

## Original Article

# Evidence-based nursing improves unhealthy psychology and the quality of life and reduces the incidence of complications in hemodialysis patients

Limei Li, Ruixia Hu

*Department of Blood Purification, Affiliated Hospital of Jining Medical College, Jining, Shandong, China*

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**Abstract:** Purpose: To explore the effects of evidence-based nursing (EBN) on unhealthy psychology, the quality of life, and the incidence of complications in hemodialysis patients. Methods: 96 hemodialysis patients who were admitted to the blood purification department of the Affiliated Hospital of Jining Medical College from January 2016 to March 2018 were randomized into a control group which received conventional nursing and an experimental group which received conventional nursing combined with EBN (n = 48). The two groups of patients were evaluated in terms of the degree of understanding their diseases, treatment compliance, unhealthy psychology, quality of life, incidence of complications, and nursing satisfaction. Results: Compared with those in the control group, patients in the experimental group had a significantly higher degree of understanding their diseases ( $P < 0.05$ ), a significantly higher treatment compliance rate ( $P < 0.05$ ), a significantly lower SAS score ( $P < 0.05$ ), a significantly lower SDS score ( $P < 0.05$ ), and a significantly better quality of life ( $P < 0.05$ ). Compared with the control group, the experimental group exhibited a significantly lower incidence of complications ( $P < 0.05$ ), and higher nursing satisfaction ( $P < 0.05$ ). Conclusion: For hemodialysis patients, EBN can relieve their negative emotions, improve their nursing satisfaction, treatment compliance and quality of life, and increase their understanding of diseases, as well as promote their rehabilitation and reduce their incidence of complications.

**Keywords:** Hemodialysis, evidence-based nursing, unhealthy psychology, quality of life, incidence of complications

## Introduction

Hemodialysis, which transports a large amount of harmful metabolic wastes from the body to the outside of the body through semi-permeable membranes, can purify the blood, regulate body fluid equilibrium and thereby maintain the lives of patients with renal failure [1, 2]. Long-term hemodialysis prolongs the patients' lives, but it also brings expensive drugs and surgical equipment to the patients while they are suffering from the disease. Due to the heavy economic burden, the patients are prone to negative emotions such as anxiety and depression, thus resisting treatment. A few patients have dysarteriotomy, deep vein thrombosis, and other complications, and patients with severe negative emotions may even commit suicide. Therefore, these negative emotions seriously affect the therapeutic effect of hemodialysis [3-5].

Moreover, hemodialysis is usually complicated with infections and other complications, which have an impact on overall efficacy and prognosis, so reducing the complications is also vital to the treatment [6]. Therefore, nursing is very important for hemodialysis patients, and evidence-based nursing (EBN) has a regulatory effect on acute renal failure in hemodialysis [7].

Widely used due to its functional treatment, EBN means that after discovering the patients' practical situations, nursing staff formulate and perfect nursing plans to solve problems by following practical evidence combined with clinical skills and personal experience [8]. The application effect of EBN on hemodialysis patients has been widely studied, but most of the studies are about its effect on relieving negative emotions and reducing the incidence of complications [9, 10]. Its effect on the postoperative quality of life has rarely been studied.

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Therefore, the effects of EBN on mental health, the incidence of complications and hemodialysis patients' quality of life were explored in this study, in order to find better nursing plans for the patients.

## Materials and methods

### *General information*

96 hemodialysis patients who were admitted to the blood purification department of the Affiliated Hospital of Jining Medical College from January 2016 to March 2018 were randomized into the control group, which received conventional nursing, and the experimental group, which received conventional nursing combined with EBN (n = 48). The patients consisted of 44 males and 52 females, with an average age of (61.34 ± 5.14) years old. Among them, 42 patients had an educational level of university or above, and 54 patients had an educational level below university. Inclusion criteria: Patients with end-stage renal disease in stable condition and having undergone continuous dialysis for at least 3 months were selected; Patients with severe malnutrition, hypercalcemia, hypocalcemia, hyperphosphatemia and other symptoms. Also, all patients agreed to this study and signed the informed consent. Exclusion criteria: Patients with intracranial hemorrhage or increased intracranial pressure; Patients with severe cardiomyopathy and refractory heart failure; Patients who have been found with or have a potential malignancy before and after treatment; Patients with acute inflammatory symptoms; Immunocompromised patients; Patients with communication problems who did not cooperate with the study.

### **Nursing methods**

#### *Conventional nursing*

Patients in control group received conventional nursing care. ECG monitoring was performed to pay close attention to changes in the patients' vital signs. During hemodialysis, the patients' sweat was wiped away in time to avoid their anxiety due to damp clothes. During nursing, the patients' skin was regularly wiped with warm water to avoid sores, and cleaning with soap was forbidden to avoid pressure sores and inflammations in the operative site. After admission, the nursing staff explained the related matters needing attention to the patients'

family members in detail, regularly monitored the patients' conditions, and instructed the patients to reasonably arrange time for rest and sleep. They also recorded and cared for patients with the early symptoms of anxiety and depression, and instructed special personnel to accompany and nurse these patients. In addition, they strengthened communication with the patients to relieve their stress during treatment.

#### *EBN*

Patients in the experimental group were treated with conventional nursing combined with EBN. (1) Experienced chief physicians and head nurses were selected to set up an EBN team, in order to regularly explain the skill of document retrieval, special business, and nursing to the members based on a combination of practice and theory. (2) Factors affecting the patients' clinical manifestations, psychological changes, and efficacy during hospitalization were recorded and understood, to formulate evidence-based problems. (3) According to the evidence-based problems, the most suitable nursing evidence was selected through document retrieval and evaluation. (4) The patients were instructed on their disease and health in plain language, which mainly included a knowledge of hemodialysis and EBN. (5) The nursing staff strengthened communication with the patients, understood their real thoughts about disease treatment, and paid attention to their psychology, so as to prevent negative emotions. (6) Noise from monitoring instruments was avoided. Nasal oxygen inhalation was given to the patients, and non-invasive ventilation and mask oxygen inhalation were given to the patients with severe hypoxia. Time for the patients' sleep and rest was ensured. Ineffective or reactive nursing was avoided to prevent the patients from resisting the nursing environment. Warm and comfortable wards were created for the patients. The patients were closely inspected with respect to their condition changes and physiological indexes, and they cooperated with doctors to complete the treatment after their discomfort was reported to attending doctors in time. The nursing staff conversed with the patients with empathy, listening and other modes of psychological communication, and advised them to talk with friends and relatives when they had negative emotions which needed to be relieved. Additionally, the nursing

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**Table 1.** General information

Items	Experimental group n = 48	Control group n = 48	X <sup>2</sup> /t	P
Gender			0.168	0.682
Male	21 (43.75)	23 (47.92)		
Female	27 (56.25)	25 (52.08)		
Age (Years)			0.042	0.838
≤ 61	24 (50.00)	23 (47.92)		
> 61	24 (50.00)	25 (52.08)		
BMI (kg/m <sup>2</sup> )			0.389	0.533
≤ 22	30 (62.50)	27 (56.25)		
> 22	18 (37.50)	21 (43.75)		
Educational level			0.169	0.681
University or above	22 (45.83)	20 (41.67)		
Below university	26 (54.17)	28 (58.33)		
Types of diseases			0.203	0.903
Chronic glomerulonephritis	23 (47.92)	22 (45.83)		
Diabetic nephropathy	11 (22.92)	10 (20.83)		
Hypertensive nephropathy	14 (29.17)	16 (33.33)		
Course of disease (Years)	7.45 ± 2.24	7.73 ± 2.20	0.618	0.538
Dialysis duration (Years)	6.43 ± 2.43	6.36 ± 2.37	0.143	0.887
Tube placement			0.043	0.837
Internal jugular vein catheter	20 (41.67)	21 (43.75)		
Femoral vein catheterization	28 (58.33)	27 (56.25)		

ing habit. They also instructed the patients' relatives and friends to give the patients more psychological care, to make them feel family support through appropriate visits, and to build their confidence and courage to cooperate in the treatment.

### Outcome measures

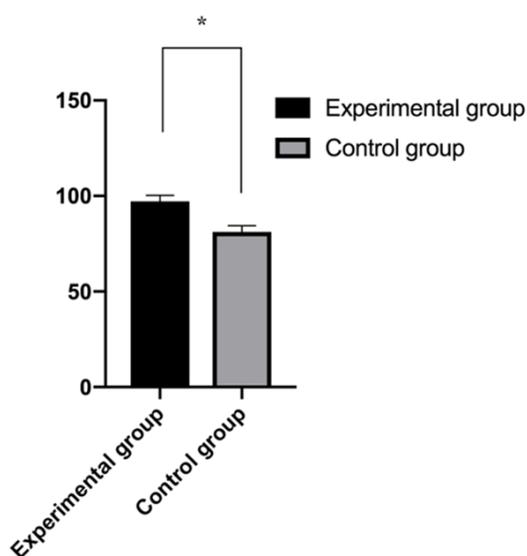
(1) Degree of understanding their diseases: The patients' degree of understanding their diseases was evaluated by questionnaires. On a scale of 100, the score indicated the degree of understanding of the disease.

(2) Treatment compliance: The patients' treatment compliance was investigated through questionnaires, which mainly included questions about whether hemodialysis was conducted on time, questions about their examinations, injected liquid and medication, proper rest or exercise, and whether they eat according to regulations. According to the results, the patients were divided into those of complete compliance, partial compliance, and non-compliance [11].

(3) The self-rating anxiety scale (SAS) and the self-rating depression scale (SDS) were used to evaluate the negative psychological state, degree of anxiety and depression in patients according to the evaluation criteria in the references [12, 13].

(4) Quality of life: The patients' quality of life was evaluated, which mainly included physical function, psychological function, social function, cognitive function, and material life. The higher the score of each dimension was, the better the quality of life was [14].

(5) Incidence of complications: The incidence of shock, infection, anemia, hypoglycemia and hypotension in patients was respectively re-



**Figure 1.** Comparison of the degree of understanding their diseases. The degree of understanding their diseases in the experimental group was significantly higher than it was in the control group ( $P < 0.05$ ). Note: \*indicates  $P < 0.05$ .

staff instructed the patients to correct their unhealthy living habits, and to develop an eat-

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**Table 2.** Comparison of treatment compliance

Items	Experimental group n = 48	Control group n = 48	$\chi^2$	P
Complete compliance	41 (85.42)	32 (66.67)	-	-
Partial compliance	5 (10.42)	7 (14.58)	-	-
Non-compliance	2 (4.17)	9 (18.75)	-	-
Compliance rate	46 (95.83)	39 (81.25)	5.031	0.025

significantly higher than (81.23  $\pm$  3.24)% in the control group (P < 0.05). More details are shown in **Figure 1**.

*Experimental group showed a higher treatment compliance rate than the control group*

**Table 3.** Comparison of SAS and SDS scores before and after EBN

Items	Experimental group n = 48	Control group n = 48	t	P
SAS	22.11 $\pm$ 4.24	34.15 $\pm$ 4.84	12.960	< 0.001
SDS	21.64 $\pm$ 4.65	37.71 $\pm$ 5.24	15.890	< 0.001

The experimental group had 41 cases of complete compliance, 5 cases of partial compliance, and 2 cases of non-compliance, while the control group had 32 cases of complete compliance, 7 cases of partial compliance, and 9 cases of non-compliance.

The treatment compliance rate in the experimental group was significantly higher than it was in the control group (P < 0.05) (**Table 2**).

*The experimental group showed lower SAS and SDS scores than the control group*

The SAS score in the experimental group was (22.11  $\pm$  4.24) points, significantly lower than the (34.15  $\pm$  4.84) points in the control group (P < 0.05). The SDS score in the experimental group was (21.64  $\pm$  4.65) points, significantly lower than the (37.71  $\pm$  5.24) points in the control group (P < 0.05) (**Table 3** and **Figure 2**).

*Patients in the experimental group had a better quality of life*

The physical function, psychological function, social function, cognitive function and material life scores in the experimental group were (81.41  $\pm$  2.64), (80.97  $\pm$  2.53), (80.98  $\pm$  2.45), (79.94  $\pm$  2.43) and (80.14  $\pm$  2.34) points, respectively, significantly higher than the (62.42  $\pm$  2.34), (62.04  $\pm$  2.51), (61.85  $\pm$  2.35), (62.12  $\pm$  2.34) and (61.97  $\pm$  2.24) points in the control group (P < 0.05) (**Table 4**).

*Patients in the experimental group were less likely to develop complications after EBN*

The numbers of patients with shock, infection, anemia, hypoglycemia, and hypotension in the experimental group were 0, 1, 1, 0, and 1, respectively. The numbers in the control group were 1, 2, 3, 2 and 2, respectively. The incidence of complications in the experimental group was significantly lower than it was in the

recorded. The total incidences of complications were compared [15].

(6) Nursing satisfaction: The patients' nursing satisfaction was investigated through self-made questionnaires, which had a total score of 100 points. Greater than 90 points indicated very satisfied, 70-89 points indicated satisfied, and lower than 70 points indicated dissatisfied.

### Statistical methods

In this study, SPSS 19.0 (Beijing NDTimes Technology Co., Ltd.) was used to statistically analyze the experimental data. Count data underwent a chi-squared test. Measurement data were expressed by the mean  $\pm$  standard deviation, and a t test was used for comparisons between two groups, and a paired t test was used for comparisons between before and after intervention. In this study, GraphPad Prism 8 was used to plot figures. When P < 0.05, the difference is statistically significant.

### Results

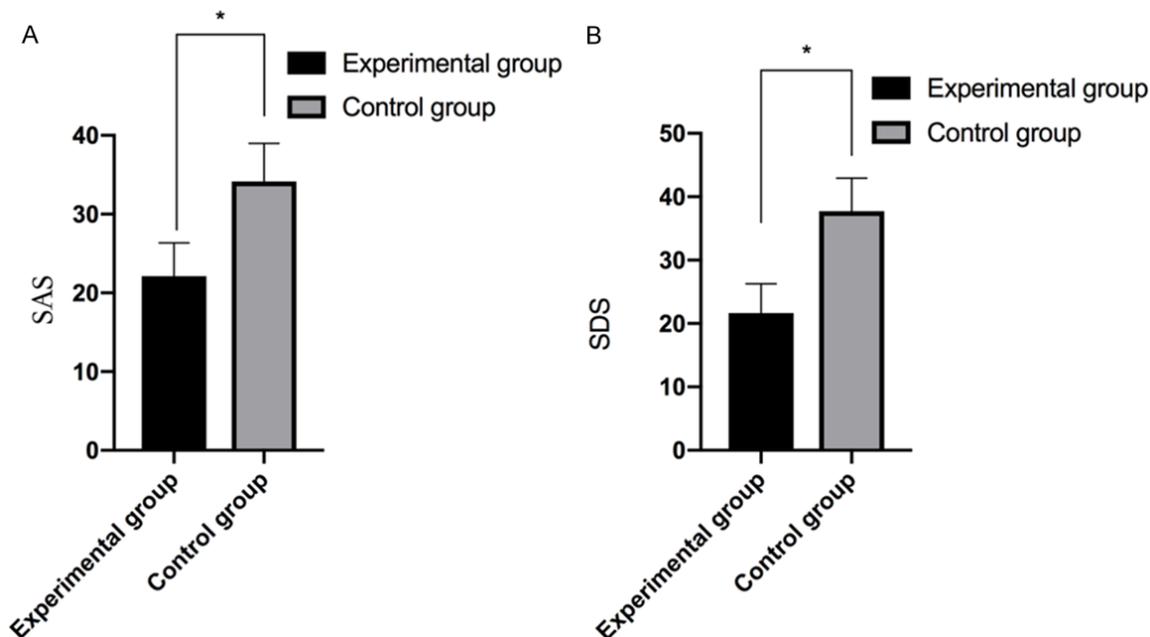
#### General information about the experimental and control groups

There was no significant difference between the control and experimental groups in gender, age, course of the disease, or educational level (P > 0.05). More details are shown in **Table 1**.

*The experimental group showed a higher degree of understanding their diseases than the control group*

The degree of understanding their diseases in the experimental group was (97.17  $\pm$  3.14)%,

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**Figure 2.** Comparison of SAS and SDS scores before and after EBN. The SAS score in the experimental group was significantly lower than it was in the control group ( $P < 0.05$ ). The SDS score in the experimental group was significantly lower than it was in the control group ( $P < 0.05$ ). Note: \*indicates  $P < 0.05$ .

**Table 4.** Comparison of quality of life after EBN

Items	Experimental group n = 48	Control group n = 48	t	P
Physical function	81.41 ± 2.64	62.42 ± 2.34	37.290	< 0.001
Psychological function	80.97 ± 2.53	62.04 ± 2.51	36.800	< 0.001
Social function	80.98 ± 2.45	61.85 ± 2.35	39.040	< 0.001
Cognitive function	79.94 ± 2.43	62.12 ± 2.34	36.600	< 0.001
Material life	80.14 ± 2.34	61.97 ± 2.24	38.860	< 0.001

control group ( $P < 0.05$ ). More details are shown in **Table 5**.

*Patients in the experimental group were more satisfied with the nursing care*

The experimental group had 39 cases of high satisfaction, 6 cases of satisfaction, and 3 cases of dissatisfaction, while the control group had 30 cases of high satisfaction, 7 cases of satisfaction, and 11 cases of dissatisfaction. The nursing satisfaction in the experimental group was 93.75%, significantly higher than the 77.08% in the control group ( $P < 0.05$ ) (**Table 6**).

### Discussion

The incidence of renal failure is high and the therapeutic effect on it is unsatisfactory. The

disease is currently treated by kidney transplantation and hemodialysis. However, because of high medical expenses and objective difficulties in finding matching organs, it is difficult to apply kidney transplantation to the routine treatment of renal failure.

Hemodialysis is cost effective and convenient in comparison, so it has become the main therapy for patients with advanced renal failure [16]. Hemodialysis temporarily replaces kidney transplantation and recovers the renal function of patients with acute renal failure. Its main step is to convectively disperse blood through drainage to form the exchange and circulation of substances in vivo and vitro, thus eliminating metabolic wastes in vivo. The purified blood can be re-transported to the body for reuse. The duration and ratio of hemodialysis should be adjusted in time, and the effect is the best when the duration is 14-16 h weekly [17]. Hemodialysis maintains the patients' lives, but it also causes many complications during treatment due to the deteriorative conditions and long course of the disease. The complications, mainly hypotension and hypo-

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**Table 5.** Comparison of the incidences of complications after EBN

Groups	Shock	Infection	Anemia	Hypoglycemia	Hypotension	Incidence of complications
Experimental group n = 48	0	1 (2.08)	1 (2.08)	0	1 (2.08)	3 (6.25)
Control group n = 48	1 (2.08)	2 (4.17)	3 (6.25)	2 (4.17)	2 (4.17)	10 (20.83)
X <sup>2</sup>	-	-	-	-	-	4.360
P	-	-	-	-	-	0.0368

**Table 6.** Comparison of nursing satisfaction

Satisfaction	Experimental group n = 48	Control group n = 48	X <sup>2</sup>	P
Very satisfied	39 (81.25)	30 (62.50)	-	-
Satisfied	6 (12.50)	7 (14.58)	-	-
Dissatisfied	3 (6.25)	11 (22.92)	-	-
Nursing satisfaction	45 (93.75)	37 (77.08)	5.352	0.021

glycemia, not only affect the patients' emotions and quality of life, but they also increase the difficulty of treatment and lead to serious consequences [18, 19]. According to studies, with the progress of new technologies for hemodialysis, patients hope that their physiology, psychology, and social communication can be specifically cared for while their lives are maintained [20-22]. However, high medical expenses and insufficient medical knowledge increase the depression, anxiety and other negative emotions of some hemodialysis patients, seriously affecting the efficacy of the hemodialysis.

Nurses in charge adopt EBN to care for the patients during holistic nursing. Studies show that hemodialysis patients' emotional disturbances are mainly anxiety and depression, which indirectly affect the therapeutic effect of hemodialysis [23, 24]. In this study, the degree of understanding their diseases, treatment compliance, and nursing satisfaction of the hemodialysis patients were analyzed and compared. The results showed that, compared with those in the control group, the patients in the experimental group had a significantly higher degree of understanding their diseases ( $P < 0.05$ ), treatment compliance rate ( $P < 0.05$ ), and nursing satisfaction ( $P < 0.05$ ). In some studies, EBN significantly improves patients' treatment compliance and nursing satisfaction [25-27]. This is possibly because EBN improves the patients' understanding of hemodialysis, which enables them to receive treatment and nursing and rehabilitation training more

actively. The SAS and SDS scores in the experimental group were significantly lower than those in the control group ( $P < 0.05$ ). A study shows that nurses can carefully communicate with patients, hold heart-to-heart talks and adopt other EBN measures, so as to help

them build confidence in defeating diseases and significantly relieve their depression and anxiety. In addition, hospitals can inform patients under great economic pressure of preferential policies and offer them copies of the policies, to reduce their physical and mental burden [28]. The quality of life scores in the experimental group were significantly higher than those in the control group ( $P < 0.05$ ). According to a previous study, nursing plans that conform to the conditions of hemodialysis patients significantly increase the patients' treatment compliance, relieve their negative emotions, and improve their physical, psychological, social, and cognitive functions [29]. The incidence of complications in the experimental group was significantly lower than it was in the control group ( $P < 0.05$ ). A previous study shows that EBN significantly reduces the incidence of shock after nursing and prevents complications such as hypoglycemia, hypotension, and anemia [30].

In summary, for hemodialysis patients, EBN can reduce their adverse reactions, reduce the incidence of complications and negative emotions, promote their rehabilitation, and improve their quality of life, disease cognition and nursing satisfaction, as well as relieve their and their families' economic pressure. But there are still some limitations in this study. The samples are limited to hemodialysis patients in our hospital, and the research range is relatively small, so the results of this study may have some uncertainty. The ultimate goal of this

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study is to encourage more scholars to pay attention to and discuss the effective treatments for hemodialysis patients, so that more hemodialysis patients benefit.

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## Disclosure of conflict of interest

None.

**Address correspondence to:** Ruixia Hu, Department of Blood Purification, Affiliated Hospital of Jining Medical College, No. 89, Gutun Road, Rencheng District, Jining 272029, Shandong, China. Tel: +86-0537-2903064; E-mail: ruixiahuu@163.com

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