

## Original Article

# The effects of the collaborative nursing model on the self-nursing ability, hemodialysis compliance, and quality of life of patients on hemodialysis

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**Abstract:** Objective: this study was designed to analyze the effect of the collaborative nursing model on the self-nursing ability, hemodialysis compliance, and quality of life of patients on hemodialysis. Methods: 121 patients with end-stage renal disease (ESRD) admitted to our hospital were included as the study objects, retrospectively analyzed, and divided into 2 groups based on the nursing method used. While the control group was routinely nursed, the observation group was subjected to the collaborative nursing model, and the 2 groups were compared in terms of their scores from the exercise of self-nursing agency scale (ESCA), hemodialysis compliance, short form 36 health survey questionnaire (SF-36), and satisfaction after nursing. Results: (1) The scores of self-concept, self-nursing sense of responsibility, self-nursing skills, health knowledge level, and self-nursing ability in the observation group after the intervention were (29.98±2.15), (32.58±2.38), (40.28±4.05), (47.89±4.59), (116.99±5.88), respectively, which were higher than the corresponding scores in the control group ( $P<0.05$ ). (2) The scores of compliance with the hemodialysis program, medication, liquid intake, dieting, and hemodialysis in the observation group after the intervention were (21.19±1.29), (21.45±1.58), (20.59±1.63), (17.98±1.88), (86.63±1.88), respectively, which were higher than the corresponding scores in the control group ( $P<0.05$ ). (3) The scores of mental health, interpersonal relations, social function, exercise, overall health, body pain, physiological role, and physiological function in the observation group after the intervention were (92.25±0.12), (91.02±2.55), (90.18±1.29), (92.28±2.6), (93.29±1.2), (92.13±2.88), (93.26±2.59), (95.63±1.29), respectively, which were higher than the corresponding scores in the control group ( $P<0.05$ ). Conclusion: The collaborative nursing model can improve the self-nursing ability, hemodialysis compliance, and quality of life (QOL) of patients on hemodialysis.

**Keywords:** Hemodialysis, collaborative nursing model, self-nursing ability, hemodialysis compliance, quality of life

## Introduction

Hemodialysis is a common substitutive renal therapy widely applied in patients with ESRD [1, 2]. Though it can alleviate patients' conditions to a certain degree and extend their survival, a deficiency in the scientific and rational management still results in an undesired QOL [3].

As a new nursing model based on routine nursing, the collaborative nursing model insists on a full utilization of limited medical resources, encourages patients and their family members to be involved in the nursing, and unearths patients' self-nursing awareness to the utmost [4, 5]. It focuses more on the self-management

of patients and their family members and the interaction with experts on the basis of nursing [6]. Presently, China is challenged by an increasingly higher incidence of ESRD, and hemodialysis nursing has been identified as a key link affecting treatment and post-treatment recovery [7, 8]. In order to improve the self-nursing ability, hemodialysis compliance, and QOL of patients on hemodialysis, the application of the collaborative nursing model in hemodialysis nursing is discussed in the present study [1].

The present study specifically analyzed the effects of the collaborative nursing model on self-nursing ability, hemodialysis compliance, and the QOL of patients on hemodialysis. 2

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groups were set up for the comparison after routine nursing and intervention with the collaborative nursing model, in order to provide more effective and scientific opinions for the recovery of patients on hemodialysis.

### Materials and methods

#### *Materials*

121 patients with end-stage renal disease (ESRD) admitted to our hospital were included as the study objects, retrospectively analyzed, and divided into 2 groups based on the nursing methods. The control group (n=60), consisting of 39 males and 21 females ranging in age from 18 to 74, was routinely nursed, while the patients in the observation group (n=61) consisting of 42 males and 19 females, ranging in age from 19 to 73, were subjected to the collaborative nursing model. (1) Inclusion criteria: patients included into this study were had sufficient language competence, were clear of mind and independent in life before the onset of the disease. The patients and their family members provided informed consent, and the study was approved by the Second Affiliated Hospital of Hainan Medical University ethics committee. (2) Exclusion criteria: some patients were excluded as they withdrew from the study halfway, or they declined to participate in the study, or had a severe organ dysfunction such as hepatic and renal failure, a malignant tumor, or a functional or mental disorder.

#### *Methods*

The control group was routinely nursed in a comfortable treatment environment and an optimized hemodialysis room with soft lights, neat surroundings, and rationally controlled indoor humidity and temperature. An air conditioner was used when it was necessary to make sure the patients felt comfortable as much as possible; blood sugar fluctuation is one of the hazards during hemodialysis, which can be solved by a rational control of the patients' blood sugar levels (BSL). In this process, the observation of and response to any low BSL reactions was met with sugars and snacks prepared in advance, supervision over the patients for quantitative intake; the speeds of hemodialysis and ultrafiltration shall also be controlled to avoid significant dehydration. Any trend of low blood pressure shall be immediately intervened with hemodialysis in a high Na<sup>+</sup> se-

quence, accompanied by proper adjustment of the dialysate temperature, and any trend of high blood pressure shall be treated with hemodialysis in a low Na<sup>+</sup> sequence, accompanied by buccal hypotensors to control the blood pressure at a reasonable level. The last element is enhanced guidance on patients for self-nursing in the case of internal arteriovenous fistula.

The observation group adopted the collaborative nursing model.

#### *Comprehensive evaluation of patients*

In the collaborative nursing model, primary nurses, patients and patients' family members were assembled to formulate a targeted collaborative nursing program. First of all, the primary nurses shall establish an amicable relationship with the patients, as patients under long-term hemodialysis may be depressed and negative to various degrees as is usual, and some of them have received limited cultural education, leading to difficulties in the comprehensive and correct understanding of the collaborative nursing model. Therefore, primary nurses shall, based on patients' educational backgrounds and conditions, comprehensively evaluate their psychological status, self-nursing ability, and demands on knowledge about the disease, actively exchange and communicate with patients to maximally relieve their fear to hemodialysis and to establish an amicable relationship. Also, the primary nurses shall explain to the patients and their family members what hemodialysis is, the hazards of the excess intake of water and unreasonable dieting, and the necessity of their active cooperation with various examinations. Patients and their family members shall be guided in participating in nursing following an individualized nursing plan, in order to consolidate their care roles.

#### *Enhanced knowledge guidance on patients*

Knowledge related to hemodialysis is introduced to patients, who are also informed of the types of routine drugs, how to take them, and any possible adverse reactions. Patients are required to take medicines according to doctor's instructions and are regularly monitored across various indexes. For senior patients with a compromised self-nursing ability, they or their family members shall be instructed to put

a week's supply of drugs in a container. Family members also shoulder the responsibility of supervising the patients' medication; to each patient a health education manual is distributed for their reference with family members from time to time as a source of more knowledge and understanding on hemodialysis. In addition, patients are required to pay return visits for routine electrocardiograms, liver function, and blood and urine test, to exercise as appropriate depending on their actual conditions, and to keep themselves warm, adequately rested, and bathed. Furthermore, the patients' family members are engaged in recording their blood pressure at home, and they report the same to doctors and nurses during hemodialysis for the reasonable adjustment of medication.

### *Enhanced prevention of arteriovenous fistula*

For patients needing long-term hemodialysis treatment, the failure to take scientific and rational preventative measures in advance may result in fistula occlusion or stenosis, affecting the effects of hemodialysis markedly. Therefore, after hemodialysis treatment, patients and their family members shall pay attention to any pressure or water at the fistula site which shall be kept clean and dry to prevent infection. Proper exercise is necessary to maintain plentiful blood vessels, and patients are required to visit the doctor in case of errhythmia, infection, hydropneumothorax, etc.

### *Enhanced psychological nursing*

With family members present as diligent listeners, the patients express their worries under the guidance of the primary nurses. This is a process to help understand their psychological status, to give psychological support and encouragement to them, to help them establish an active and positive mental status for recovery, and to maximally relieve their fear and enhance confidence in the treatment. Meanwhile, a meeting may be held for patients with this disease to create an opportunity for the exchange of ideas and communication, support and encouragement, to advance the process of recovery.

### *Observation indices*

(1) Self-nursing ability: after intervention, the 2 groups' self-nursing ability was evaluated with

ESCA [9] which consists of 43 items of 4 dimensions, including self-concept, self-nursing sense of responsibility, self-nursing skills and health knowledge level. Each item is scored from 0 to 4 points, resulting in a total possible ESCA score of 172. A positive relation is established between the self-nursing ability and the score. The scale has a Cronbach  $\alpha$  of 0.88.

(2) Hemodialysis compliance score: the compliance scale developed by Zhang Yan was used for the assessment. The scale consists of 4 dimensions, such as compliance with the hemodialysis program, compliance with the medication, compliance with liquid intake, and compliance with dieting. Each dimension contains 6 items and each item is scored from 0 to 4 points, of which 0 represents "never" and 4 "always". A patient's score between 0 and 92 is positively related with compliance [10]. The scale has a Cronbach  $\alpha$  of 0.85.

(3) QOL: after intervention, SF-36 [11] was used to evaluate the QOL of both groups from 36 items in 8 dimensions, namely, mental health, interpersonal relations, social function, exercise, overall health, body pain, physiological role and physiological function. Each dimension is ranked between 0 and 100, and the QOL is positively associated with the total score. The scale has a Cronbach  $\alpha$  of 0.96.

### *Statistical analysis*

The statistical analysis was performed with SPSS 22.0. In the case of numerical data expressed as the means  $\pm$  standard deviation, comparison studies were carried out using independent-samples *T* tests for the data which were normally distributed, and a Mann-Whitney *U* test was carried out for the data which were not normally distributed, a paired test for pre-and-pro comparisons in the group; in the case of nominal data expressed as [n (%)], comparison studies were carried out through  $\chi^2$  tests for intergroup comparisons. For all statistical comparisons, significance was defined as  $P < 0.05$ .

## **Results**

### *Comparisons between the observation group and the control group in terms of general characteristics*

The observation group consisted of 42 males (68.85%) and 19 females (31.50%), with an

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**Table 1.** Comparison of the general data between the observation group and the control group [n (%)]/( $\bar{x} \pm s$ )

Materials		Observation Group (n = 61)	Control Group (n = 60)	t/ $\chi^2$	P
Gender (n)	Male	42 (68.85)	39 (65.00)	0.203	0.652
	Female	19 (31.50)	21 (35.00)		
Age (y)		58.16±2.15	58.09±2.13	0.180	0.858
Disease type					
	Chronic renal disease	23 (37.70)	21 (35.00)	0.089	0.992
	Hypertensive renal disease	20 (32.79)	19 (31.67)		
	Diabetic nephropathy	16 (26.23)	17 (28.33)		
	Other types of renal disease	2 (3.28)	3 (5.00)		
Educational background					
	Primary school and below	9 (14.75)	11 (18.33)	0.012	0.968
	Middle school	38 (62.30)	36 (60.00)		
	College and above	14 (22.95)	13 (21.67)		

**Table 2.** Comparison between the observation group and the control group in self-nursing ability after the intervention ( $\bar{x} \pm s$ , Score)

Group	Self-concept	Self-nursing sense of responsibility	Self-nursing skills	Health knowledge level	Total score
Control Group (n = 60)	21.02±1.25	19.25±2.12	28.52±2.58	32.12±3.28	95.18±4.59
Observation Group (n = 61)	29.98±2.15	32.58±2.38	40.28±4.05	47.89±4.59	116.99±5.88
t	27.964	32.514	19.014	26.669	22.718
P	0.000	0.000	0.000	0.000	0.000

age range of 19-73 and an average age of (58.16±2.15), while the control group comprised 39 males (65.00%) and 21 females (35.00%) with an age range of 18-74 and an average age of (58.09±2.13). The patients in the observation group had 23 (37.70%) cases of chronic renal disease, 20 (32.79%) cases of hypertensive renal disease, 16 (26.23%) cases of diabetic nephropathy and 2 (3.28%) cases of other types of renal disease, which corresponded to 21 (35.00%), 19 (31.67%), 17 (28.33%), 3 (5.00%) in the control group. In terms of educational background classified as primary school and below, middle school, college and above, the data reported were 9 (14.75%), 38 (62.30%) and 14 (22.95%) in the observation group, and 11 (18.33%), 36 (60.00%) and 13 (21.67%) in the control group. The two groups had no statistical difference in terms of age, gender, disease type, or educational background ( $P>0.05$ , **Table 1**).

### *Comparison between the observation group and the control group in self-nursing ability*

The scores of self-concept, self-nursing sense of responsibility, self-nursing skills, health

knowledge level, and self-nursing ability in the observation group after intervention were (29.98±2.15), (32.58±2.38), (40.28±4.05), (47.89±4.59), and (116.99±5.88), respectively, which were higher than of the scores in the control group ( $P<0.05$ ). (**Table 2** and **Figure 1**).

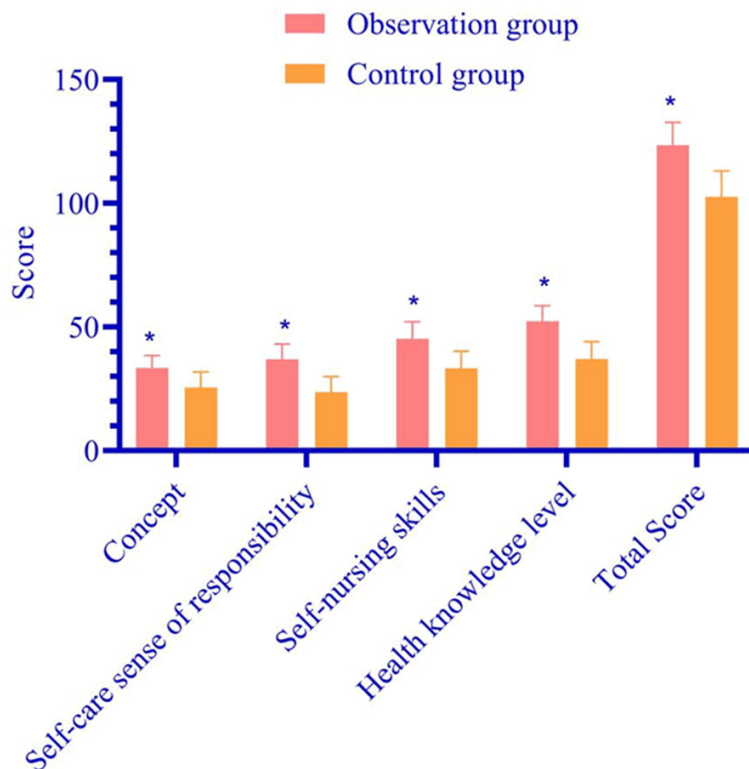
### *Comparison between the observation group and the control group in hemodialysis compliance score*

The scores of compliance with the hemodialysis program, medication, liquid intake, dieting and hemodialysis in the observation group after the intervention were (21.19±1.29), (21.45±1.58), (20.59±1.63), (17.98±1.88), and (86.63±1.88), respectively, which were higher than of the scores in the control group ( $P<0.05$ , **Table 3**).

### *Comparison between the observation group and the control group in QOL*

The scores of mental health, interpersonal relations, social function, exercise, overall health, body pain, physiological role and physiological function in the observation group after

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**Figure 1.** Comparison between the observation group and the control group in the scores of self-nursing ability. After the intervention, the scores of mental health, interpersonal relation, social function, exercise, overall health, body pain, physiological role, and physiological function in the observation group were all higher than the corresponding scores in the control group ( $P < 0.05$ ). \*indicates that when compared with control group,  $P < 0.05$ .

the intervention were  $(92.25 \pm 0.12)$ ,  $(91.02 \pm 2.55)$ ,  $(90.18 \pm 1.29)$ ,  $(92.28 \pm 2.6)$ ,  $(93.29 \pm 1.2)$ ,  $(92.13 \pm 2.88)$ ,  $(93.26 \pm 2.59)$ , and  $(95.63 \pm 1.29)$ , respectively, which were higher than of the scores in the control group ( $P < 0.05$ , **Table 4**).

### Discussion

Hemodialysis is an important clinical means of extending the survival of patients with ESRD, and its purposes are undergoing changes to some extent as developments are achieved in modern medical technology. Instead of pursuing the only goal of extending the survival of patients, hemodialysis also aims to gradually change patients' awareness of survival, and improve their self-nursing ability and QOL [12, 13].

Studies reveal that some patients on hemodialysis are compromised in their self-nursing

abilities due to factors such as insufficient social support, low educational backgrounds and financial capacity, and in hemodialysis compliance as they endure hemodialysis for such a long time and suffer from many complications, which makes it difficult for them to tolerate the treatment [14, 15]. As a new nursing model developed from routine nursing, collaborative nursing model proposes that both patients and their family members shall participate in nursing activities [16]. It assists nurses to supervise over and educate patients in an individualized manner based on patients' actual conditions, and facilitate improving the degree of adaptability and support of patients and their family members, and maximally wake up the patients' subjective initiative. In such a process, nurses work as coordinator, supporter and educator [17, 18]. In addition, the nursing model stresses the importance of the patients'

and their family members' participation in the formulation of a collaborative nursing program with primary nurses, which is advantageous to the improved knowledge and understanding of collaborative nursing and hemodialysis, and has the result of enhanced self-constraint [19, 20]. The efforts from patients, their family members, and the primary nurses contribute to a unified nursing support system, in which, their roles are fully leveraged, and the enthusiasm and initiative of patients and their family members are motivated [21]. Next, the nursing program based on a discussion of the three parties would be the best one, according to which, the patients are comprehensively evaluated by nurses, introduced to the knowledge of this disease and hemodialysis, and improved by psychological intervention and the nursing of arteriovenous fistula. This process benefits the reduction of the patients' mental pressure and fear and allows their family members to be more and clearly focused in nursing. Also



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**Table 3.** Comparison between the observation group and the control group in hemodialysis compliance scores after the intervention ( $\bar{x} \pm s$ , Score)

Group	Compliance with hemodialysis program	Compliance with medication	Compliance with liquid intake	Compliance with dieting	Total score
Control Group (n = 60)	18.15±0.28	18.02±0.22	17.15±0.18	15.12±0.21	70.12±0.36
Observation Group (n = 61)	21.19±1.29	21.45±1.58	20.59±1.63	17.98±1.88	86.63±1.88
t	17.844	16.654	16.249	11.711	66.826
P	0.000	0.000	0.000	0.000	0.000

**Table 4.** Comparison between the observation group and the control group in QOL after the intervention ( $\bar{x} \pm s$ , Score)

Group	Mental health	Interpersonal relation	Social function	Exercise	Overall health	Body pain	Physiological role	Physiological function
Control Group (n = 60)	75.12±2.36	76.11±1.18	71.13±2.33	70.36±0.85	72.33±3.69	70.12±0.58	70.16±0.85	71.26±3.63
Observation Group (n = 61)	92.25±0.12	91.02±2.55	90.18±1.29	92.28±2.69	93.29±1.29	92.13±2.88	93.26±2.59	95.63±1.29
t	56.620	41.161	55.759	60.228	41.843	58.047	65.690	49.364
P	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

patients' confidence in treatment is improved, accompanied by a consolidation of their self-nursing ability. The study by Sato et al. [22] has a reference value, in which patients on hemodialysis were subjected to the collaborative nursing model, and it was found that the nursing model can improve the QOL and self-nursing ability of patients on hemodialysis.

In the present study, compared with the control group, the observation group attained higher scores in self-concept, self-nursing sense of responsibility, self-nursing skills, health knowledge level, and self-nursing ability after the intervention ( $P < 0.05$ ), indicating that the collaborative nursing model can improve the self-nursing ability of patients on hemodialysis for possible reasons that in this model, patients' understanding of the importance of hemodialysis, and the contributions of delinquent conduct to an elevated risk level of hemodialysis was improved based on consolidated education of knowledge about the disease, which resulted in less such unacceptable conduct [23]. Next, the collaborative nursing model helps patients to comprehensively and correctly understand their roles and build confidence in the treatment [24]. Compared with the control group, the observation group attained higher scores in compliance with the hemodialysis program, medication, liquid intake, dieting and hemodialysis after intervention ( $P < 0.05$ ), indicating that the collaborative nursing model can significantly improve the hemodialysis compliance of patients on hemodialysis. Sher et al.

[25] pointed out that, in addition to education, family income, medical insurance and such other objective factors, social factors including self-confidence, social supports, psychological health and medical resources also affect the compliance of patients on hemodialysis. In the collaborative nursing model, nurses collaborate with the patients' family members to build a self-nursing system, which helps patients build confidence in treatment and improve their enthusiasm and initiative in hemodialysis via the provision of psychological support, social support and family support [26]. The collaborative nursing transforms the patients' role from the one being managed to the one who manages. This process contributes to an alleviated psychological load and an improved self-management ability and hemodialysis initiative in patients [27]. Compared with the control group, the observation group attained higher scores in mental health, interpersonal relation, social function, exercise, overall health, body pain, physiological role and physiological function ( $P < 0.05$ ), which further supported the efficacy of the collaborative nursing model on patients on hemodialysis by improving their QOL. The possible underlying reasons are the alleviated conditions and mental load, and an improved QOL of patients on hemodialysis after advancement in self-nursing ability and hemodialysis compliance.

In conclusion, the collaborative nursing model can improve the self-nursing ability, hemodialy-

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sis compliance, and the quality of life (QOL) of patients on hemodialysis.

However, results obtained from the study were less representative as fewer patients were included. In the future, more in-depth study is necessary.

### Disclosure of conflict of interest

None.

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