

ORIGINAL RESEARCH

Utilizing the Omaha System to Enhance Care for Lymphoma Patients During Autologous Hematopoietic Stem Cell Transplantation: Exploring Effects on Anxiety and Depression

Shizhen Teng, MM; Feng Wei, MM; Zengwei Bao, MM

ABSTRACT

Background • Autologous hematopoietic stem cell transplantation (AHSCT) is a standard treatment for lymphoma, yet it is associated with psychological distress. Omaha System-based care offers a structured approach to address the unique needs of patients undergoing AHSCT.

Objective • This study aims to evaluate the efficacy and utility of Omaha System-based care in patients undergoing autologous hematopoietic stem cell transplantation (AHSCT) for lymphoma (LY), focusing particularly on its impact on psychological well-being.

Methods • The study adopted an observational design and included 80 LY patients undergoing AHSCT at our hospital between January 2022 and December 2022. Of these, 46 patients received Omaha System-based care (observation group), while 34 patients received conventional care (control group). Pre- and post-intervention assessments comprised the Self-rating Anxiety/Depression Scale (SAS/SDS), Pittsburgh Sleep Quality Index (PSQI), and Functional Assessment of Cancer Therapy–Bone Marrow Transplant (FACT-BMT).

Additionally, the duration of stay in the laminar airflow bio-clean room (LAFR), total hospital stays, hospitalization expenses, and incidence of adverse reactions were recorded. Nursing satisfaction was also evaluated.

Results • Post-intervention, the observation group exhibited significantly lower SAS, SDS, and PSQI scores compared to the control group ($P < .05$), indicating improved psychological well-being. Moreover, the observation group demonstrated a shorter hospital stay ($P < .05$), reduced healthcare expenditures, lower incidence of adverse reactions, and higher nursing satisfaction ($P < .05$).

Conclusions • Omaha System-based care demonstrates promising outcomes in enhancing the safety and psychological well-being of LY patients undergoing AHSCT. The findings underscore its potential as an effective intervention to optimize patient care in this population. Further research is warranted to validate these results and facilitate their broader adoption in clinical practice. (*Altern Ther Health Med*. [E-pub ahead of print.])

Shizhen Teng, MM; Feng Wei, MM; Zengwei Bao, MM, Department of Hematology; First Affiliated Hospital of Suzhou University; Suzhou; Jiangsu; China.

Corresponding author: Zengwei Bao, MM
E-mail: baozengwei@126.com

INTRODUCTION

Lymphoma (LY), a malignant neoplasm arising from lymph nodes, lymphoid tissue, and lymphocytes, manifests with painless progressive lymphadenopathy and systemic involvement of tissues and organs.¹ Based on tumor cell morphology, LY is categorized into non-Hodgkin's lymphoma and Hodgkin's lymphoma.² Its global incidence is on the rise, with the World Health Organization (WHO) estimating 589,600 new cases worldwide in 2018, posing a significant public health concern.³

Autologous hematopoietic stem cell transplantation (AHSCT) stands as a prevailing approach in managing relapsed or aggressive malignant LY. This procedure entails the collection of autologous stem cells from the patient's tissue, followed by their isolation, culture, and subsequent transplantation to facilitate hematopoietic and immune system restoration, resulting in definitive therapeutic outcomes and expedited recovery.⁴ However, patients undergoing AHSCT encounter a substantial symptom burden, psychological distress, considerable financial implications, prolonged hospitalization, and a countless complex nursing challenge, significantly impinging upon their overall quality of life.^{5,6} Therefore, the quest for an optimal nursing model tailored to transplant patients remains a crucial focus in clinical nursing practice.

The Omaha system, devised by the Visiting Nurses Association of Omaha, comprises three integral components: a problem classification scheme, an intervention scheme, and

Table 1. General Information of the Patients

Group	n	Age	Male / Female	BMI (kg/m ²)	Disease Stage II/III/IV	Understanding Omaha System-based care (Yes/No)	Clinical symptom Enlarged lymph nodes/growing in extranodal organs/both
Observation	46	45.8±3.5	25(54.4)/21(45.6)	24.2±1.9	5(10.9)/20(43.5)/21(45.6)	3(6.5)/43(93.5)	22(47.8)/14(30.4)/10(21.7)
Control	34	45.7±3.2	16(47.1)/18(52.9)	24.1±1.7	4(11.8)/12(35.3)/18(52.9)	2(5.9)/32(94.1)	15(44.1)/13(38.2)/6(17.6)
χ^2/t		0.131	0.416	0.243	0.554	0.014	0.574
P value		.896	.519	.809	.758	.907	.750

Note: BMI - Body Mass Index. Values are presented as mean ± standard deviation or [n (%)]. The P values were obtained using χ^2 or t test, as applicable, comparing the observation and control groups.

a problem rating scale for outcomes.⁷ It finds extensive application in community nursing for chronic diseases, specialized disease management, and continuous care. This systematic approach not only effectively directs clinical practice but also fosters healthy patient behaviors and augments their quality of life. Furthermore, its utility extends to standardizing nursing documentation, guiding clinical nursing protocols, and advancing information management practices.^{7,8}

In recent years, the Omaha system has gained significant traction in clinical practice, resulting in notable outcomes in disease management and nursing interventions across various medical conditions, thereby enhancing patients' quality of life.^{9,10} However, its utilization in AHSCT for LY remains scantily documented. The scarcity of its documented use in AHSCT for LY underscores the need for further exploration and research into the potential benefits and challenges of implementing the Omaha system in this specific clinical context.

Therefore, this study conducted a comprehensive analysis to investigate the potential of the Omaha system in alleviating anxiety and depression, providing valuable insights for future clinical implementation.

MATERIALS AND METHODS

Study Design

This study employed a retrospective observational design, focusing on 80 LY patients who underwent AHSCT at our hospital from January 2022 to December 2022. The study aimed to assess the impact of the Omaha system-based care intervention on anxiety and depression levels among these patients post-transplantation. In our hospital, customary care was administered until June 2022, during which 34 patients were included, constituting the control group. Subsequently, from June 2022 onward, Omaha System-based care was introduced, and a total of 46 patients were enrolled during this phase, comprising the observation group. Approval for this study was obtained from the hospital ethics committee.

Inclusion and Exclusion Criteria

Inclusion criteria were as follows: (1) Patients aged >18; (2) pathologically diagnosed with LY;¹¹ (3) admitted to our hospital; (4) considered suitable candidates for AHSCT;¹² (5) with clear consciousness; (6) available comprehensive clinical data; and (7) provided informed consent, were included. Exclusion criteria were as follows: (1) Patients with concurrent heart, liver, kidney, or other organ dysfunction (e.g., coronary artery disease, myocardial infarction, cirrhosis);¹³ (2) inability

to communicate verbally; (3) autoimmune disorders; (4) intolerance to treatment modalities; (5) limited life expectancy; (6) incomplete participation in the study; or (7) referred to another hospital were excluded.

Demographic and Clinical Characteristics

We collected and analyzed data encompassing age, sex, body mass index (BMI), and disease stages. The statistical analysis revealed no significant differences between groups ($P > .05$); see Table 1.

Patient Education and Routine Care Protocols

Patients received comprehensive education regarding AHSCT procedures, precautionary measures, potential complications, and medication guidance. Furthermore, the nursing staff carefully ensured rigorous disinfection and adequate sterilization of the laminar-flow operating room before transplantation, conducting daily cleaning and disinfection of the floor, walls, and medical equipment. Close monitoring for gastrointestinal and other adverse reactions was maintained during transplantation, with prompt intervention as needed. Post-transplantation, vigilant monitoring of vital signs and reinforced dietary guidance were implemented.

Implementation of Omaha System-Based Care

We implemented care based on “*The Omaha System* (<https://www.omahasystem.org/>)”¹³ in the observation group. Its main components included the following.

Problem Classification Scheme. Prior to initiating nursing care, a multidisciplinary transplant care research group consisting of physicians, head nurses, transplant nurses, nutritionists, and psychological counselors was established. Nursing interventions based on the Omaha System were initiated. Utilizing the Omaha problem classification scheme, a nursing evaluation scale for LY patients undergoing AHSCT was developed. The preliminary evaluation results summarized the main nursing problems before, during, and after transplantation. By integrating literature, previous clinical experience, and Omaha theory, the research team collaboratively formulated a targeted nursing intervention plan, culminating in the development of Omaha System-based nursing intervention measures.

Intervention Scheme. During treatment and care, precise attention was directed towards addressing the psychosocial domain of patients before transplantation, as well as the physiological and healthy behavior domains during and after transplantation. Targeted nursing

interventions were tailored to address specific care issues within these domains. Additionally, the research team underwent uniform weekly training sessions covering various aspects of care, including measures to be implemented, important considerations, and scoring methods.

Problem Rating Scale for Outcomes. The psychological state of patients was assessed using the: (1) Self-rating Anxiety/Depression Scale (SAS/SDS) before (upon admission) and after nursing care (at discharge), with lower scores indicating decreased anxiety and depression levels. (2) Assessment of sleep quality: Patients' sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI).¹⁴ This index employs a 21-point scale, with higher scores correlating with poorer sleep quality.

(3) Assessment of quality of life: The quality of life for patients in both groups before and after intervention was assessed using the Functional Assessment of Cancer Therapy–Bone Marrow Transplant (FACT-BMT).¹⁵ This evaluation tool measures four dimensions: physical well-being, social/family well-being, emotional well-being, and functional well-being. The score obtained from the FACT-BMT is directly correlated with the overall quality of life experienced by the patients. (4) Patient satisfaction with nursing intervention: Patient satisfaction with nursing intervention was assessed upon discharge using a questionnaire developed by our hospital. Satisfaction levels were categorized as satisfied, fair, or dissatisfied. Overall satisfaction was calculated as the sum of the satisfied and fair rates. Overall Satisfaction = Satisfied Rate + Fair Rate.[†]

Outcome Measures

The study compared pre- and post-intervention scores of the SAS, SDS, PSQI, and FACT-BMT. Additionally, nursing satisfaction survey results at discharge were analyzed. Other outcome measures included the length of stay in the laminar airflow bio-clean room (LAFR), hospital stay duration, hospitalization expenses, and incidence of adverse reactions during treatment.

Statistical Analysis

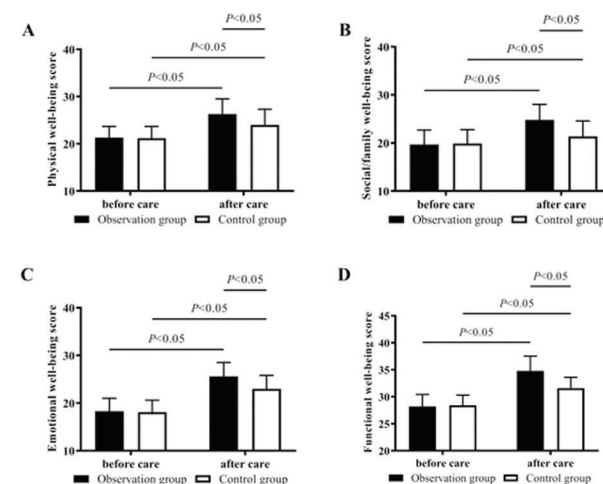
For statistical analysis, the collected data were carefully inputted into the SPSS version 24.0 software (International Business Machines, Corp., Armonk, NY, USA). The Chi-square test (χ^2) was utilized to compare categorical data, including satisfaction levels and incidence of adverse reactions. Measurement data were presented as mean $\pm$ standard deviation ($\bar{x} \pm s$). The independent sample *t* test and paired *t* test were employed for comparing measurement data, such as scoring results, providing a comprehensive evaluation of the study outcomes. A significance threshold of $P < .05$ was applied to determine the statistical significance of the findings.

RESULTS

Comparative Analysis of Pre- and Post-Care Quality of Life

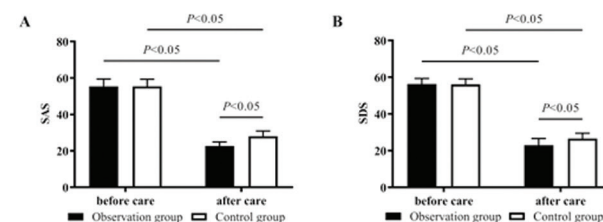
Both the observation group and control group exhibited no statistically significant difference in the scores of each

Figure 1. Quality of Life Before and After Nursing



Note: A-D represent the scores for physical well-being, social/family well-being, emotional well-being, and functional well-being, respectively. The data illustrate changes in quality of life measures before and after nursing interventions.

Figure 2. Psychological State Before and After Care



Note: A and B represent the Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS), respectively. These figures depict the psychological state of patients before and after receiving care.

dimension of the FACT-BMT scale before care ($P > .05$). Following care, elevated scores were observed in both cohorts. However, notably higher scores were recorded in the observation group across the physical, social/family, emotional, and functional well-being dimensions ($P < .05$), see Figure 1A-1D.

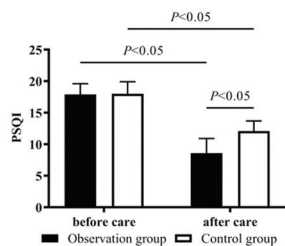
Comparison of Psychological State Before and After Care

Before receiving care, both the observation and control groups exhibited high scores on the SAS and SDS, with no statistically significant difference between the groups ($P > .05$). After intervention, reductions in SAS and SDS scores were observed in both groups. Notably, the observation group experienced more significant reductions in SAS and SDS scores compared to the control group ($P < .05$), see Figure 2A and 2B.

Comparison of Sleep Quality Before and After Care

Upon comparison, no statistical significance was observed between the observation and control groups in terms of sleep quality, as assessed by the PSQI score. Prior to receiving care, both groups exhibited high PSQI scores ($P > .05$). After intervention, reductions in PSQI scores were

Figure 3. PSQI Before and After Care



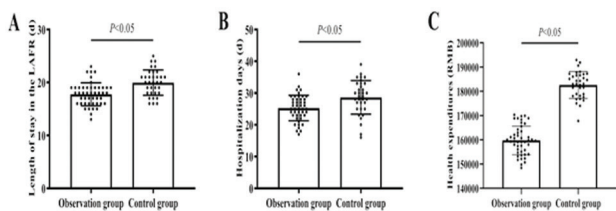
Note: This figure illustrates the changes in the Pittsburgh Sleep Quality Index (PSQI) scores before and after receiving care.

Table 2. Adverse Effects During Treatment

Group	n	Bleeding	Oral Infection	Fever	Gastrointestinal Discomfort	Overall Incidence
Observation Group	46	1(2.2)	1(2.2)	1(2.2)	2(4.3)	10.9
Control Group	34	2(5.9)	3(8.8)	2(5.9)	4(11.8)	32.3
χ^2						5.639
P value						0.018

Note: Values are presented as [n (%)]. The P value was obtained using the chi-square test (χ^2), comparing the incidence of adverse effects between the observation and control groups.

Figure 4. Comparison of Rehabilitation and Health Expenditures



Note: This figure presents the comparison of key indicators related to rehabilitation and health expenditures. Sub-figures A-C represent the length of stay in the LAFR, hospital stay, and health expenditures, respectively.

Table 3. Results of Nursing Satisfaction Survey

Group	n	Satisfied	Fair	Dissatisfied	Overall Satisfaction
Observation Group	46	29(63.0)	15(32.6)	2(4.4)	44(95.6)
Control Group	34	10(29.4)	15(44.1)	9(26.5)	25(73.5)
χ^2		8.851	1.105	8.068	8.068
P value		.003	.293	.005	.005

Note: Values are presented as [n (%)]. The P value was obtained using the chi-square test (χ^2), comparing the nursing satisfaction levels between the observation and control groups.

noted in both groups, with notably lower scores observed in the observation group ($P < .05$), see Figure 3.

Comparison of Treatment Safety

During treatment, adverse reactions such as bleeding, oral infections, fever, and gastrointestinal discomfort were observed in both the observation and control groups. Statistical analysis indicated an overall incidence rate of 10.9% in the observation group and 32.3% in the control group, with a significant inter-group difference ($P < .05$), see Table 2.

Comparison of Rehabilitation and Health Expenditures

Analysis of the length of stay in the laminar airflow bio-clean room (LAFR) and hospital duration revealed shorter durations in the observation group compared to the control

group ($P < .05$); see Figure 4A and 4B. Furthermore, the health expenditures in the observation group totaled RMB 159 788.00 $\pm$ 5892.09, representing a significant reduction compared to the control group ($P < .05$), see Figure 4C.

Comparison of Nursing Satisfaction

The satisfaction survey revealed notable differences between the observation and control groups. Specifically, the observation group exhibited a significantly higher satisfied rate ($P < .05$), a comparable fair rate ($P > .05$), and a notably lower dissatisfied rate compared to the control group ($P < .05$). Overall, the satisfaction level of the observation group surpassed that of the control group ($P < .05$), see Table 3.

DISCUSSION

LY, as a prevalent tumor disease in modern medicine, significantly impacts the health and safety of patients.¹⁶ While AHSCT has demonstrated high effectiveness in treating LY, the substantial symptoms and psychological burdens, along with elevated health expenditures during treatment, may impede patients' rehabilitation.¹⁷ Thus, identifying tailored care approaches suitable for AHSCT provides a more reliable guarantee for the treatment of these patients. This study highlights the accelerated patient recovery observed in the observation group following Omaha System-based care, offering valuable reference and guidance for the future management of LY patients undergoing AHSCT.

In our study, we observed a more significant improvement in the FACT-BMT score among the observation group following care compared to the control group. This finding suggests that Omaha System-based care may more effectively enhance patients' quality of life than routine care. Similarly, Plowfield et al.¹⁸ and Chow et al.¹⁹ reported that Omaha System-based care improved the quality of life in patients with stroke and Parkinson's disease, respectively, providing additional support for the findings of our study.

The Omaha problem classification scheme is extensively utilized across diverse populations and has demonstrated effectiveness in evaluating patient care issues.^{20,21} However, there exists a deficiency in nursing evaluation systems tailored specifically for patients undergoing AHSCT. In response, leveraging the problem classification scheme of the Omaha System and considering the unique characteristics of AHSCT patients, this study developed a nursing problem evaluation scale. This scale aims to identify major nursing concerns at various stages of transplantation through comprehensive nursing assessments. Therefore, nurses can implement targeted care interventions with emphasis and insight throughout the transplantation process.²²

In our study, patients undergo targeted psychosocial care addressing anxiety, role adaptation, and transplant preparation before transplantation. Symptom management was provided for high-dose chemotherapy during pretreatment, autotransfusion, and adverse reactions during transplantation. Additionally, psychological intervention and detailed care addressed worries, fears, adverse reactions of

various systems, and prevention of transplant-associated complications after transplantation. It is further evidenced by the lower SAS, SDS, and PSQI scores observed in the observation group after receiving care, indicating the significant role of Omaha System-based care in actively alleviating patients' anxiety and depression.

Studies^{23,24} have indicated a close correlation between lymph nodes and emotional states. When individuals experience anxiety, depression, or similar conditions, their tissues and organs undergo significant stress, leading to lymph node enlargement, lymphadenitis, and even the development of LY.²⁴ Through dynamic adjustments to nursing interventions, considering evolving symptoms and challenges in various domains, patients can experience optimized comfort levels, improved physical health, enhanced emotional stability, and better quality of life during transplantation.

Previous research²⁵ has also demonstrated the beneficial effects of OS-based care in enhancing the psychological well-being of patients undergoing prostate cancer surgery, suggesting its potential to enhance overall rehabilitation quality for patients. On the other hand, it is important to consider the safety of AHSCT.^{26,27} This is due to the potential chemotherapy-induced toxicities and side effects, including myelosuppression, nausea, and vomiting, as well as the susceptibility of patients to hematopoietic dysfunction following stem cell collection.²⁸

In this study, the incidence of adverse reactions was lower in the observation group than in the control group, indicating that Omaha System-based care provides a more reliable guarantee for the safety of AHSCT. This is attributed to the accurate care provided through precise care evaluation, thereby mitigating risk events during patient treatment. Previous evidence has also demonstrated the beneficial impact of Omaha System-based care in reducing complications after gynecological surgery,²⁹ supporting our findings. This finding underscores the importance of Omaha System-based care in intervening and dynamically evaluating nursing issues in the physiological realm, thereby reducing the occurrence of complications such as oral infections and bleeding.

In Omaha System-based care, nurses are required to utilize the nursing problem evaluation form for daily assessments. This strategy ensures timely identification of potential nursing issues and facilitates the evaluation of the intervention's effectiveness. For patients exhibiting inadequate response to interventions, the research team conducted multidisciplinary discussions and dynamically adjusted the nursing plan. This approach effectively reduced the incidence and severity of symptoms across various domains, fostering physiological, psychological, social, and emotional well-being. Therefore, it facilitated accelerated blood reconstruction and recovery, leading to shortened stays in the LAFR and hospital, as well as decreased associated expenses. As a result, an increase in nursing satisfaction among patients in the observation group was observed.

Through Omaha System-based care interventions, this study enhanced the quality of life for LY patients undergoing AHSCT during the peri-transplant period, mitigated the occurrence of complications, shortened hospitalization stays, and reduced hospitalization expenses. Additionally, this system facilitated transplant nurses in scientifically evaluating nursing issues, enabling them to deliver comprehensive and comfortable care tailored to the main nursing concerns at various stages of transplantation. These findings hold significant clinical implications for guiding practice in transplant nursing.

Study Limitations

Despite the valuable insights gained from this study, several limitations must be acknowledged. Firstly, the study was limited by inadequate experimental conditions and a small sample size, potentially impacting the generalizability of the findings. Furthermore, the absence of ongoing care for transplant patients post-discharge may have influenced the long-term outcomes assessed. Additionally, the lack of established clinical guidelines for Omaha System-based care necessitates further refinement of specific nursing protocols. In the future, efforts should be directed toward addressing these limitations to enhance the nursing model and provide more robust guidance for the expedited recovery of patients undergoing AHSCT.

CONCLUSION

In conclusion, this study underscores the efficacy of Omaha System-based care interventions in enhancing the quality of life and safety outcomes for patients undergoing AHSCT. By implementing targeted nursing interventions throughout the peri-transplant period, complications were mitigated, hospitalization duration was reduced, and associated expenses were minimized. Despite inherent limitations such as experimental constraints and sample size, the positive impact of Omaha System-based care on patient outcomes is evident. Moving forward, continued efforts to optimize and standardize nursing protocols are essential to enhance the effectiveness of this approach. Overall, this study provides valuable insights into the potential of Omaha System-based care to facilitate the rapid rehabilitation of patients undergoing AHSCT. This insight paves the way for future advancements in healthcare delivery, ensuring better support and outcomes for patients undergoing AHSCT.

COMPETING INTERESTS

The authors report no conflict of interest.

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None.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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