Int J Clin Exp Med 2021;14(1):356-364
www.ijcem.com /ISSN:1940-5901/IJCEM0118769

Original Article

The effects of collaborative care model (CCM) guided nursing practice on the self-management and self-efficacy of kidney transplant recipients

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Received July 23, 2020; Accepted October 21, 2020; Epub January 15, 2021; Published January 30, 2021

Abstract: Objective: The purpose of this study was to analyze the effects of the Collaborative Care Model (CCM) on the self-efficacy and self-management of kidney transplant recipients. Methods: A total of 73 patients who underwent renal transplantation from July 2018 to June 2019 in our hospital were recruited as the study cohort for this retrospective analysis and randomly divided into the control group (n = 36, who underwent conventional nursing) and the observation group (n = 37, who underwent CCM). The two groups were compared in terms of their physical indicators, self-efficacy, self-management, degree of mastery of health knowledge, and quality of life. Results: The observation group's self-efficacy scores for symptom management and general management of disease were higher than they were in the control group at 1, 2, and 3 months after discharge ($P < 0.05$). The dietary behavior, physical activity, psychosocial behavior, and therapeutic behavior scores in the observation group were higher than they were in the control group ($P < 0.05$). The degree of mastery of health knowledge in the observation group and its caregivers was higher than it was in the control group and its caregivers, respectively ($X^2 = 4.357$, $P = 0.037$). The ratio of readmission within three months after discharge in the observation group was 13.51%, lower than the ratio in the control group ($X^2 = 4.012$, $P = 0.045$). The quality of life scores in the observation group were higher than they were in the control group at 1, 2, and 3 months after discharge ($P < 0.05$). Conclusion: The implementation of CCM in the care of kidney transplant recipients can help stabilize the patients' physical signs, increase their degree of mastery of health knowledge, improve their self-efficacy and self-management abilities, and significantly improve their quality of life.

Keywords: CCM, kidney transplant, self-efficacy, self-management ability, quality of life

Introduction

For patients with end-stage renal disease, kidney transplantation is the most ideal option, while allogeneic kidney transplantation remains the best available method [1]. At present, due to the advances in medical technology as well as the improvement of surgical techniques and clinical experience, the graft survival rate after transplantation has gradually increased [2]. Studies have found that the one-year survival rate of patients after kidney transplantation is more than 95%, and the 5-year survival rate is more than 85% [3].

However, for patients who undergo kidney transplants, the completion of the kidney transplant does not represent the end of the treatment, and an improvement in the survival rate after transplantation does not mean an improvement in the of quality of life [4]. Many patients have rejection reactions after their renal transplants, reactions which have adverse effects on their physical and mental health [5]. In order to maximize kidney transplant patients' quality of life, appropriate nursing intervention measures should be taken. The mode of nursing has gradually changed from the earlier physiological mode to a more com-

prehensive physiological-psychological-sociocultural mode. The quality of care was assessed not only from the disease condition, but also in terms of the physical, psychological and social rehabilitation [6, 7].

The collaborative Care Model (CCM) originated in the United States. This care model provides an integrated approach in which primary care providers, care managers, and psychiatric consultants work together to provide care and monitor the patients' progress [8]. It involves building a collaborative partnership with patients and engaging in shared decision-making by assessing and incorporating their capacities, desires, needs, values, and barriers [9]. In this study, a total of 73 kidney transplant recipients admitted to our hospital from July 2018 to June 2019 were recruited as the study cohort to explore the value of CCM in nursing.

Materials and methods

A total of 73 patients who underwent a kidney transplant from July 2018 to June 2019 in our hospital were recruited as the study cohort for this retrospective analysis and randomized into the control group (n = 36) or the observation group (n = 37). All the patients signed an informed consent, and the study was approved by the ethics committee of Jingzhou First People's Hospital, The First Affiliated Hospital of Changjiang University. (1) Inclusion criteria: Patients who met the regulatory requirements of the Human Organ Donation Regulations of China [10] and who underwent an allogeneic kidney transplant, patients over 18 years old, patients who were local residents, patients who had a primary school education or higher, and patients who had basic communication and understanding skills were included. (2) Exclusion criteria: Patients who were younger than 18 or over 60 years old, patients with a cognitive impairment, patients who also suffered from serious diseases that affected their health, patients with stable vital signs before the surgery, and patients without caregivers were excluded.

Treatment methods

The control group only underwent routine nursing care. Dialysis-related preparations were made and the patients were guided and assisted in their pre-operative examinations, etc., to ensure a smooth kidney transplant procedure. The patients' vital signs were closely monitored, and the drainage tubes and patients' positions were properly arranged. Oral health education was provided for the patients, and the precautions after the operation were explained. When the patient was discharged from the hospital, discharge guidance and education were given, and a health brochure was issued to inform the patient to follow up regularly as suggested by the doctor. If there were significant complications after discharge, the patient would return to the hospital immediately for an examination.

The observation group received CCM, and a collaborative nursing team was established that included the attending physician, the primary nurse, the patient, and the patient's family members. The primary nurse was required to have obtained the qualification certificates and have three years of relevant nursing experience. The nurses were also required to have good communication skills. The primary nurses were required to receive professional training in advance, including training on kidney transplantation, the concept and implementation of the collaborative care model, and assessment scales for kidney transplant recipients. The training lasted for two days, and an exam was administered at the end of the two days. Nursing care for the patients was provided only after the nurses passed the exam.

The duration of nursing intervention started from the end of operation to three months after the discharge. The details are as follows:

Within three days after surgery, each patient's health literacy level, self-management ability, and self-efficacy were evaluated to help the patient establish a self-management record, and rehabilitation manuals were issued for the patient's reference. The nursing staff communicated with the patients face to face to create a quiet environment, understand the patient's emotional state and his or her psychological problems. The nursing staff was responsible for taking the initiative to explain the disease to the patients, answer their questions patiently, encourage them to talk to earlier patients who have recovered well, so as to benefit from their rehabilitation experience. In addition, the nursing staff was asked to communicate with the caregiver, to understand the

caregiver's psychological pressure and other burdens, to explain the role of the caregiver in the patient's rehabilitation, and to encourage the caregiver to actively participate in the patient's care.

At 3-7 days after the surgery: The nurses explained the type of surgery, the method of the kidney transplant, and the nursing plan, prognosis, etc. to the patients and the caregivers, and offered a rehabilitation manual for them to learn at any time. The caregivers were taught to master the care methods and taught to relieve their emotional stress when caring for the patients, so as to avoid affecting the patients with adverse emotions.

At 8-14 days after the surgery: The nursing staff educated the patients and caregivers via video, PPT, pictures, text, etc. to reinforce their self-management knowledge such as medication, symptoms, diet, and exercise management, guided them to learn to identify any signs of complications, and taught them how to prevent and respond to problems.

1) Symptom management. The patients and caregivers were taught to identify postoperative acute rejection. Prior to rejection, the patients may experience unexplained fever, elevated body weight, kidney enlargement, significant pain, headache, tachycardia, inexplicable irritability, fatigue, bloating, and increased blood creatinine and urea nitrogen levels. When one or more of the above manifestations are found, the patient or caregiver should immediately report to the nurses or the physicians for an examination and treatment. 2) Medication management. This component mainly guided the patients and caregivers to understand the medication methods, dosages, frequencies, precautions, etc., and to inform the patients and caregivers of the possible side effects and preventive treatment methods after the medication, and advised the patients to strictly follow the doctor's advice, especially taking their anti-rejection medicines on time. 3) Dietary management. A dietary menu was formulated by assessing the patients' digestive conditions, medication history, medical conditions, dietary habits, dietary preferences, compliance, urine output, complications, and risks. The patients were instructed to chew carefully and swallow slowly, to eat a fiber-rich diet, including fresh fruits and vegetables, and to maintain a regular exercise schedule. 4) Exercise management. The exercise routine was limited to simple exercises such as walking and Tai Chi, to ensure no fatigue occurred during the exercise. At the same time, kidney rupture and bleeding should be prevented after the transplant.

At 15-21 days after the surgery: The health knowledge learned by the patients should be consolidated. The CCM team should join in discussions to formulate the post-discharge care plans. The patients were helped to write a self-management diary, including recording their temperature, blood pressure, pulse, morning weight, 24 h urine output, pain in the kidney, diet, medication, and activities. A WeChat group was established by the nursing staffs to share patient experiences in dealing with diseases.

Out-of-hospital care: Within 3 months after discharge, the nursing staff followed up with the patient via WeChat regularly, communicated with the patient in the WeChat group at least 3 times a week to gather information on each patient's condition and rehabilitation and to share health knowledge with the group. The patients could leave a message in the WeChat group or the hospital's public account at any time after discharge. The nursing staff regularly checked the chatting records, summarized and answered the questions. The answers were posted in the group for the other patients who might benefit.

Outcome measurement

Self-efficacy: The Self-efficacy of Chronic Disease Scale (CDSES) [11] was used for the evaluation. The evaluation includes 6 items, with 1-4 items reflecting the self-efficacy of symptom management and 5-6 items reflecting the self-efficacy of the common management of diseases. Each item was scaled between 1-10, of which 1 is completely unconfident and 10 is completely confident. The evaluations were performed before the surgery, and at 1, 2, and 3 months after discharge.

Self-management ability: The Renal Transplant Recipient's Self-management Scale (RTRSS) [12] was used for the evaluation. It contains 4 dimensions, including dietary behavior (9 items), physical activity (5 items), psychosocial behavior (4 items), and therapeutic behavior

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

Baseline data		Observation group (n = 37)	Control group (n = 36)	t/X^2	P
Gender	Male	23 (62.16)	25 (69.44)	0.430	0.512
	Female	14 (37.84)	11 (30.56)		
Age (year)		43.23±12.56	44.51±12.84	0.431	0.668
BMI (kg/m^2)		22.42±2.19	23.02±2.31	1.139	0.259
Kidney transplant type	Living donor	25 (67.57)	23 (63.89)	0.110	0.741
	Controlled cardiac-death donors	12 (32.43)	13 (36.11)		
Type of dialysis before kidney transplant	Hemodialysis	24 (64.86)	22 (61.11)	0.110	0.740
	Peritoneal dialysis	13 (35.14)	14 (38.89)		

(10 items), and uses a 1-4/5 Likert scale. The score is directly proportional to the patient's self-management ability. The evaluations were performed before the surgery and at 3 months after discharge.

Level of health literacy: The patients and caregivers were evaluated when they were discharged from the hospital in terms of disease monitoring, dietary knowledge, medication knowledge, exercise knowledge, prevention and treatment of infections and rejection. 20 questions were compiled by the CCM team to measure the patients' health literacy. 18-20 correct answers were considered excellent, 10-17 correct answers were considered good, and fewer than 10 correct answers was considered bad. Level of health literacy = (number of excellent cases + number of good cases)/total cases * 100%.

Readmission rate: The percentage of admitted patients who returned to the hospital within 3 months of discharge in the two groups (except for follow up) was compared.

Quality of life: The Quality of Life Renal Transplant Recipients (QOL-RT) instrument [13] was used. The 34 items in the survey covered 4 dimensions, including physiology, psychology, society, and disease treatment. Each item was scored 1-5, and the total score ranged from 34-170 points. The scores were directly proportional to the patients' quality of life. The evaluations were administered at discharge, and at 1, 2, and 3 months post-discharge.

Statistical analysis

The statistical analysis was performed using SPSS 22.0. The measurement data were expressed as the mean ± standard deviation (mean ± SD). The comparisons of the results between groups were performed using independent sample t tests. The count data were expressed as [n (%)]. The comparisons between groups were examined using X^2 tests. Multipoint comparisons were performed using ANVOA with post hoc F tests. $P < 0.05$ indicated a significant difference.

Results

Baseline data

There were no significant differences in terms of sex ratio, average age, average body mass index (BMI), kidney transplantation type, or type of dialysis before the renal transplantation between the two groups ($P > 0.05$) (**Table 1**).

CCM improved self-efficacy

There were no significant differences in the self-efficacy symptom management and common management of disease scores between the two groups before the surgery ($P > 0.05$). The observation group's self-efficacy in symptom management and common disease management scores were observed at 1, 2, and 3 months post-discharge. The scores in the observation group were significantly higher than the scores in the control group ($P < 0.05$) (**Figure 1**).

CCM improved self-management abilities

The two groups showed no significant differences in their preoperative dietary behavior, physical activity, psychosocial behavior, or therapeutic behavior scores before the surgery ($P > 0.05$). At 3 months after the surgery, the self-

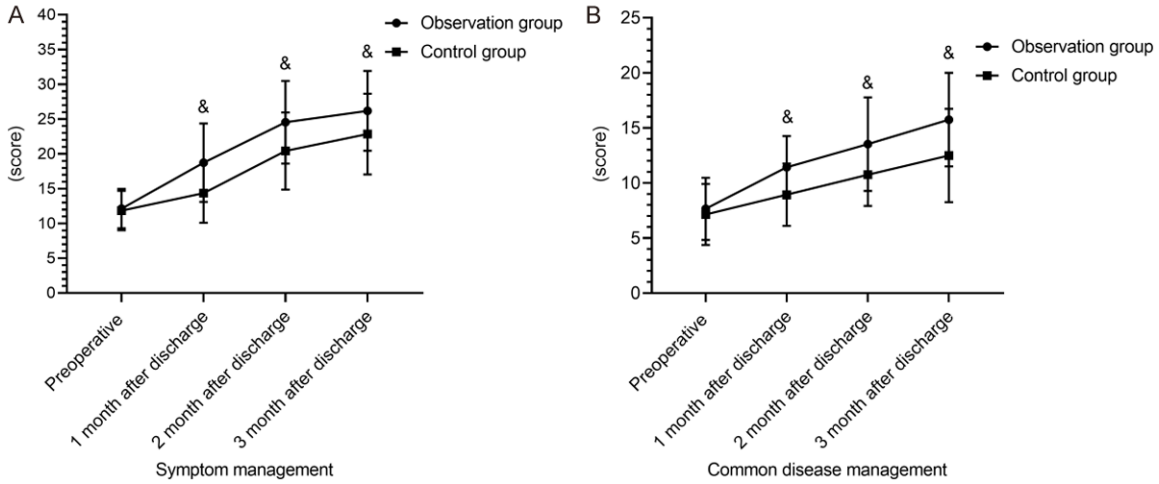

Figure 1. Comparison of the self-efficacy between the two groups. There were no significant differences in the preoperative symptom management or the common disease management scores between the two groups ($P > 0.05$). The observation group showed a significantly higher self-efficacy at 1, 2, and 3 months after discharge than the control group ($P < 0.05$). &indicates $P < 0.05$.

Table 2. Comparison of the two groups' self-management abilities ($\bar{x} \pm s$)

Group	Time	Dietary behavior	Physical activity	Psychosocial behavior	Therapeutic behavior
Observation group (n = 37)	Before surgery	13.25±2.85	10.24±2.21	7.81±1.64	18.76±3.69
	3 months after discharge	24.85±5.46	16.25±3.42	13.75±2.69	31.12±5.74
Control group (n = 36)	Before surgery	12.89±2.76	9.89±2.31	7.12±1.37	17.49±3.26
	3 months after discharge	20.31±4.81	12.42±2.75	10.31±2.16	25.34±4.73
t		3.766	5.264	6.015	4.688
P		0.000	0.000	0.000	0.000

management scores were increased in both groups, and the observation group showed higher self-management scores than the control group ($P < 0.05$) (**Table 2**; **Figure 2**).

CCM improved the health literacy of the patients and caregivers

The patients in the observation group showed higher levels of health literacy than the patients in the control group ($X^2 = 4.357$, $P = 0.037$) (**Table 3**). The caregivers in the observation group also showed higher levels of health literacy than the caregivers in the control group ($X^2 = 4.823$, $P = 0.028$, **Table 4**).

CCM reduced the readmission rates

In the observation group, 5 patients were readmitted due to severe symptoms within three months after their discharge, for a readmission rate of 13.51%. In the control group, 12 patients were re-admitted due to severe symptoms within three months after their discharge, for a readmission rate of 33.33%. The readmission rate in the observation group was significantly lower than it was in the control group ($X^2 = 4.012$, $P = 0.045$) (**Table 5**).

CCM improved quality of life

The quality of life scores at discharge showed no significant differences between the observation group and the control group ($P > 0.05$). The quality of life scores in the observation group were significantly higher than the corresponding scores in the control group at 1, 2, and 3 months after discharge ($P < 0.05$) (**Figure 3**).

Discussion

The rehabilitation of kidney transplant recipients takes a long time and is expected to be

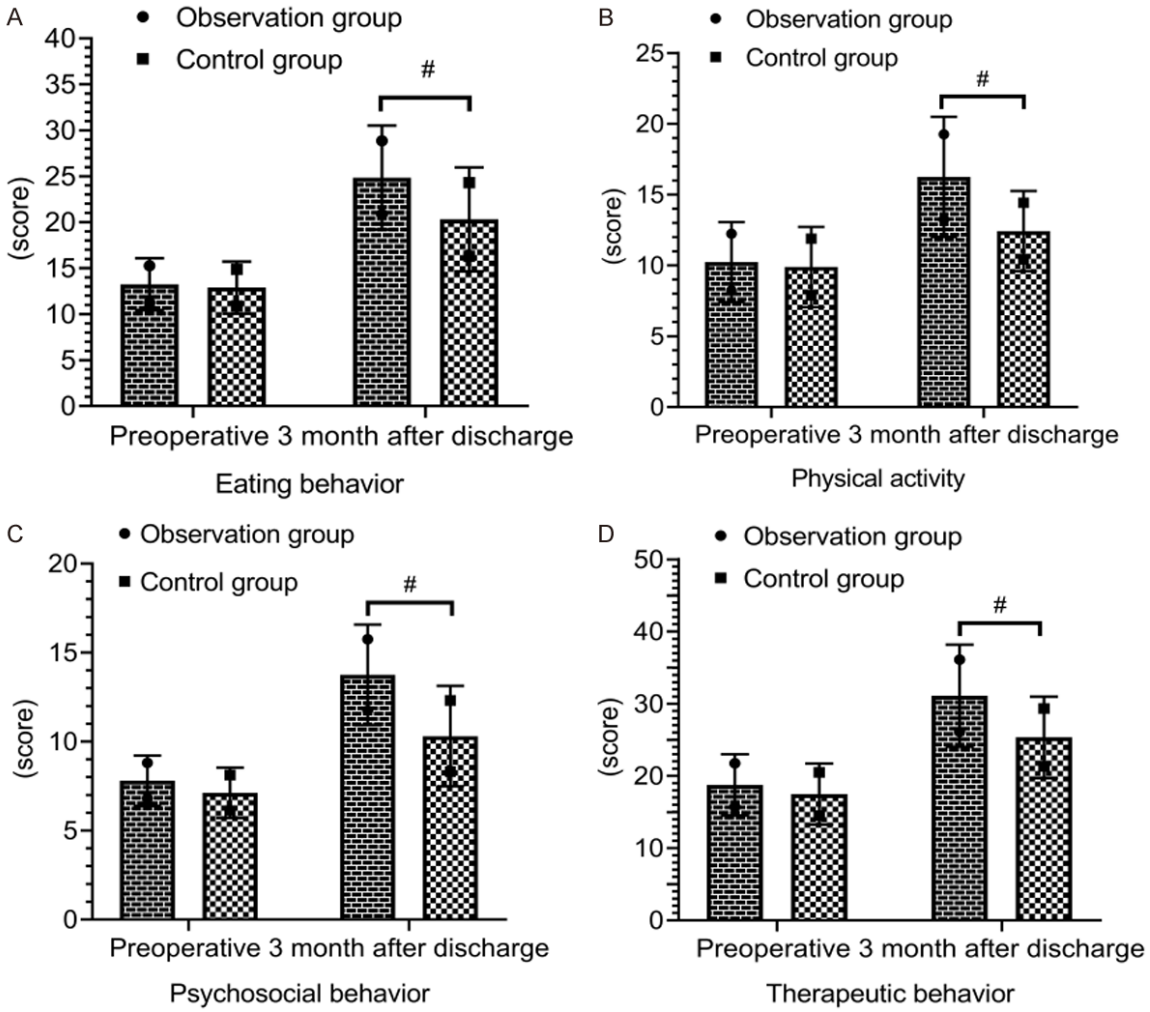

Figure 2. Comparison of the self-management abilities between the two groups. There was no significant difference in the preoperative self-management abilities between the two groups ($P > 0.05$). Compared with the control group at 3 months post-discharge, the observation group showed significantly higher self-management abilities ($P < 0.05$). #$P < 0.05$.

Table 3. Comparison of the health literacy in the two groups [n (%)]

Group	Fully mastered	Partially mastered	Not mastered	Mastery degree
Observation group (n = 37)	13 (35.14)	20 (54.05)	4 (10.81)	33 (89.19)
Control group (n = 36)	10 (27.78)	15 (41.67)	11 (35.56)	25 (64.44)
X^2				4.357
P				0.037

Table 4. Comparison of the health literacy in the two groups of caregivers [n (%)]

Group	Fully mastered	Partially mastered	Not mastered	Mastery degree
Observation group (n = 37)	14 (37.84)	20 (54.05)	3 (8.11)	34 (91.89)
Control group (n = 36)	10 (27.78)	16 (44.44)	10 (27.78)	26 (72.22)
X^2				4.823
P				0.028

Table 5. Readmission rate within 3 months post-discharge [n (%)]

Group	Cases	Readmission	Not readmission
Observation group	37	5 (13.51)	32 (86.49)
Control group	36	12 (33.33)	24 (66.67)
X^2		4.012	
P		0.045	

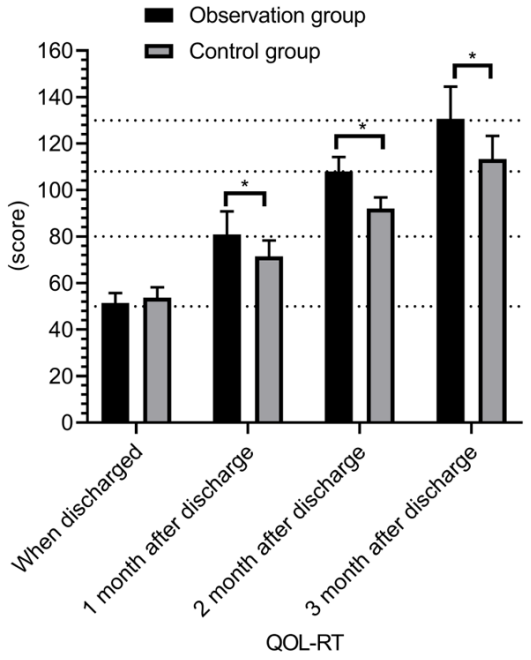

Figure 3. Comparison of the quality of life between the two groups. The two groups showed no differences in their QOL-RT scores at the time of discharge ($P > 0.05$). The QOL-RT score at 1, 2 and 3 months after discharge in the observation group was significantly higher than that in the control group ($P < 0.05$). *indicates $P < 0.05$.

done at home, so it is very important to improve the patients' self-management abilities. Self-management abilities after kidney transplantation include the proper management of the transplanted kidney, the prevention of complications, and proper diet, exercise, etc. [14]. Mollazadeh et al. [15] confirmed that the level of self-management after renal transplantation can affect quality of life. However, a complicated recovery process coupled with low education levels, and economic crises have resulted in low self-management abilities after kidney transplantation, especially in terms of physical activity and social psychology [1, 12]. A study by Jamieson et al. [16] found that some patients had poor lifestyle habits after discharge, such as staying up late, drinking, smoking, etc.

The CCM nursing model in the observation group provided group, individualized, and cooperative interventions. Group intervention refers to the centralized education for patients with the same disease, and individualized intervention refers to face-to-face education for patients with insufficient understanding or low acceptance. Cooperative intervention refers to cooperation with patients and their caregivers to implement nursing interventions [17]. Group intervention and individualized intervention can ensure that patients receive high-quality nursing services during their hospitalization, and cooperative intervention can ensure that good self-management is still performed after their discharge, thereby maintaining in-hospital treatment effects, achieving improved prognosis and quality of life. A controlled study confirmed that the application of CCM in nursing can significantly improve the self-efficacy of patients and meet a patient's self-management needs [18].

The observation group received CCM-guided nursing intervention, and their self-efficacy scores were higher than the scores in the control group at 1, 2, and 3 months post-discharge ($P < 0.05$), indicating that CCM can significantly improve the self-efficacy of kidney transplant recipients. The reason may be that in the implementation of CCM nursing, the nursing staff shared experiences with patients through scenario simulation in a face-to-face manner, imparted indirect experience to the patients through video, PPT, pictures, etc., understood their psychological conditions and needs through communication, explained the disease in detail, and cared about their inner feelings, so that each patient's self-efficacy is strengthened. In this study, the self-management ability scores in the observation group were significantly higher than the scores in the control group at three months after discharge ($P < 0.05$), indicating that the implementation of CCM can improve patients' self-management abilities and ensure that patients receive better self-management support after discharge, including accurately monitoring their conditions and handling abnormalities in a timely manner, which is of great value in speeding up the rehabilitation and improving the quality of the rehabilitation.

In this study, the health literacy levels of the patients in the observation group and their caregivers were higher than they were in the control group and among their caregivers ($P < 0.05$). A similar study also showed that the health literacy of patients in the study group who received CCM nursing after 3 months was higher than it was in the conventional group ($P < 0.05$) [19], which was consistent with this study. This was because the nursing intervention under the guidance of CCM required the establishment of a nursing team including physicians, nurses, patients, and caregivers. The team members could play their own roles in nursing, and carry out nursing interventions in terms of physiology, psychology and society, so as to meet all aspects of the patient's nursing needs. Through the comprehensive education provided by the nursing staff, the patient's awareness of treatment and rehabilitation were improved. The caregiver's participation enabled the patient to obtain more social support and greater confidence in coping with the rehabilitation, thereby improving the quality of the implementation of care.

The readmission rate within 3 months in the observation group was significantly lower than it was in the control group. In addition, the quality of life scores in the observation group at 1, 2, and 3 months post-discharge were significantly higher than the scores in the control group ($P < 0.05$), confirming that CCM can improve quality of life after discharge in kidney transplant recipients. Another study also found that the CCM nursing model used in nephrology nursing can reduce the readmission rate after discharge and improve patients' quality of life to a greater extent [20]. The quality of life of renal transplant recipient patients will be affected by a variety of factors, including the living environment, mental state, dietary status, exercise habits, lifestyles, and medication management after discharge. In addition, a study by Truitt et al. [21] found that patient compliance after discharge has a significant impact on quality of life. The results of this study show that the observation group's self-management ability improved significantly after receiving CCM, indicating that patients can maintain a higher degree of compliance and thus significantly improve their quality of life. It was found that CCM nursing implementation has a promoting effect on the improvement of patients' self-care ability [22]. This is attributed to the fact that under the comprehensive health education and guidance of the nursing staff during hospitalization, the patients and caregivers mastered more health knowledge, and the nursing staff set up WeChat groups to share information and professional advice after discharge. Since the self-management abilities of the patients was enhanced, the complications after discharge were managed well and the patients were able to recover more smoothly, so as to significantly reduce the readmission rate [23].

In summary, CCM-guided care for kidney transplant recipients can significantly improve patients' sense of self-efficacy, enhance their self-management abilities and their health literacy, and significantly reduce their readmission rate. The patients' quality of life was significantly improved, confirming the value of CCM. However, the small sample size and the short follow-up time may result in biased results, which will be improved in future studies.

Acknowledgements

Application of rock sugar water in thirst after gastrointestinal surgery (2019HC35). Research on the application of psychological resilience education in volume control of peritoneal dialysis patients (2019HC35).

Disclosure of conflict of interest

None.

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