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Original Article

Clinical efficacy of two different nursing methods in uremic patients on hemodialysis

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Abstract: Objective: To evaluate the effects of two different nursing interventions on disease status and quality of life of uremic patients during hemodialysis. Methods: A total of 84 uremic patients admitted from November 2018 to November 2019 were divided into the programmed nursing group (n=42) that was given programmed nursing care and the conventional nursing group (n=42) that was given routine nursing care. The clinical data were analyzed and relevant indicators were compared. Results: The patients' level of rehabilitation knowledge and degree of cooperation were significantly higher, and the efficacy of blood purification and self-care ability were much better in the programmed nursing group than in the conventional nursing group (all P<0.001). The quality of life after the intervention and treatment compliance were significantly better in the programmed nursing group than in the conventional nursing group (P<0.01 and P<0.05, respectively). Conclusion: Programmed nursing intervention for uremic patients can improve the efficacy of blood purification and quality of life, which is therefore worth being promoted in clinical practice.

Keywords: Blood purification, nursing model, uremia

Introduction

In recent years, there has been a peak in the incidence of uremia with the changes of living standards and environment in China [1]. Uremia, an acute critical condition, generally occurs at the end stage of renal failure since toxins which can't be effectively eliminated, largely accumulate in the body and lead to loss of function in the kidneys. In severe cases, uremia has a significant potential to be life-threatening [2, 3]. Nowadays in China, there is an increasing number of patients with uremia, most of whom need blood purification treatment in clinical practice. Although blood purification has shown great efficacy, complications may still occur during treatment. Besides, traditional nursing methods have some shortcomings, and inappropriate nursing care can have a negative impact on patients and hinder the treatment process [4]. Therefore, how to better provide quality nursing intervention needs urgent attention by medical staff. Combined with the practical situation of patients, effective nursing intervention must be performed during blood purification treatment, so as to mitigate disease severity, grasp the optimal treatment opportunity, and minimize complications. Herein, we explored the clinical effects and prognosis of different nursing modes for uremic patients receiving blood purification treatment.

Materials and methods

General data

A total of 84 hemodialysis patients admitted to the Blood Purification Center of Xinhua Hospital, School of Medicine, Shanghai Jiaotong University from November 2018 to November 2019 were randomly divided into the programmed nursing group (n=42) given programmed nursing care and the conventional nursing group (n=42) given routine nursing care. The clinical data were retrospectively analyzed.

Inclusion and exclusion criteria

The included patients were diagnosed with chronic kidney failure through diagnostic criteria, as issued by Nephropathy Association,

China Society of Chinese Medicine [5]. All patients received hemodialysis (4 hours, three times per week, for over 12 months) with arteriovenous fistula as the vascular access.

In addition, patients with recent acute and chronic infections or a history of blood transfusion in the past 3 months were excluded. Those with combined diseases that cause significant decline in muscle strength (e.g., malignant tumors, trauma, cerebrovascular disease sequelae, and hyperthyroidism) were also excluded. Written informed consent was obtained from all patients and ethics approval for the study was given by the Ethics Committee of Xinhua Hospital, School of Medicine, Shanghai Jiaotong University.

Nursing methods

Routine blood purification was given to the conventional nursing group, mainly including creating a good rehabilitation environment and closely monitoring the various indicators of patients (e.g., vital signs, urine volume, and infection status) [6, 7]. On the basis of conventional nursing care, programmed nursing intervention was given to the programmed nursing group, mainly including evaluation of the patients' condition, formulation of personalized nursing plan and implementation of the plan.

As to the evaluation of patients' condition, nursing staff proactively communicated with the patients with eye contact and kind expression, and understood their feelings when observing their symptoms, for mastery of the patients' knowledge level on blood purification. On this basis, better nursing care was provided for the patients [8, 9].

As for the formulation of a personalized nursing plan, nursing staff created a preliminary plan based on the evaluation of the patients' condition, and then communicated with the patients and their families during the process of implementation to improve the nursing plan in a timely manner [10, 11].

As to the implementation of the nursing plan, before blood purification treatment, the relevant knowledge of uremia and rehabilitation measures were introduced to the patients and their families to relieve the patients' psychological burden and for better cooperation with treatment. After blood purification treatment, nursing staff formulated nutrition recipes according to the patients' treatment and specific situation so as to strictly control the dietary factors. Meanwhile, the patients were guided to maintain good sleep habits, especially waking early, for good recovery [12]. During the entire course of treatment, proactive communications with the patients were built to minimize their negative emotions caused by the disease or family status.

Outcome measures

Level of knowledge: A self-made questionnaire was used to investigate the knowledge level of patients on uremia, diet, psychology, exercise, intravenous drip, and hemodialysis [13].

Degree of cooperation: The patients' performances, such as understanding of doctor's instructions and compliance behaviors (e.g., self-care, cooperation with treatment) were evaluated objectively by duty nurses to reflect their degree of cooperation with treatment.

Efficacy of blood purification therapy: The programmed nursing group received hemodialysis three times a week using a disposable F18 hollow polysulfone membrane fiber dialyzers (Wego Holding Co., Ltd., China; effective membrane area =1.8 m^2), and hemoperfusion once a week using disposable HA-130 macroporous resin hemoperfusion apparatus (Jafron Biomedical Co., Ltd., Zhuhai, China). During the treatment, the hemoperfusion apparatus was connected in series prior to the dialyzer for the first two hours, then the blood only passed through the dialyzer for the next two hours. The conventional nursing group received hemodialysis three times a week for 4 hours per session, using disposable F18 hollow polysulfone membrane fiber dialyzers (Wego Holding Co., Ltd., China, effective membrane area =1.8 m^2). According to each project, both groups were consecutively treated for 4 weeks with dialysis dosage of 12 h/week. Bicarbonate dialysate was administered with a flow rate of 500 mL/min and average blood flow of 250±20 mL/min. C-reactive protein (CRP) was determined using colloidal gold immunochromatography assay and double antibody sandwich method (C-reactive protein quantitative assay kits, Kanu Shanghai Biological Technology Co., Ltd., China). Detection of blood urea nitrogen (Shanghai Yinggong Biotechnology Co., Ltd., China) was also performed. Subsequently, the

Table 1. Baseline information ($\bar{x}$±sd)

	Programmed nursing group (n=42)	Conventional nursing group (n=42)	t/χ^2	P
Age (year)	66.6±5.3	67.0±5.1	0.570	0.596
Gender (male/female)	23/19	24/18	0.152	0.892
Disease course (year)	10.8±6.5	10.5±6.7	0.337	0.735
BMI (kg/m^2)	18.69±1.38	18.74±1.36	1.002	0.846
Blood purification therapy (time)	0.37±0.28	0.41±0.26	0.918	0.663

Note: BMI: body mass index.

Table 2. Comparison of level of knowledge and degree of cooperation ($\bar{x}$±sd)

Group	Level of knowledge	Degree of cooperation
Programmed nursing group (n=42)	17.34±3.65	93.0±1.21
Conventional nursing group (n=42)	12.10±2.88	81.21±1.34
t	5.242	5.331
P	<0.001	<0.001

Table 3. Comparison of effects of blood purification therapy ($\bar{x}$±sd)

Group	CRP (mg/L)	BUN (mmol/L)
Programmed nursing group (n=42)	10.86±2.98	23.56±3.21
Conventional nursing group (n=42)	15.99±2.76	27.71±3.76
t	7.784	8.673
P	<0.001	<0.001

Note: CRP: C-reactive protein; BUN: blood urea nitrogen.

serum was separated by centrifugation at 3,000 rpm for 10 minutes from each sample, placed into numbered EP tubes, and stored in the freezer at -70°C for batch detection.

Quality of life: Quality of life (QoL) was assessed using the Short Form 36 Health Survey scale, which incorporated physical functioning, role-physical, vitality, bodily pain, social functioning, role-emotional and mental health with a total score of 100 points (higher scores indicate better QoL) [14].

Self-care ability: The self-made nursing ability scale, which was composed of two dimensions, namely, self-concepts and self-care skills, both with a maximum score of 10 points (higher scores reveal better self-care ability).

Statistical analysis

Data analyses were performed with SPSS 22.0 software (IBM Corp., Armonk, NY, USA). Independent t-test was adopted for comparison between the two groups to the measurement data with normal distribution expressed as mean ± standard deviation ($\bar{x}$±sd). Chi-square test (χ^2 test) was adopted for enumeration data expressed as the case/percentage (n/%). P<0.05 was considered statistically different.

Results

As shown in **Table 1**, there was no statistical significance in the age, gender, disease course, body mass index, and times of blood purification treatment between the two groups (P>0.05), suggesting that the two groups were comparable.

We compared patients' level of rehabilitation knowledge and degree of cooperation by adopting the self-made questionnaire (reliability =0.719, validity =0.717) with a 4-grade scoring system. It was found that the programmed nursing group showed a significantly higher level of rehabilitation knowledge and degree of cooperation than the conventional nursing group (both P<0.001). See **Table 2**.

The efficacy of blood purification therapy, QoL scores after the intervention, self-care ability and treatment compliance were compared, and the results were as follows. The effect of blood purification in the programmed nursing group was much better than that in the conventional nursing group (P<0.001). See **Table 3**. The QoL scores after the intervention in the programmed nursing group were much higher than those in the conventional nursing group (P<0.01). See **Table 4**. The self-care ability (self-concept and self-care skills) in the programmed nursing group was much better than that in the conven-

Table 4. Comparison of QoL scores ($\bar{x}$±sd)

Item	Programmed nursing group (n=42)	Conventional nursing group (n=42)
Physical functioning		
Pre-intervention	53.27±5.14	53.58±5.47
Post-intervention	66.37±6.51**,##	54.05±5.68
Role-physical		
Pre-intervention	21.36±2.14	22.05±2.54
Post-intervention	29.54±2.55**,##	22.54±2.16
Vitality		
Pre-intervention	33.65±3.21	34.02±4.21
Post-intervention	46.60±4.71**,##	34.41±3.69
Bodily pain		
Pre-intervention	44.85±4.15	45.07±5.12
Post-intervention	65.32±7.41**,##	45.17±4.62
Social functioning		
Pre-intervention	48.50±4.11	49.08±5.01
Post-intervention	65.47±6.98**,##	49.45±5.65
Role-emotional		
Pre-intervention	46.14±5.12	46.55±5.23
Post-intervention	63.52±6.47**,##	47.56±5.14
Mental health		
Pre-intervention	51.32±4.25	50.98±6.14
Post-intervention	54.24±3.66**,##	51.23±5.36
Overall QoL score		
Pre-intervention	325.24±30.54	326.35±33.14
Post-intervention	428.53±44.12**,##	322.15±35.60

Note: Compared with pre-intervention, **P<0.01; Compared with the conventional nursing group, ##P<0.01. QoL: quality of life.

Table 5. Comparison of self-care ability ($\bar{x}$±sd)

Group	Self-concept	Self-care skills
Conventional nursing group (n=42)	6.56±1.51	5.87±1.25
Programmed nursing group (n=42)	8.12±1.37	7.65±1.34
t	5.960	6.372
P	<0.001	<0.001

tional nursing group (P<0.001). See **Table 5**. The treatment compliance in the programmed nursing group was much better than that in the conventional nursing group (P<0.05). See **Figure 1**.

Discussion

Blood purification treatment plays a pivotal role in prolonging the lives of uremic patients, which removes metabolic wastes in the body through infiltration and diffusion to maintain the acid-base and electrolyte balance. Hence, the treatment can replace the renal function partly and alleviate some uremic symptoms to extend the survival time of patients effectively.

A large number of clinical trials and data analysis have unveiled that most patients have poor rehabilitation knowledge on uremia, a common condition in clinical practice, which reduces the treatment efficacy and even threatens lives in serious cases [14, 15]. Ikizler et al. found that during the treatment of blood purification, programmed nursing intervention could facilitate understanding of the patients on rehabilitation knowledge and help them more actively cooperated with the treatment for early recovery [16]. In line with the result above, our study demonstrated that the patients' knowledge level on uremia in the programmed nursing group was much higher than that in the conventional nursing group.

Additionally, a lot of clinical trials have revealed that there is poor efficacy of blood purification in many patients with poor compliance [17]. In this study, the CRP level was significantly lower in the programmed nursing group (10.86±2.98 mg/L), as compared to the conventional nursing group (15.99±2.76 mg/L). This is due to the patients in the programmed nursing group having better psychological and physiological states than the patients in the conventional nursing group before blood purification treatment.

A previous study found that more valuable time could be gained for the treatment and rehabilitation of patients after programmed nursing intervention [18]. Teerawattananon et al. reported effective nursing intervention during blood purification treatment helped alleviate symptoms to a certain extent, grasp the optimal time opportunity, and minimize complications [19]. Similarly, our study identified that

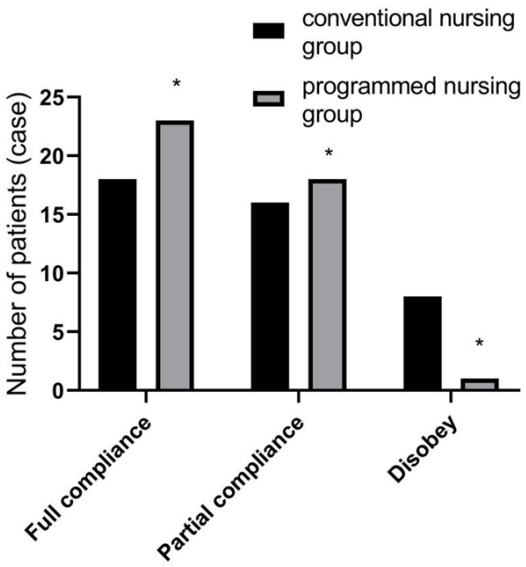

Figure 1. Comparison of treatment compliance. Compared with the conventional nursing group, *P<0.05.

programmed nursing care significantly improved the patients' QoL and relieved their negative emotions during the treatment.

Besides, studies have unveiled that psychological construction can't be strengthened for lack of self-care ability, resulting in plenty of obstacles for blood purification treatment [20, 21]. Tanner et al. reported that patients undergoing programmed nursing intervention had much better self-care ability than patients undergoing routine nursing intervention [22]. Similarly, our study showed a significant increase in the patients' self-care ability in the programmed nursing group, which helped the patients adapt to blood purification treatment. It can be seen that programmed nursing intervention for patients undergoing blood purification treatment can provide certain support for self-care [23].

In this study, the patients' overall compliance in the programmed nursing group was significantly higher than that in the conventional nursing group, indicating that programmed nursing care can help the patients master the knowledge and skills related to disease and treatment, and promote their treatment compliance.

Since little research has been done on different nursing models for uremic hemodialysis patients to delay disease progression and improve prognosis, further research is highly desirable. Besides, the sample size in our single-center study is small, hence, we will use larger sample sizes and perform a multi-center clinical trial to get a more precise conclusion in the future.

In summary, programmed nursing intervention for patients undergoing blood purification treatment can ameliorate the efficacy of blood purification, QoL and treatment compliance, thus this nursing care is worthy of being promoted widely in the clinic.

Disclosure of conflict of interest

None.

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