

## Original Article

# The effect of multidisciplinary cooperative continuous nursing on the self-efficacy and quality of life in allogeneic hematopoietic stem-cell transplantation patients

Ying Chen<sup>1</sup>, Xiaming Zhu<sup>1</sup>, Yin Lu<sup>1</sup>, Shengli Xue<sup>1</sup>, Jing Yang<sup>2</sup>, Ling Lu<sup>1</sup>

Departments of <sup>1</sup>Hematology, <sup>2</sup>Nutrition, The First Affiliated Hospital of Soochow University, Suzhou, Jiangsu Province, China

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**Abstract:** Objective: To explore the effect of multidisciplinary cooperative continuous nursing on the self-efficacy and quality of life in allogeneic hematopoietic stem-cell transplantation patients. Methods: A prospective study was conducted in which 180 patients who had undergone allogeneic hematopoietic stem cell transplantation were randomly divided into an observation group (n=90) and a control group (n=90). The patients in the control group underwent routine nursing, and the patients in the observation group underwent multidisciplinary cooperative continuous nursing. The self-efficacy, quality of life, sleep quality, medication adherence, and psychological states of the patients were compared between the two groups at two weeks before discharge and at three months after discharge. Results: Compared with at two weeks before discharge, there were higher self-efficacy scores, including stress reduction, more positive attitudes and decision making, higher Karnofsky Performance Status Scale and Morisky Medication Adherence Scale scores, but lower Pittsburgh Sleep Quality Index and Profile of Mood States scores in both groups (all  $P < 0.05$ ), and the magnitude of the changes in the observation group were more pronounced. Conclusion: Multidisciplinary cooperative continuous nursing for patients receiving allogeneic hematopoietic stem-cell transplantation can significantly enhance their self-efficacy, improve their quality of life, alleviate their adverse emotions, and increase their medication adherence and sleep quality.

**Keywords:** Allogeneic hematopoietic stem-cell transplantation, multidisciplinary cooperative continuous nursing, self-efficacy, quality of life

## Introduction

Hematopoietic stem-cell transplantation (HSCT) means that allogeneic or autologous normal hematopoietic stem cells are transplanted in the patients through an intravenous infusion after they receive a super high-dose of chemoradiotherapy with the aim of reconstructing the functions of normal hematopoiesis and the immune receptors, which is currently an effective treatment for malignant hematological diseases [1, 2]. Patients usually need to take long-term immunosuppressive drugs after allogeneic HSCT. However, the patient's medication adherence will be significantly reduced because of their poor body constitution, the high cost of the immunosuppressive

drugs, and the significant adverse reactions [3]. Moreover, discharge from the hospital after allogeneic HSCT can lead to a relaxation of vigilance in some patients and a withdrawal from formal hospital interventions, which can cause severe graft-versus-host disease (GVHD) in patients undergoing allogeneic HSCT who have to be re-hospitalized. Therefore, for patients discharged from the hospital after allogeneic HSCT, taking reasonable and effective nursing interventions is of great clinical significance for improving patients' out-of-hospital medication adherence, prognoses, and disease outcomes [4].

Traditional nursing intervention work is mostly performed by nurses independently. Although

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the nursing staff possesses strong, professional nursing knowledge, they are deficient in other professional knowledge, such as clinical treatment and pharmaceutical intervention [5]. Multidisciplinary cooperative continuous nursing aims to bring the chief physician, supervisor nurse, dietitian, pharmacist, psychological counselor, and professionals in other disciplines together to collaborate with each other, develop and implement a targeted, high-quality nursing service for the patients, and to extend this service to home nursing after discharge. This mode breaks the limitation of routine nursing and can help the patient to recover more effectively [6]. A study on the nursing of patients with multiple myeloma after discharge showed that the multidisciplinary cooperative continuous nursing model could significantly improve their compliance with out-of-hospital medication, alleviate bone pain, and improve their health [7]. For patients receiving allogeneic HSCT who face more problems after discharge, multidisciplinary cooperative continuous nursing is especially important. Self-efficacy refers to a subjective assessment made by individuals about their ability to accomplish a certain task, and the result of the assessment directly affects one's motivation. For patients with chronic diseases such as hypertension or psychiatric disorders that require long-term medication, a stronger self-efficacy indicates the stronger execution capabilities a patient has to perform certain behaviors, such as taking medication as prescribed by a doctor [8]. Therefore, our study explored the effect of multidisciplinary cooperative continuous nursing on the self-efficacy and quality of life (QOL) in patients with allogeneic HSCT with the aim of providing information on the nursing of patients with allogeneic HSCT after discharge.

### Materials and methods

#### *General information*

A prospective study was designed in which 180 patients who underwent allogeneic HSCT in The First Affiliated Hospital of Soochow University from January 2019 to December 2019 were randomly divided into an observation group and a control group, with 90 patients in each group. This study was approved by the medical Ethics Committee of The First Affiliated Hospital of Soochow University.

**Inclusion criteria:** Patients aged 18 to 65 years old, patients with malignant blood system diseases who underwent allogeneic HSCT treatment, patients with normal communication and writing, patients who signed the informed consent.

**Exclusion criteria:** Patients with psychiatric complications or serious cardiovascular or cerebrovascular diseases, patients with liver or kidney dysfunction or failure, patients who participated in other research projects, patients who withdrew from this study for various reasons, patients with cognitive dysfunction, and patients unable to complete questionnaires.

#### *Methods*

Patients in the control group received routine nursing, and the bedside nurses informed the patients and their families of the precautions to be taken after transplantation, guided their daily diets, and provided basic nursing care for them according to the doctor's instructions.

Patients in the observation group received multidisciplinary cooperative continuous nursing [9, 10]. First, a multidisciplinary continuous nursing team was established: the team consisted of the chief physician, a supervisor nurse, a dietitian, a pharmacist, a psychological counselor, and so on with each performing his or her own function but collaborating with each other. Second, we created individual patient files: the basic patient information was promptly recorded and updated. Third, pre-discharge nursing interventions: health education brochures about allogeneic HSCT were given to the patients and their families. Reasonable scales were used to evaluate the patients' psychological states, self-efficacy, sleep quality, QOL and medication adherence two weeks before discharge. A comprehensive assessment of the patient's condition was performed to formulate a targeted and individualized nursing program, and the supervisor nurses provided instructions on each patient's post-discharge medication and diet. All the patients were told to return to the hospital regularly for review. Fourth, continuous nursing after discharge: a follow-up was performed every week by the nurses over the telephone, and corresponding suggestions were given according to each patient's specific conditions. Monthly follow-up visits through

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WeChat video or home visits were also performed to assess the patients' health statuses through face-to-face communications, and guidance on medication, diet and rehabilitation management was provided by the nurses. The details are as follows:

1) Health education: The patients were provided with disease-related knowledge, the considerations, possible complications, and countermeasures after allogeneic HSCT, as well as the importance and necessity of maintaining medication adherence.

2) Psychological counseling: Information about the patients' psychological changes was obtained by communicating with them. Targeted psychological counseling was administered to comfort and encourage the patients and to increase their confidence in defeating diseases, which was conducive to improving their negative emotions and treatment compliance.

3) Medication instruction: The responsible nurses recorded the detailed medication information including usage and dosage, route of administration, and adverse reactions and communicated with the pharmacist and chief physician in a timely manner. Then the chief physician adjusted the treatment plan or usage and dosage according to the feedback from the nurses.

4) Dietary guidance: The patients were instructed to consume easily-digestible food rich in protein and vitamins and to eat more fruits and vegetables. A dietary plan was developed by a dietitian according to each patient's specific conditions and adjusted according to the follow-up results. Special lectures were given on daily diets, and body composition analyses were performed regularly for the patients.

The intervention effect in both groups was evaluated at three months after discharge.

### *Outcome measures*

*Main outcome measures:* All the assessment scales were filled out by the patients themselves at two weeks before discharge and at three months after discharge and were collected immediately.

The assessment of each patient's self-efficacy was conducted with an instrument called Strategies Used by People to Promote Health

(SUPPH), which includes three dimensionalities: stress reduction (10-50 points), positive attitude (15-75 points), and making decisions (3-15 points) [11]. A higher score indicates the better self-efficacy.

The assessment of each patient's QOL was conducted with an instrument called Karnofsky Performance Status (KPS), which has a total possible score of 100 points [12]. A higher score indicates a better QOL.

*Secondary outcome measures:* The assessment of each patient's sleep quality was conducted using the Pittsburgh Sleep Quality Index (PSQI), which has a total possible score of 18 points [13]. A higher score indicates worse sleep quality.

The assessment of each patient's medication adherence was conducted using the Morisky Medication Adherence Scale (MMAS), which has a total possible score of 8 points [14]. A higher score indicates better medication adherence.

The assessment of each patient's psychological state was conducted using the brief Profile of Mood States (POMS), which includes six dimensionalities: tension (24 points), depression (24 points), anger (28 points), vigor (24 points), fatigue (20 points), and confusion (20 points) [15]. A higher score indicates a worse mood.

### *Statistical analysis*

SPSS 20.0 was used to analyze the data. The enumeration data were expressed as case/percentage (n, %), and  $\chi^2$  tests were used for the comparisons. The Kolmogorov-Smirnov test was used for the normality test, and the data conforming to a normal distribution were expressed as the mean  $\pm$  standard deviation ( $\bar{x} \pm sd$ ). Paired t-tests were used for the comparisons before and after the intervention in the same group, and an independent t-tests were used for the comparisons between two groups.  $P < 0.05$  was considered statistically significant.

## **Results**

### *Basic information*

There were no significant differences in the basic information between the two groups ( $P > 0.05$ ). See **Table 1**.

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**Table 1.** Comparison of the basic information ( $\bar{x} \pm sd$ )

Item	Observation group (n=90)	Control group (n=90)	t	P
Sex (n)			0.557	0.455
Male	45	40		
Female	45	50		
Age (years)	37.7±5.5	38.1±6.3	0.454	0.651
BMI (kg/m <sup>2</sup> )	23.20±1.10	23.33±1.04	0.815	0.416
Smoking history (n)			0.611	0.435
Yes	34	29		
No	56	61		
Drinking history (n)			1.731	0.188
Yes	30	22		
No	60	68		
Basic blood disease (n)			1.276	0.516
Multiple myeloma	28	23		
Acute lymphoblastic leukemia	22	25		
Acute non-lymphocytic leukemia	18	21		
Acquired aplastic anemia	12	13		
Others	10	8		
Transplant modality (n)			0.722	0.697
Autotransplantation	30	27		
Sibling transplantation	38	36		
Others	22	27		
Education (n)			1.822	0.402
College or above major	38	34		
Senior school	32	28		
Junior high school and below	20	28		
Family income (yuan/month)			1.158	0.561
<5000	8	6		
5000~10000	40	35		
>10000	42	49		

Note: BMI: body mass index.

### Self-efficacy

Compared with their scores at two weeks before discharge, the stress reduction, positive attitude, and decision-making scores in both groups all increased at three months after discharge, and the rate of increase in the observation group was larger than it was in the control group (all  $P < 0.001$ ). See **Table 2**.

### QOL

The KPS scores in both groups at three months after discharge were all higher than they were at two weeks before discharge, and the rate of increase in the observation group was

larger than it was in the control group (all  $P < 0.001$ ). See **Table 3**.

### Sleep quality

The PSQI scores in both groups at three months after discharge were all lower than they were at two weeks before discharge, and the rate of decrease in the observation group was larger than it was in the control group (all  $P < 0.001$ ). See **Table 4**.

### Medication adherence

The MMAS scores in both groups at three months after the discharge were all higher than they were at two weeks before the discharge, and the rate of increase in the observation group was larger than it was in the control group (all  $P < 0.05$ ). See **Table 5** and **Figure 1**.

### Psychological state

The POMS scores in both groups at three months after discharge were all lower than they were

at two weeks before discharge, and the rate of decrease in the observation group was larger than it was in the control group (all  $P < 0.01$ ). See **Table 6**.

### Discussion

Research by Younas et al. pointed out the necessity of continuous nursing for improving the QOL of out-of-hospital patients [16]. In our study, at three months after discharge, the stress reduction, positive attitude, decision making, and KPS scores in the observation group were significantly higher than the corresponding scores in the control group, suggesting that multidisciplinary cooperative continu-

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**Table 2.** Comparison of the SUPPH scores ( $\bar{x} \pm sd$ )

Item	Stress reduction	Positive attitude	Decision making
Observation group (n=90)			
Two weeks before discharge	26.60±4.39	40.40±5.44	7.68±2.20
Three months after discharge	39.58±5.85 <sup>***,###</sup>	51.10±4.87 <sup>***,###</sup>	11.18±2.44 <sup>***,###</sup>
Control group (n=90)			
Two weeks before discharge	27.11±4.75	41.12±5.38	7.36±2.50
Three months after discharge	33.75±4.49 <sup>***</sup>	46.68±6.49 <sup>***</sup>	9.30±2.47 <sup>***</sup>

Notes: Compared with two weeks before discharge, <sup>\*\*\*</sup>P<0.001; compared with the control group, <sup>###</sup>P<0.001. SUPPH: Strategies Used by People to Promote Health.

**Table 3.** Comparison of the KPS scores ( $\bar{x} \pm sd$ )

Index	KPS score
Observation group (n=90)	
Two weeks before discharge	60.40±8.69
Three months after discharge	75.58±7.50 <sup>***,###</sup>
Control group (n=90)	
Two weeks before discharge	61.52±6.70
Three months after discharge	69.97±7.48 <sup>***</sup>

Notes: Compared with at two weeks before discharge, <sup>\*\*\*</sup>P<0.001; compared with the control group, <sup>###</sup>P<0.001. KPS: Karnofsky Performance Status.

**Table 4.** Comparison of the PSQI scores ( $\bar{x} \pm sd$ )

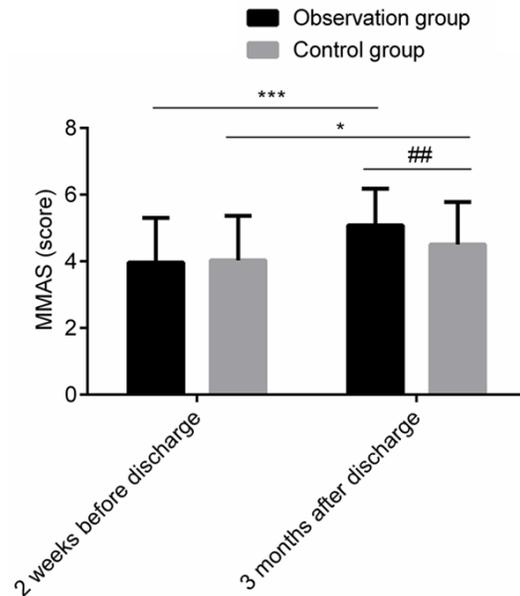
Index	PSQI score
Observation group (n=90)	
Two weeks before discharge	14.39±3.40
Three months after discharge	10.04±2.22 <sup>***,###</sup>
Control group (n=90)	
Two weeks before discharge	14.16±3.43
Three months after discharge	12.30±2.28 <sup>***</sup>

Notes: Compared with at two weeks before discharge, <sup>\*\*\*</sup>P<0.001; compared with the control group, <sup>###</sup>P<0.001. PSQI: Pittsburgh Sleep Quality Index.

**Table 5.** Comparison of MMAS scores ( $\bar{x} \pm sd$ )

Index	MMAS score
Observation group (n=90)	
Two weeks before discharge	3.96±1.34
Three months after discharge	5.08±1.10 <sup>***,##</sup>
Control group (n=90)	
Two weeks before discharge	4.03±1.33
Three months after discharge	4.50±1.28 <sup>*</sup>

Notes: Compared with two weeks before discharge, <sup>\*</sup>P<0.05, <sup>\*\*\*</sup>P<0.001; compared with the control group, <sup>##</sup>P<0.01. MMAS: Morisky Medication Adherence Scale.



**Figure 1.** Comparison of the MMAS scores. Compared with before discharge, <sup>\*</sup>P<0.05, <sup>\*\*\*</sup>P<0.001; compared with the control group, <sup>##</sup>P<0.01. MMAS: Morisky Medication Adherence Scale.

ous nursing for patients who underwent allogeneic HSCT can significantly improve their self-efficacy and QOL, which is consistent with the study findings from Wang et al. [17]. This is because the members of the multidisciplinary cooperative continuous nursing team paid close attention to the conditions of patients with allogeneic HSCT continuously and have a comprehensive understanding of the disease progression and physical conditions of the patients after their discharge from the hospital. Moreover, the intervention plans and rehabilitation protocols developed for the patients are based on their actual situations, and they are highly targeted and professional [9]. The patients gain a comprehensive understanding of the disease through health educa-

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**Table 6.** Comparison of the POMS scores ( $\bar{x} \pm sd$ )

Index	Observation group (n=90)		Control group (n=90)	
	Two weeks before discharge	Three months after discharge	Two weeks before discharge	Three months after discharge
Tension	19.97±2.87	16.60±3.30 <sup>***,##</sup>	19.36±2.64	17.98±3.04 <sup>**</sup>
Depression	20.05±2.57	16.33±3.21 <sup>***,###</sup>	19.75±2.38	18.12±2.22 <sup>***</sup>
Anger	22.36±3.29	19.40±4.30 <sup>***,##</sup>	22.59±3.58	21.05±3.44 <sup>**</sup>
Vigor	18.80±2.85	14.46±2.97 <sup>***,###</sup>	18.40±3.10	17.07±3.37 <sup>**</sup>
Fatigue	15.59±3.20	13.25±2.67 <sup>***,##</sup>	15.96±3.48	14.44±3.20 <sup>**</sup>
Confusion	16.40±3.29	13.31±3.26 <sup>***,##</sup>	16.03±3.11	14.67±2.96 <sup>**</sup>

Notes: Compared with before discharge, <sup>\*\*</sup>P<0.01, <sup>\*\*\*</sup>P<0.001; compared with the control group, <sup>##</sup>P<0.01, <sup>###</sup>P<0.001. POMS: Profile of Mood States.

tion and eliminate all kinds of negative mental attitudes and bad emotions through psychological counseling; strict medication guidance not only reduces the incidence of adverse reactions, but it also avoids or alleviates the harm brought by GVHD. Dietary guidance provides a guarantee for the rapid recovery of patients through a reasonable diet. Under the effect of the above-mentioned comprehensive factors, the patients' self-efficacy and QOL are improved naturally [17].

Milders et al. have previously shown that having caregivers collaborate with other trained professionals to deliver interventions for patients is effective [18]. The results of our study showed that the MMAS scores in the observation group were significantly higher than they were in the control group at three months after discharge, suggesting that multidisciplinary cooperative continuous nursing can significantly improve the medication adherence of patients undergoing allogeneic HSCT, which is of crucial importance to reduce the development of GVHD. The results are consistent with relevant study findings, such as Gomarverdi et al. who demonstrated that multidisciplinary cooperative continuous nursing contributes to improving patients' treatment adherence [19]. Martín-Delgado et al. found that the implementation of multidisciplinary cooperative continuous nursing can reduce the incidence of complications in patients undergoing organ transplantation [20]. This is because the implementation of multidisciplinary cooperative continuous nursing offers the same full range of personalized medical care for out-of-hospital patients as they do in the hospital. Through regular com-

munication and the supervision and guidance from hospital professionals, patients can develop healthy living and medication habits, which are conducive to improving their medication adherence, thereby improving the therapeutic effect and reducing the risk of adverse reactions after transplantation [21].

A study by Meiklejohn et al. found that multidisciplinary cooperative continuous nursing can improve the negative mental attitudes and bad emotions of patients with malignancies, a finding that was also confirmed by our study [22]. At three months after discharge, the tension, depression, anger, vigor, fatigue, and confusion scores as well as the PSQI scores in the observation group were all lower than they were in the control group, indicating that for patients undergoing allogeneic HSCT, multidisciplinary cooperative continuous nursing can significantly control all kinds of bad emotions and improve their sleep quality. The reason is that the members of the multidisciplinary cooperative continuous nursing team communicated with the patients regularly to promote health education, so that the patients fully understood the importance of cooperation with the treatment. Meanwhile, it helps to release the mental stress of patients and encourages the patients to better manage their own emotions through targeted psychological counseling [9, 22].

However, this study was a single-center study with a limited sample size and a short follow-up time, so more in-depth research on the impact of multidisciplinary cooperative continuous nursing on patients' long-term QOL is needed.

In conclusion, multidisciplinary cooperative continuous nursing for patients undergoing allogeneic HSCT can significantly enhance their self-efficacy, improve their QOL, relieve their bad emotions, and improve their medication adherence and sleep quality. Therefore, it is worthy of clinical application.

### Disclosure of conflict of interest

None.

**Address correspondence to:** Ling Lu, Department of Hematology, The First Affiliated Hospital of Soochow University, No. 188 Shizi Street, Suzhou 215006, Jiangsu Province, China. Tel: +86-18605123560; E-mail: luling1soo@163.com

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