11] The presence of acroedema two weeks after fistula plasty, or the presence of internal fistula side limb oedema during the use of

Hemodialysis Room, Suzhou Kowloon Hospital Shanghai Jiao Tong University School of Medicine, Suzhou 215028, Jiangsu, China.

Correspondence: Jinhua Liu. e-mail: 13584838591@163.com

ORICID: 0009-0006-0990-442X

internal fistula, may indicate the occurrence of venous hypertension.[12] Premature use of the internal fistula before maturity, and repeated puncture of the mature internal fistula in the same location or range, as well as insufficient needle pressure after puncture may lead to aneurysm.[13] Therefore, how to promote the postoperative maturation and maintenance of AVF is a key issue of medical research.

In perioperative period and post-discharge, the patients need to master a lot of health education knowledge, including preoperative limb protection, postoperative limb function exercise, self-monitoring of blood pressure and internal fistula.[14] If the patients can master the relevant self-care knowledge, learn to self-monitor, timely identify the abnormality of internal fistula, and deal with it as soon as possible, the occurrence of some adverse complications of internal fistula can be avoided.[15] Studies have shown that there is a certain relationship between patients' self-care ability and internal fistula complications.[16,17] As patients are older, their memory and understanding ability are poor, their self-care ability is insufficient, and the disease is easy to cause them to have negative emotions which affects the state of the patients.[16] Therefore, it is critical to adopt effective nursing methods to improve patients' self-care ability to improve the success rate of AVF.

The authorisation theory was first used in the practice of enterprise management, emphasising the transfer of rights, and is a management method.[18] Since the 1990s, researchers have introduced the theory of empowerment into the field of psychology, emphasising the role of intrinsic motivation in behaviour change.[19] Empowerment is a process of active behaviour change that increases individual self-efficacy, and its core is to stimulate patients' initiative in health management and carry out cognitive behaviour changes that promote health.[20] In the field of nursing, Ellis-Stoll and Popkess-Vawter in 1998 analysed the concept of authorisation process, which has been defined as a process in which "nurses and patients participate together" to help the person being served change unhealthy behaviours.[21] Through authorisation education, patients' self-management compliance can be improved, and the patients can self-manage their diseases under the guidance of medical staff, prevent complications, and improve their disease conditions.[22]

The current study was planned to explore the effects of nursing measures based on authorisation theory in patients with initial AVF.

Patients and Methods

The prospective randomised control trial (RCT) was conducted at Suzhou Kowloon Hospital Shanghai Jiao Tong University School of Medicine, Suzhou, China from March 2023 to March 2024, and comprised patients with initial AVF admitted to the haemodialysis room. The sample was raised using convenience sampling technique. Those included were patients of either gender aged 18-60 years who met the diagnostic criteria of chronic renal failure 4-5,[23] had clear awareness without communication barriers, and were willing to be subjected to AVF for haemodialysis, with forearm being the site of AVF. Those excluded were patients with coexisting serious diseases. After taking informed consent from the patients, they were randomised using the lottery method into research group RG and control group CG. This study was registered at Chinese Clinical Trial Registry https://www.chictr.org.cn/showproj.html?proj=195996, and the registration number was (ChiCTR2300074884). This study was approved by the Ethics Committee of Suzhou Kowloon Hospital Shanghai Jiao Tong University School of Medicine.

CG patients were given routine nursing care. When the patients were admitted to hospital, they were guided about filling in data-collection questionnaires and scales to fully grasp the process.

Preoperative care entailed health education the purpose of which was to help patients steer clear of tension and anxiety, improve confidence in the treatment, and ensure better compliance. At the same time, in order to avoid infection and ensure the smooth implementation of AVF, preoperative care was given with respect to the stomostomy test to ensure that the skin was clean and intact, and venipuncture on the stomostomy side was avoided as far as possible to avoid skin and blood vessel damage, which may cause postoperative infection.

After the completion of the operation, the nurses observed the wound condition of the patients in time, observed whether the tremor and noise were good, reported to the attending doctor in time when there was bleeding, and stopped the bleeding in time. Corresponding health education was provided to the patients to guide them about how to be sure about whether or not the internal fistula was unobstructed. Early postoperative exercise was carried out in time to promote the early maturity of the internal fistula. For example, patients could pinch the rubber medicine ball 3-4 times a day with the arm of the internal fistula side for 10-15 minutes each time, or press the upper arm of the internal fistula side with a tourniquet to moderately expand and fill the vein 2-3 times a day for 5-10 minutes each time, and apply a hot towel to the arm of the internal fistula side if there was local swelling.

Before the patients were discharged, the nursing staff issued relevant health manuals in advance, including the introduction of knowledge related to AVF, as well as

guidance and suggestions on diet care, daily care, psychological care and other aspects of the patient post-discharge. Telephone follow-up was conducted at 2 weeks, 4 weeks and 3 months after discharge to keep an eye on the recovery of the patients, and to remind the patients about clinic follow-up at 2 weeks, 1 month ad 2 months after surgery, and to fill in the self-management ability scales and questionnaires again at the end of the 3rd month.

In addition to the routine care, RG patients received nursing measures based on the authorisation theory. Within 24 hours of admission, the contents and implementation process of the empowerment education programme were introduced to the patients, the personal responsibilities of the patients were clarified, and the significance of empowerment education for internal AVF was emphasised. Relevant questionnaires were filled in, and the intervention lasted 10-20 min in order to make the patient clear about the decisive role in the whole process of AVF nursing.

Preoperatively, the nurses asked the patients about the problems that needed to be solved, and imparted health education according to the needs. In order to avoid infection and ensure the smooth implementation of intra-AVF, preoperative care was carried out on the stomatous side to ensure clean skin. The nurses avoided IV injection or infusion on the surgical side of patients to avoid skin damage, and cleaned it before surgery to ensure aseptic operation. The intervention time was 30-60min. The nurses asked the patients about their feelings about the impact of the operation on themselves, encouraged the patients to self-persuade, self-suggest and assume the responsibility of AVF self-management, helped the patients eliminate tension and anxiety, improved their confidence in treatment, and improved their compliance. The nurses established a WeChat group for patients with postoperative AVF, encouraged the patients to communicate. This intervention lasted 30-60min.

On the first day after the surgery, the patient and the nurses discussed the existing nursing problems together. During the discussion, the nurses guided the patient about putting forward feasible and gradual phased goals in the light of their own problems. Professional suggestions were given with a neutral attitude, the goals set by the patient were affirmed, and AVF self-management was encouraged. The intervention lasted 30-60min.

Before discharge, the nurses sent relevant health manuals in advance, including the introduction of knowledge related to AVF, as well as guidance on diet, daily nursing, psychology and other aspects of the patients after discharge. The nurses regularly communicated with the patients through telephone follow-up, asked the patients whether there were difficulties in the process of making changes, and gave professional suggestions to ensure scientific and effective life management of the patients. The intervention was carried out twice, lasting about 30-60min each.

From the time of discharge till 3 months post-discharge, the nurses communicated with the patients through telephone follow-up every week, confirmed the stage goals achieved by the patients, analysed the unfinished stage goals together with the patients, guided the patients about conducting self-assessment and reflection, and revised the plan. This intervention lasted 3 months, and the nurses followed up the patients by telephone follow-up four times a month. In the third month, the questionnaire survey was conducted again, which lasted about 30 minutes.

The study had a range of observation indicators, including internal fistula patency rate which indicated the number of patients with three requirements at the same time; pulsation and tremor of the internal fistula blood vessels touched by the hand, continuous vascular murmurs, and haemodialysis pump control blood flow >200ml/min. Internal fistula patency rate was calculated by dividing the number of cases of internal fistula patency by the total number of cases and multiplying it by 100.

Self-management ability was assessed using the Self-Care Ability Scale,[24] that had 4 dimensions; self-concept (8 items, 0-32 points), health cognition (17 items, 0-68 points), self-management awareness (6 items, 0-24 points), and self-management ability (12 items, 0-48 points). The total score was 172 points, with higher scores indicating better self-management ability.

The Hamilton Anxiety (HAM-A) and Hamilton Depression (HAM-D)[25] scales were used to assess negative emotions. HAM-A had 14 items, with a score of 0-4 for each item. The higher score represented more anxiety. HAM-D contained 24 items, with a maximum score of 76, and higher scores indicated more severe depression.

The 36-item short-form (SF-36)[26] was adapted to assess quality of life (QOL), which involved 4 aspects of physiological function, psychological state, role function, and social function. The score for each aspect was 0-100 points, and the higher score represented better QOL.

The incidence of complications, such as infection, haematoma, internal fistula occlusion, and subcutaneous oedema in the groups was noted.

Patients' satisfaction with nursing was assessed using an institutional questionnaire, with scores ranging 0-100

points, with 90-100=very satisfied, 60-89=satisfied, and <60 =dissatisfied. Total satisfaction was the total of very satisfied and satisfied cases that was divided by the total number of cases and multiplied by 100.

Data was analysed using SPSS 20. Measurement data was expressed as mean±standard deviation, and t-test was used for comparison. Statistical data was expressed as frequencies and percentages, and chi-square test was used for comparison. P<0.05 was considered statistically significant.

Results

Of the 76 patients, 38(50%) were in group RG; 21(55.3%) males and 17(44.7%) females with mean age 61.14±6.04 years. There were 38(50%) patients in group CG; 20(52.6%) males and 18(47.4%) females with mean age 61.21±6.13 years. There was no significant between the groups at baseline (Table 1)

After 3 months, the internal fistula patency rate of RG patients was significantly higher compared to CG patients (p<0.05) (Tale 2).

In terms of self-management ability, the scores of self-concept, health cognition, self-management awareness and self-management ability were not significantly different between the groups at baseline (p>0.05). Post-intervention, the scores were elevated in both groups (p<0.05), but those of RG were significantly higher compared to CG (p<0.05) (Figure 1).

HAM-A and HAM-D scores were not significantly different

Table-1: Baseline characteristics of the patients.

Items	Control group (n=38)	Research group (n=38)	t-test/x^2	p-value
Gender (male/female)	20/18	21/17	0.053	0.818
Age (years)	61.14±6.04	61.21±6.13	0.050	0.960
Dialysis time (years)	5.10±1.04	5.15±1.08	0.206	0.838
Degree of education			0.336	0.846
Primary school or below	18	20		
Junior and senior high schools	17	16		
Junior college, bachelor degree or above	3	2		

Table-2: Internal fistula patency rate in the study groups.

Group	Cases	Number of internal fistula access patency	Internal fistula patency rate
Research	38	36	94.74%
Control	38	28	73.68%
x^2		6.333	
p-value		0.012	

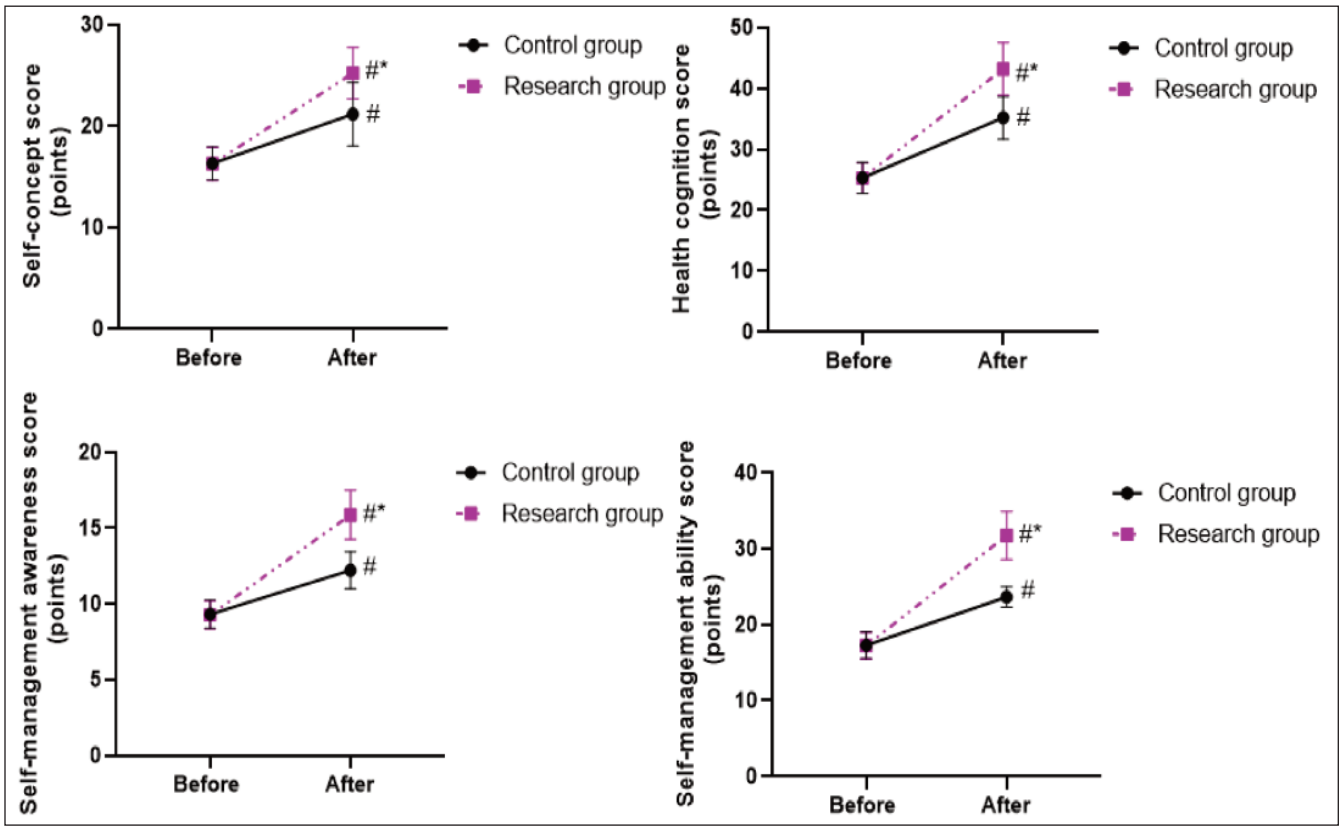


Figure-1: Self-management ability in the two groups.

*#p<0.05 compared to baseline. *p<0.05 compared to the control group.*

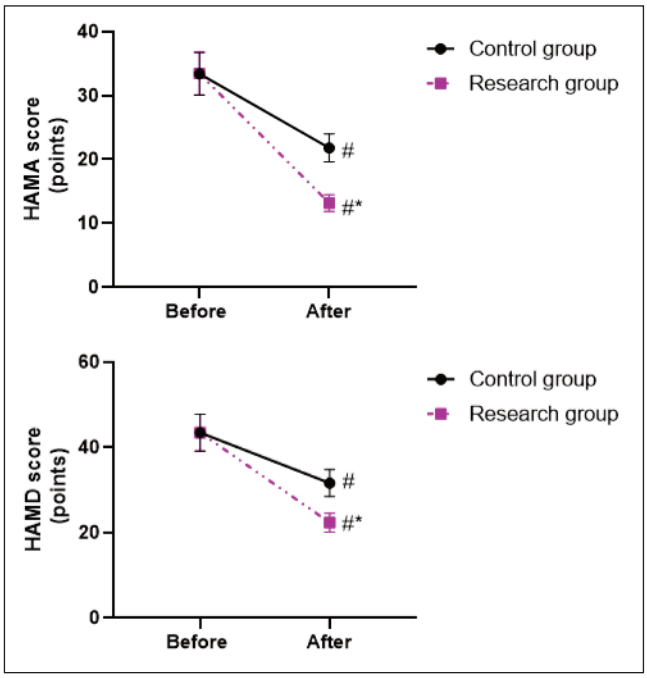


Figure-2: Psychological status of the patients.

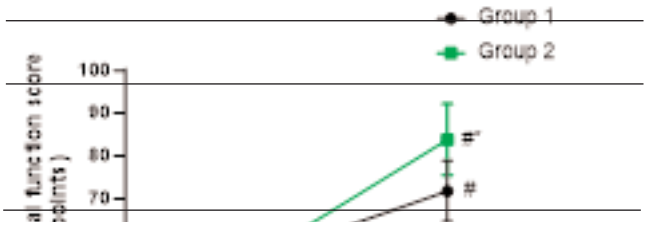
*#p<0.05 compared to baseline. *p<0.05 compared to the control group. HAMA: Hamilton Anxiety Scale, HAMD: Hamilton Depression Scale.*

between the groups at baseline ($p>0.05$). Post-intervention, the scores declined in both the groups ($p<0.05$), but those in RG were lower compared to CG ($p<0.05$) (Figure 2).

At baseline, QOL scores were not significantly different between the groups ($p>0.05$). Post-intervention, the scores were elevated in both the groups ($p<0.05$), and those in RG were higher compared to CG ($p<0.05$) (Figure 3).

Table-3: The incidence of complications.

Group	Cases	Infection	Haematoma	Internal fistula occlusion	Subcutaneous oedema	Total incidence rate
Control	38	3	3	3	0	9 (23.68%)
Research	38	1	1	0	0	2 (5.26%)
x^2						5.208
***p*-value**						0.023



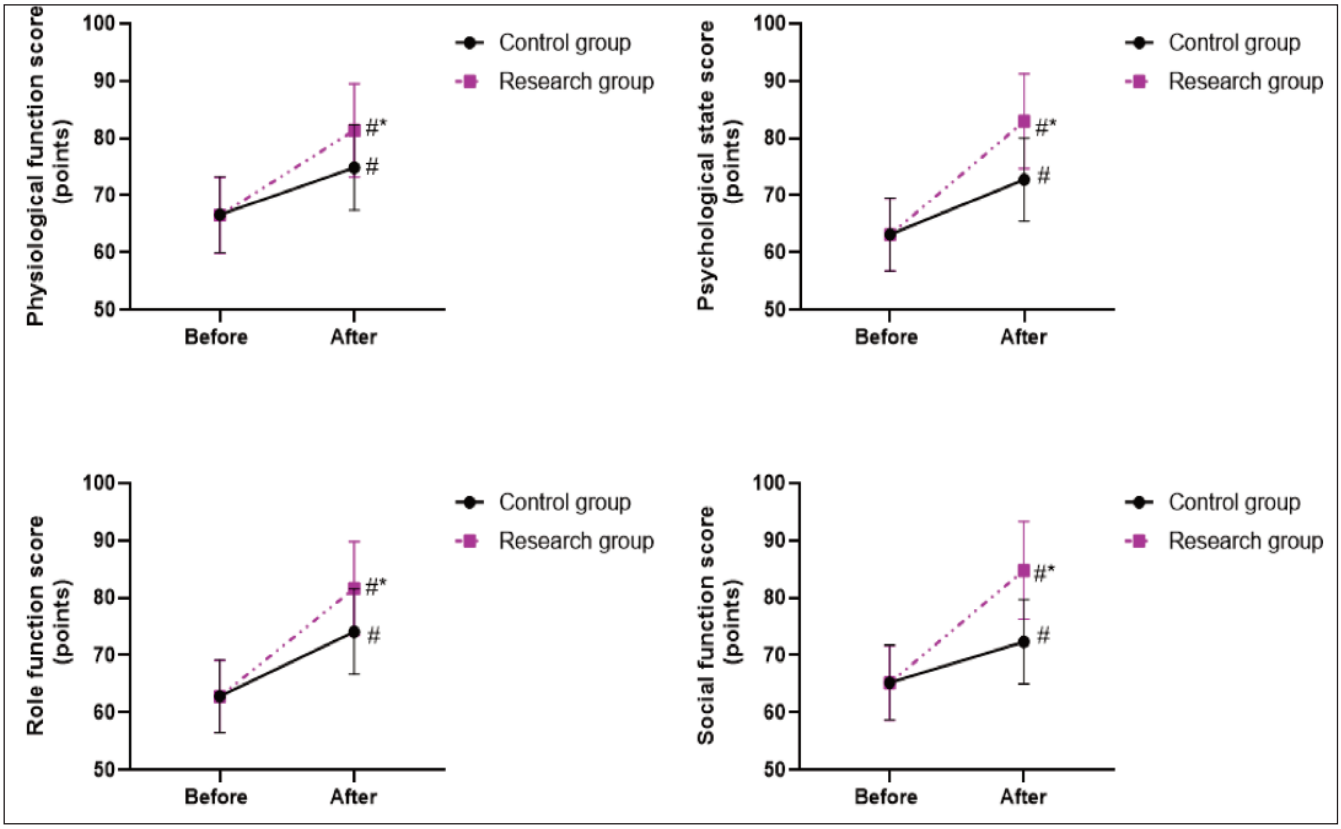


Figure-3: Comparison of quality of life (QOL) scores between the groups.

*#p<0.05 compared to baseline. *p<0.05 compared to the control group.*

The incidence of complications in RG was lower copared to CG (p<0.05) (Table 3).

Satisfaction with nursing was higher in RG than CG (p<0.05) (Table 4).

Discussion

End-stage renal patients need long-term haemodialysis treatment to prolong their lifespan.[27] The key to this treatment is internal AVF, which is extremely commonly used and can effectively improve the therapeutic effect, but it is prone to complications, such as subcutaneous haematoma and internal fistula occlusion.[28] Studies have shown that the occurrence of complications of internal AVF is related to various factors, such as treatment environment, psychological quality, and physical quality of patients, which seriously affect the curative effect and reduce the long-term survival rate.[29-31] In order to improve the above situation, it is essential to continuously promote the quality of clinical nursing.

The authorisation theory is a new clinical intervention model that obtains the authorisation of patients to carry out relevant intervention and nursing work for patients, so that patients feel respected and recognised, and can cultivate patients' self-management consciousness.[32] By changing the passive relationship of patients in traditional clinical nursing, the authorisation theory enables patients to actively participate in their own health education and the formulation of clinical nursing plans.[33] The authorisation theory helps patients make decisions by assessing and understanding various ideas, and respects patients' own decisions, so that patients may cooperate more actively and proactively with subsequent treatment and nursing work.[34] At home and abroad, a number of studies have confirmed that the authorisation theory can cultivate patients' confidence in treatment and self-management ability, and ultimately improve patients' self-efficacy.[35]

In the current study, within 3 months, RG subjects had higher internal fistula patency rate along with lower incidence of complications compared to the CG, suggesting that nursing measures based on the authorisation theory could promote the internal fistula patency rate, and decrease the incidence of complications in patients with initial AVF, which was consistent with a previous study.[36]

The current study also manifested that post-intervention, RG had higher scores of self-concept, health cognition, self-management awareness and self-management ability, lower scores of HAM-A and HAM-D, higher scores of physiological function, psychological state, role function and social function, and higher nursing satisfaction compared to CG. All these results suggested that nursing measures based on the authorisation theory could promote the self-management ability and reduce the negative emotions, improve QOL, and add to patients' level of satisfaction with nursing. It has been reported that the use of empowerment health education programme can improve parents' self-efficacy in caring for children undergoing corrective surgery for congenital heart disease.[37] Similarly, patients with spinal fractures who received systematic nursing on the basis of health empowerment theory experienced apparent improvements in pain, self-care and functional capacity.[22]

The current study has limitations. First, the sample size was small and it was not calculated which affected the validity of the results. Second, the follow-up time was short, and the long-term impact of nursing measures is still unclear. Large-scale and long-term studies are required to validate the current findings.

Conclusion

The application of nursing measures based on the authorisation theory in patients with initial AVF could promote the self-management ability, improve the QOL, and decrease the incidence of complications in the patients.

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Conflict of Interest: None.

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