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Application Effect of "3S2E" Nursing Model in Renal Transplant Recipients

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Abstract: To investigate the effect of "3S2E" nursing management mode in kidney transplant recipients. From October 2022 to October 2024, patients who underwent allograft kidney transplantation in the kidney transplantation Center of Urology Department of a general Grade III hospital were selected as the study objects. Convenience sampling method was divided into control group (42 cases) and observation group (42 cases). The control group was given routine nursing measures, and the observation group was given "3S2E" nursing management mode on the basis of the control group. The scores of self-rating anxiety Scale (SAS), self-rating Depression Scale (SDS), Pittsburgh Sleep Quality Index Scale (PSQI), nursing satisfaction and compliance with immunosuppressants were compared between the two groups. After intervention, the scores of SAS, SDS and PSQI in the observation group were significantly lower than those in the observation group,and the scores of immunosuppressive compliance and nursing satisfaction were higher than those in the control group. The application of "3S2E" nursing mode in kidney transplant recipients has obvious effects, which can fully demonstrate the professional technology and quality of nursing, so as to improve nursing satisfaction and reduce nursing risk, and has important significance for various indicators of kidney transplant recipients.

1. Introduction

When both kidneys of the body are completely lost, in addition to hemodialysis and peritoneal dialysis, patients with renal failure can improve their kidney metabolic circulation through kidney transplantation surgery, thereby enhancing their quality of life and reducing life risks [1]. However, kidney transplant recipients face significant economic burdens and must endure long-term use of various drugs primarily for immunosuppression, frequent monitoring of drug concentrations, and dealing with drug toxicity and side effects [2]. This can lead to negative emotions such as anxiety, depression, and sleep disorders, which conventional nursing models struggle to address [3]. The '3S2E' nursing model has gained widespread international adoption in recent years, known for its strong relevance and popularity among healthcare professionals and patients [4]. This model aims to enhance the professional skills of nursing staff, optimize nursing philosophies, conduct precise assessments, and provide targeted health education, ultimately achieving a safe nursing outcome [5].While this approach has been widely applied in the treatment of traumatic brain injuries, it has

not yet been applied to post-kidney transplant care. This study evaluates the application of the '3S2E' nursing model in kidney transplant recipients.

2. Object and method

2.1 Study Subjects

A convenience sampling method was used to select 84 patients who underwent allogeneic kidney transplantation at the Urology Department's Kidney Transplant Center of a comprehensive tertiary hospital from October 2022 to October 2024. Inclusion criteria: (1) Patients undergoing their first allogeneic kidney transplantation; (2) Patients without cognitive impairment, intellectual disabilities,or mental disorders; (3) Patients who were followed up at our hospital's outpatient clinic;(4) Patients who signed an informed consent form and voluntarily cooperated. Exclusion criteria: 1) Patients with transplant failure; 2) Patients with failed transplanted kidneys; 3) Patients with severe complications. The general data of the two groups showed no statistically significant differences (P>0.05), indicating comparability. This study was approved by the hospital's ethics committee [6].

2.2 Research Methods

2.2.1 Matched Group

Conventional nursing is implemented, and the responsible nurse is fully responsible for all related nursing operations and treatments during the hospitalization of kidney transplant recipients. Health education including diet education and medication guidance is carried out at discharge.

2.2.2 Observation Group

The observation group carried out the "3S2E" nursing mode on the basis of the care mode of the control group, and the specific methods were as follows.

The department has established a professional nursing management team, centered around the '3S2E' nursing model. The head nurse serves as the overall leader, and the team consists of two senior nurses with qualifications for post-kidney transplant ward care and two physicians with intermediate or higher titles. They have developed and standardized the content related to the '3S2E' nursing model and provided standardized training for the responsible nurses involved in the nursing projects.

2.2.3 "3S" nursing mode is established

Enhance the professional skills of nursing staff in three key areas: (1) Theoretical Training: This includes the concepts of kidney transplantation surgery, preoperative preparation and patient education, postoperative maintenance of water, electrolyte, and acid-base balance, local observation of the transplant kidney area, wound and drainage tube management, and the implementation of immunosuppressive therapy. (2) On-site Demonstrations: Members of the management team will demonstrate various procedures required during the perioperative period for kidney transplant patients, such as central venous pressure measurement, sterile techniques, perineal care, oral hygiene, and pulmonary respiratory exercises. These sessions are held every Thursday and Friday morning, each lasting one hour, with a summary and assessment on Monday, and this cycle continues until all courses are completed. (3) Nursing staff will participate in psychological group training. (4) Final Assessment: After the training, a final assessment will be conducted. Participants

who score over 80 points in both theoretical knowledge and practical skills will be considered qualified and can join the group.

Optimize Nursing Philosophy (Service) (1) The head nurse conducts quarterly sessions to reinforce the political and professional ethics education of team members. (2) In the nursing process,staff should embrace the concept of proactive care. Based on their experience and observations, they should anticipate patients 'needs, proactively address issues, and focus on patients' perceptions and expectations. (3) Enhance the collective sense of honor among all nursing staff by randomly selecting patients to evaluate the care attitudes and experiences of nursing staff. Patients will participate in selecting the best nurse of the month, which boosts the enthusiasm of nursing staff, strengthens the bond between nursing staff and patients, and fosters a harmonious relationship between nurses and patients.

Ensuring Nursing Safety (safety) involves establishing standardized core nursing systems and emergency response plans for various unexpected situations. The management team conducts weekly quality control, regularly checks the nursing process, and evaluates the timeliness and accuracy of nursing documentation, the effectiveness and standardization of infection control measures, and the safety of medication management. Scores are given according to established standards to ensure that inspections are thorough and effective. Strict measures are taken to ensure nursing quality and safety, enhancing nursing staff's awareness of risk prevention and control. Any potential hazards identified during routine nursing work are addressed promptly with appropriate measures and reported for handling.

Evaluation (evaluation) involves monitoring the recipient's vital signs, central venous pressure, urine output, wound and transplant kidney area observations, rejection reactions, and morning fasting weight. Blood pressure and urine output are crucial indicators of blood flow perfusion in the transplanted kidney, requiring close monitoring. Individualized fluid management should be tailored based on the recipient's specific condition. Within 72 hours post-surgery, vital signs should be monitored every 15 minutes, with regular rounds to calculate fluid input and output, and promptly report any issues.

Health Education (Education) (1) Upon admission, the responsible nurse should promptly explain disease-related knowledge and preoperative precautions to the patient. The nurse should patiently answer any questions from the patient, gaining their trust and laying a solid foundation for subsequent care and treatment. (2) Psychological Care: Nurses should closely monitor the patient's behavior, speech, and actions while in bed for 72 hours after surgery, analyze the patient's condition, and proactively explain the causes of any issues. In special cases, such as when a transplanted kidney has delayed recovery, nurses should stabilize the patient's emotions, explain the reasons, development patterns, and the goals of nursing and treatment. If necessary, they can invite patients who are in the recovery phase to share their experiences, helping to reduce the patient's anxiety and rebuild their confidence in overcoming the disease. (3) Dietary Guidance: Kidney transplant patients need to take immunosuppressants long-term, which can affect their metabolic functions, leading to increased blood pressure, blood sugar, and uric acid levels. Therefore, a dietary guidance manual and daily menu should be provided to the patients for selection, and they should be guided to record their daily diet, focusing on a balanced nutrition. (4) Self-Monitoring: Patients should be taught how to monitor their health and become proficient in this skill. Daily observation records should be provided, and patients should be instructed to fill them out. A bedside classroom should be set up to educate patients about the abnormal signals of rejection reactions, guiding them to identify and address any issues promptly. (5) Medication Guidance: Within 24 hours after surgery, patients should be taught how to take their medication, including the names, functions, dosages, and times of administration. During their stay in the hospital, nurses should double-check the medication doses and times with the patients, providing detailed instructions on how to handle any

special situations that may arise later.

2.3 Observation indicators

2.3.1 General information questionnaire for kidney transplant recipients

The self-designed questionnaire includes general information and disease-related information.

2.3.2 Psychological Status

At admission and discharge, the Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS), and Pittsburgh Sleep Quality Index (PSQI) were used for scoring. The SAS has a standard score threshold of 50:50-59 indicates mild anxiety, 60-69 indicates moderate anxiety, and>69 indicates severe anxiety. The SDS has a standard score threshold of 53:53-62 indicates mild depression, 63-72 indicates moderate depression, and>72 indicates severe depression. The PSQI has a maximum score of 21; higher scores indicate poorer sleep quality.

2.3.3 Medication Adherence Scale

The Basel Assessment Scale [7] for immunosuppressive drug compliance was used to assess the medication compliance of kidney transplant recipients. The scale was developed by the LeuvenBasel Compliance Study Group. Higher scores indicate higher compliance.

2.3.4 Evaluation of Nursing Satisfaction

At discharge, both the control group and the observation group were required to complete a nursing satisfaction questionnaire. The questionnaire was used to collect the overall satisfaction of kidney transplant recipients with the nursing care model during their hospital stay, with 4 points for very satisfied, 3 points for satisfied, 2 points for general, and 1 point for dissatisfied. Overall satisfaction was calculated as (very satisfied + satisfied + general) / total number × 100%.

2.4 Data collection Methods

The data were collected and sorted out by specially trained persons, and the process of filling in the questionnaire was conducted with unified guidance questions and answers. At discharge, the compliance of immunosuppressive agents, psychological status and satisfaction with nursing staff of the two groups of patients were evaluated.

3. Results

3.1 Analysis of general information of patients in the two groups

Table 1 records the basic information of the two groups of patients.

Table 1: Analysis of general data of the two groups of patients

project	classify	control group (n=42)	observation group (n=42)	$\chi 2$ value	P price
sex	man	30	27	0.491	0.483
	woman	12	15		
age	18~40	22	22	-	0.599
	41~65	19	20		
	≥66	1	0		

marital status	unmarried	13	20	2.446	0.118
	married	29	22		
degree of education	Primary school and below	8	9	0.806	0.848
	junior middle school	13	16		
	High school or technical secondary school	14	11		
	College degree or above	7	6		
Monthly household income	2001~5000 yuan	10	11	0.777	0.678
	5001~8000 yuan	12	10		
	More than 8001 yuan	20	21		
Currently employed	yes	22	19	0.429	0.513
	deny	20	23		
The way you pay for medical care	at public expense	3	5	2.180	0.536
	hospitalization insurance	32	34		
	at one's own expense	5	2		
	other	2	1		
Primary disease	Renal glomerular disease	11	13	1.900	0.593
	Hypertensive kidney damage	13	17		
	diabetic nephropathy	9	6		
	other	9	6		
Time of diagnosis and transplantation	<12 months	2	6	0.593	0.743
	12 to 59 months	31	19		
	> 60 months	9	15		

3.2 Anxiety and depression of the two groups before and after intervention

After the intervention, the score of the observation group was lower than that of the control group, and the difference was statistically significant (P<0.05), as shown in Table 2.

Table 2: Comparison of scores before nursing and at discharge for two groups of patients (points, $(\bar{x} \pm s)$

group	SDS grade				SAS grade			
	Before care	When leaving the hospital	t	p	Before care	When leaving the hospital	t	p
control group (n=42)	55.64±9.12	49.50±10.52	4.687	<0.01	56.83±9.12	48.69±7.00	3.845	<0.01
observation group (n=42)	52.82±10.24	46.85±9.52	10.099	<0.01	52.11±10.12	45.16±8.32	5.695	<0.01
t price	-1.334	-1.212			-2.245	-2.108		
p price	0.229	<0.02			0.278	0.038		

3.3 Sleep conditions of patients in the two groups before and after intervention

Table 3: Comparison of scores before nursing and at discharge for two groups of patients (points, $(\bar{x} \pm s)$

group	PSQI grade			
	Before care	When leaving the hospital	t	p
control group (n=42)	11.45±3.86	10.83±3.58	0.878	<0.01
observation group (n=42)	12.61±4.42	9.07±2.34	4.884	<0.01
t price	1.286	-2.669		
p price	0.202	<0.05		

After the intervention of the two groups, the score of the observation group was lower than that of the control group, and the difference was statistically significant (P<0.05), as shown in Table 3.

3.4 Immunosuppressive agent compliance after intervention in two groups of patients

After intervention, there was no significant difference in the score of immunosuppressive agent compliance between the two groups at discharge (P>0.05), but the score of immunosuppressive agent compliance in the observation group was significantly lower than that in the control group at 1, 3 and 6 months after discharge, with statistical significance (P<0.05), as shown in Table 4.

Table 4: Compliance scores of immunosuppressive agents at discharge for the two groups of patients (points, ($x \pm s$)

group	Examples	When leaving the hospital	One month after discharge	He was discharged 3 months ago	Six months after discharge
observation group	42	14.69±0.46	15.04±0.41	14.97±0.48	14.90±0.61
control group	42	14.72±0.54	13.98±0.53	13.25±0.63	12.30±0.65
t		0.286	8.083	12.936	13.945
p		0.075	<0.05	<0.05	<0.05

3.5 Comparison of nursing satisfaction between the two groups after intervention

After intervention, the satisfaction score of the observation group was higher than that of the control group, and the difference was statistically significant (P<0.05), as shown in Table 5.

Table 5: Comparison of nursing satisfaction between the two groups (case%)

group	Example	Very satisfied	satisfied	Generally satisfactory	discontent	Overall satisfaction
observation group	42	19	12	8	3	39(92.86)
control group	42	14	10	8	10	32(76.19)
X^2						4.386
p price						0.013

4. Discussion

The '3S2E' nursing model can improve the adherence to immunosuppressive agents among kidney transplant recipients. The success of kidney transplantation is not a one-time event; there remains a high risk of rejection in the early stages. Therefore, the accurate and timely administration of immunosuppressive agents is crucial for managing most kidney transplant recipients after discharge [8]. According to the WHO's five risk factors for non-adherence in chronic disease patients, Nevins [9] et al. identified four risk factors for drug non-adherence in kidney transplant recipients, including adverse drug reactions and past experiences of non-compliance. For example, long-term use of the immunosuppressive agent cyclosporine can cause darkening of the skin and increased hair growth, while tacrolimus can lead to elevated blood sugar, blood pressure, and uric acid levels. These adverse reactions can cause concerns among kidney transplant recipients about taking their medication. The more these concerns arise, the poorer the adherence to medication becomes, leading some recipients to deliberately avoid taking their medication [10]. In fact, 15% of transplant kidney failures are due to poor adherence to medication [11]. Therefore,

high medication adherence is essential. Observations under the' 3S2E' nursing management model showed that within 6 months after discharge, the scores for taking immunosuppressive agents in the observation group were higher than those in the control group, indicating that the observation group had better adherence to immunosuppressive agents compared to the control group. Through analysis,the implementation of the "2E" management model emphasizes that within 72 hours post-surgery, nursing staff should show patience and professionalism by providing enhanced care to kidney transplant recipients. This includes conducting bedside mini-classes and health education tailored to the specific conditions of the recipients, thereby enhancing their cooperation with nursing staff and improving medication adherence [12]. Compared to the conventional nursing model, this approach more effectively highlights the importance of immunosuppressants, which in turn promotes overall health indicators [13].

The "3S2E" nursing model can alleviate depression and anxiety in kidney transplant recipients and improve their sleep quality. Kidney transplant surgery is a rare opportunity, and data generally show that the time from diagnosis to surgery for both the observation group and the control group is over 12 months. The long wait without clear results, the uncertainty of a new life after the surgery, and the difficulty in adapting to the role of a kidney transplant recipient can easily lead to anxiety and depression during hospitalization. Additionally, the cost of surgery, postoperative pain, the function of the transplanted kidney, and the risk of rejection can all contribute to poor sleep and anxiety and depression in kidney transplant recipients [14]. The table shows that, without nursing model intervention, both groups scored higher in anxiety, depression, and sleep quality than after the intervention. If the level of anxiety and depression in kidney transplant recipients is high, they are more likely to adopt a passive or evasive attitude when communicating with medical staff, which can delay problem-solving and affect their sleep quality [15]. After comparison, the observation group showed a significant reduction in depression and anxiety scores at discharge, and their sleep quality improved. This indicates that under the "3S2E" training, nursing staff, with their solid theoretical knowledge and practical skills, meticulous observation, and psychological care, can dynamically monitor the psychological state of kidney transplant recipients, enabling timely assessment of changes in their condition and sensitive adjustment to psychological fluctuations. Additionally, active and effective communication helps recipients scientifically understand changes in their condition, drug concentrations, and postoperative adverse reactions. The event is no longer unknown and there is active intervention by professionals to help the recipient obtain effective psychological support, adjust mentality, effectively relieve depression and anxiety, and improve sleep state [16].

The "3S2E" nursing model can enhance the satisfaction of kidney transplant recipients with their caregivers. According to the Countrywide Nursing Development Plan (2021-2025), during the 14th Five-Year Plan period, the development of the nursing profession will adhere to the principle of putting people first, prioritizing the protection of public health, and ensuring that nursing services serve public health. The plan emphasizes meeting the diverse nursing needs of the public as its primary goal. Kidney transplant recipients have increasingly stringent requirements for postoperative care [17]. The "3S2E" nursing model aligns with these principles and meets the needs of the recipients. In the nursing process, caregivers focus on their behavior and attitude, paying attention to patients 'perceptions and expectations. They shift from a passive to an active service approach, promptly identifying and addressing potential issues, which improves the patient's disease outcome and earns their trust and satisfaction [18]. This leads to positive feedback on the recipients 'satisfaction with nursing care. In clinical practice, the positive relationship between caregivers and patients can be built through the transmission of clinical medical knowledge and nursing philosophy.This approach effectively transforms the passive role of kidney transplant recipients in the nursing process, encouraging their active participation, understanding of healthcare providers'

work, and recognition of the efforts of nursing staff. It fosters a harmonious relationship between caregivers and patients, accelerating patient recovery. The results support this view, with the observation group showing higher satisfaction at discharge compared to the control group.

5. Conclusion

How to enhance the long-term survival rates of both the transplanted organs and patients, effectively control the concentration range of immunosuppressants, and maintain a low incidence of chronic rejection and recurrent infections remains a significant challenge in the field of organ transplantation, particularly for kidney transplant recipients. A limitation of this study is that it only tracked the long-term medication use of kidney transplant recipients after discharge for a relatively short period, which does not adequately reflect the long-term psychological and immunosuppressive changes in these patients.

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