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ORIGINAL RESEARCH

The Impact of Interaction Standard Theory-Based Multi-Care on Postpartum Recovery, Coping Styles, Psychological Distress, and Quality of Life in Women with Postpartum Hemorrhage

Feifei Meng[1,*], Yufan Yuan[2,*], Xingxing Lv[3]

[1]Department of Public Health, Shijiazhuang Obstetrics and Gynecology Hospital, Shijiazhuang, Hebei, People's Republic of China; [2]Department of Nursing, Shijiazhuang Obstetrics and Gynecology Hospital, Shijiazhuang, Hebei, People's Republic of China; [3]Department of Obstetrics, Shijiazhuang Obstetrics and Gynecology Hospital, Shijiazhuang, Hebei, People's Republic of China

*These authors contributed equally to this work

Correspondence: Xingxing Lv, Department of Obstetrics, Shijiazhuang Obstetrics and Gynecology Hospital, No. 16 Tangu North Street, Changan District, Shijiazhuang, Hebei, 050000, People's Republic of China, Tel +86-0311-89927507, Email 840662068@qq.com

Objective: This study explores the impact of an interaction standard theory-based multi-care program on postpartum recovery, coping styles, psychological distress, and quality of life in women experiencing postpartum hemorrhage (PPH).

Methods: A total of 110 women with PPH admitted to our hospital from October 2023 to October 2024 were analyzed. They were divided into a study group (n = 55, receiving the interaction standard theory-based multi-care program, integrating structured nurse-patient communication (based on King's and Satir's models) for collaborative planning of cognitive, psychological, behavioral, and dietary support) and a control group (n = 55, receiving conventional nursing intervention). Coping styles (Simplified Coping Style Questionnaire), psychological distress (Hamilton Depression/Anxiety Rating Scales - HAMD/HAMA), and quality of life (WHOQOL-BREF) were compared pre-intervention (1 day) and post-intervention (2 weeks). Postpartum recovery indicators (lochia duration, lactation onset, uterine involution, hospital stay) and nursing satisfaction were also analyzed.

Results: Pre-intervention, no significant group differences existed in coping or psychological scores ($P > 0.05$). Post-intervention (2 weeks), the study group showed significantly lower negative coping, higher positive coping, and lower HAMD/HAMA scores compared to controls ($P < 0.05$). The study group also had significantly shorter lochia duration, earlier lactation onset, quicker uterine involution, shorter hospital stays ($P < 0.05$), and higher quality of life scores ($P < 0.05$). Nursing satisfaction was significantly higher in the study group ($P < 0.05$).

Conclusion: The interaction standard theory-based multi-care program effectively promotes postpartum recovery, enhances adaptive coping, reduces psychological distress, and improves quality of life in women with PPH. This intervention demonstrates considerable clinical value.

Keywords: interaction standard theory-based multi-care, postpartum hemorrhage, postpartum recovery, quality of life, coping styles, psychological distress

Introduction

Postpartum hemorrhage (PPH) is a severe complication of childbirth and a leading cause of maternal mortality, with approximately 100,000 maternal deaths worldwide each year due to obstetric hemorrhage, accounting for 27.1% of maternal deaths.[1,2] The sudden onset of postpartum hemorrhage can lead to coagulation disorders and hypovolemic shock, posing a significant threat to maternal life.[3] In recent years, the cesarean section rate in China has been on the rise, currently exceeding 40% in most regions, with some areas even surpassing 80%.[4] This trend is noteworthy as cesarean

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sections can be associated with an increased risk of PPH and related complications, such as uterine atony or placental abnormalities, thereby heightening the need for robust postpartum management strategies.[5]

For women experiencing postpartum hemorrhage, timely rescue and treatment are crucial, including rapid hemostatic measures to save lives. During this emergency treatment, effective nursing care can enhance treatment outcomes and facilitate postpartum recovery.[6] However, women experiencing PPH often face not only acute physiological stress but also significant fear, anxiety, and the potential for long-term psychological sequelae.[7] While conventional nursing can promote recovery, it often lacks structured and systematic effective communication between nurses and patients, making it difficult for caregivers to fully understand and address the psychological state of the mothers and ensure optimal care outcomes.[8] Standard medical and nursing care effectively addresses the physiological crisis, but the psychosocial needs and coping mechanisms of these women may be inadequately supported by conventional approaches alone.[9]

Therefore, a scientific and effective nursing approach is essential for the holistic recovery of women suffering from postpartum hemorrhage. The interaction standard theory-based multi-care model, drawing upon principles such as King's Theory of Goal Attainment[10] and Satir's Model of communication and self-esteem,[11] emphasizes structured, goal-oriented communication between nurses and patients, involving them collaboratively in the development and implementation of their care plans. This holistic model provides comprehensive care encompassing cognitive re-framing, psychological support, behavioral activation, and tailored dietary guidance, aiming to improve not only problem-solving efficiency but also enhance coping strategies and quality of life for postpartum women. Previous studies on similar interactive nursing theories or interventions have primarily focused on chronic heart failure, hypertensive intracerebral hemorrhage, and liver cirrhosis.[12–14] However, there has been limited research on the impact of a specifically structured interaction standard theory-based multi-care program on postpartum recovery, coping styles, psychological distress, and quality of life in women with postpartum hemorrhage. This study aims to fill this gap by investigating the effects of this innovative nursing approach on physical recovery, coping styles, psychological distress, and quality of life in this vulnerable population.

Materials and Methods

General Data Analysis

A total of 110 women who experienced postpartum hemorrhage and were admitted to our hospital from October 2023 to October 2024 were included in the study. This study was a prospective, randomized controlled trial. Participants were recruited sequentially upon admission and diagnosis of PPH. After obtaining informed consent, eligible participants were randomly assigned to either the study or control group using a computer-generated random number sequence, with allocation concealment maintained using sealed opaque envelopes prepared by an independent statistician. They were randomly divided into two groups: a study group (n = 55, receiving the interaction standard theory-based multi-care program, hereafter referred to as the multi-care program) and a control group (n = 55, receiving conventional care). This study protocol complies with the relevant requirements of the Declaration of Helsinki issued by the World Medical Association and was approved by the Ethics Committee of Shijiazhuang Obstetrics and Gynecology Hospital (NO.2023-SOG-23). All participants were provided with a detailed explanation of the study's purpose, procedures, potential risks and benefits, their right to withdraw at any stage without affecting their standard medical care, and the measures taken to ensure the confidentiality of their personal data. Written informed consent was obtained from all participants prior to their enrollment in the study. An a priori power analysis was conducted to determine the required sample size. Based on previous literature and a pilot assessment indicating an anticipated medium to large effect size (Cohen's $d \approx 0.55$) for the primary outcome of improvement in the WHOQOL-BREF total score, a sample size of 51 participants per group was estimated to provide 80% power to detect this difference at a two-sided significance level of $\alpha = 0.05$. To account for potential attrition, we aimed to recruit 55 participants per group, resulting in a total sample size of 110. Data on detailed socioeconomic status, specific social support system scores, and parity were not systematically collected for all participants beyond the general obstetric history, and thus were not included as covariates in the primary statistical analysis.

Participant Flow

Of the 135 women assessed for eligibility, 25 did not meet the inclusion criteria (eg, age >40 years, pre-existing coagulation disorders, incomplete data expectation). The remaining 110 eligible participants consented and were randomized. All 55 participants in the study group and all 55 participants in the control group received their allocated interventions and completed all follow-up assessments at 2 weeks. Thus, data from all 110 participants were included in the final analysis. A study flow diagram was shown in Figure 1.

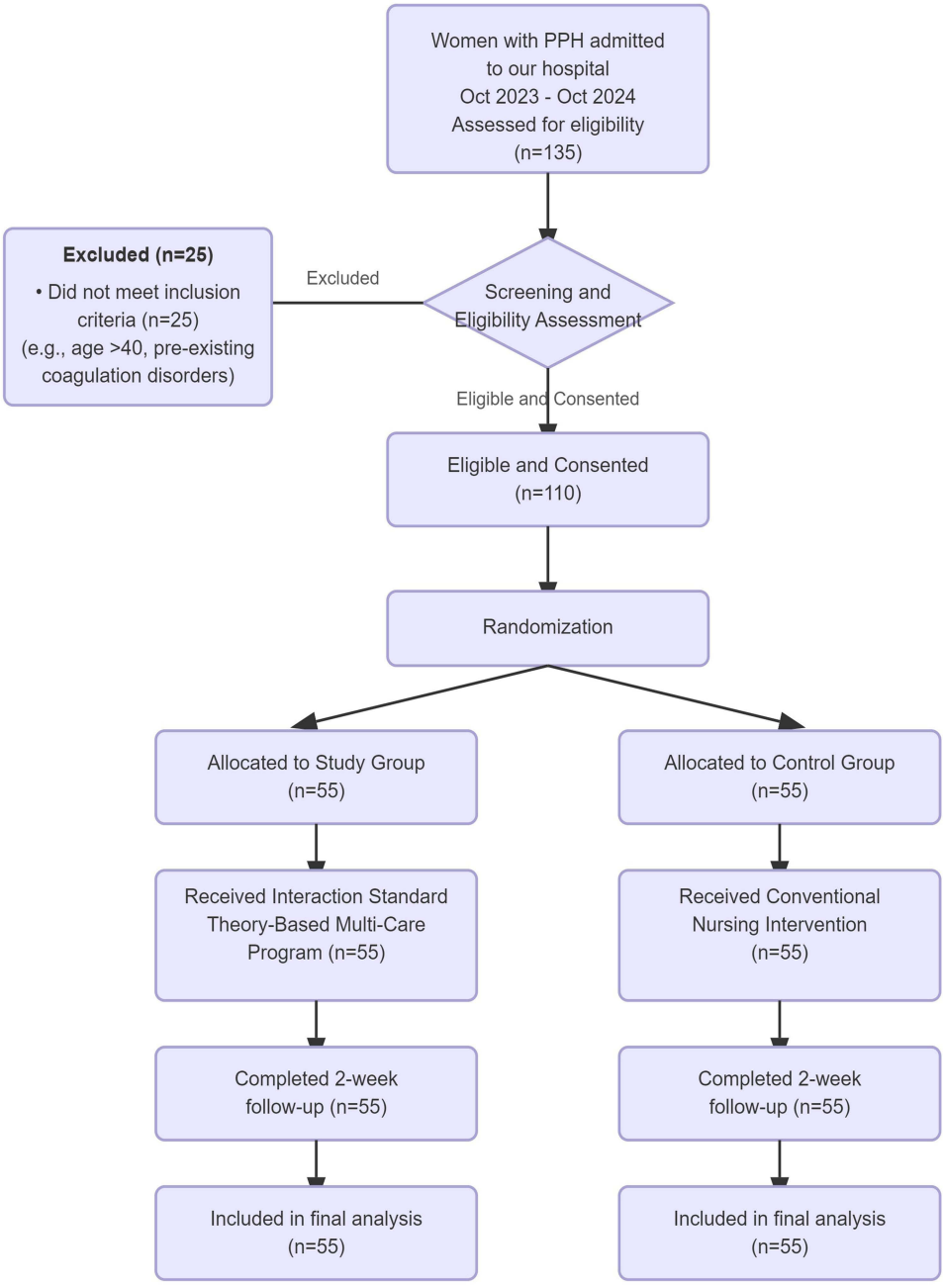

Figure 1 The study flow diagram.

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Inclusion Criteria

- Delivered in our hospital and received postpartum treatment, with a blood loss >500 mL within 24 hours after delivery;
- Age <40 years;
- Single live birth at full term;
- Stable vital signs;
- No pregnancy-related complications (other than PPH itself post-diagnosis);
- Clear cognitive function and self-awareness;
- Normal hearing and communication ability.

Exclusion Criteria

- Cervical laceration (as primary cause of PPH if not manageable by standard protocol and requiring extensive surgical repair beyond typical scope);
- Pre-existing severe cardiovascular diseases;
- Pre-existing severe renal, cardiac, or hepatic insufficiency;
- Known pre-existing coagulation disorders;
- Active systemic infectious diseases;
- Malignant tumors;
- Cellular immune function defects;
- Incomplete data or withdrawal from the study (prior to completion of the 2-week follow-up).

Methods

The control group received the standard conventional nursing interventions as per our hospital's established protocol for PPH management. After delivery, nurses carefully examined the soft birth canal, placenta, and other areas for abnormalities and monitored vital signs according to medical orders. In case of hypoxia, oxygen therapy was promptly administered, and blood transfusion was conducted based on thromboelastography results. Additionally, communication with the patient's family was maintained, and basic oral education regarding routine postpartum self-care was provided to ensure the patient's active cooperation.

In addition to conventional care, the study group received a nursing intervention based on the multi-care program. A detailed, standardized intervention manual was developed and used by the nursing staff in the study group to ensure fidelity in the delivery of all components of the multi-care program. To prevent intervention contamination, nurses who delivered the multi-care program to the study group did not provide care to patients in the control group, and vice-versa. Distinct nursing teams were assigned to each group. While nurses delivering the intervention were aware of group allocation due to the nature of the intervention, data collectors involved in outcome assessment were, where feasible, different individuals or trained to minimize bias, though complete blinding was challenging. The specific content was as follows:

Collective Training

The department's chief physician and head nurse provided collective training for all nursing staff assigned to the study group. The collective training comprised 10 hours of workshops, including theoretical instruction on King's Theory of Goal Attainment[10] and Satir's Model,[11] communication skills practice (eg, active listening, empathetic responding, non-verbal communication), and case simulations. The training covered postpartum hemorrhage causes, intervention techniques, nurse-patient interaction standards, objectives, significance, prevention of related complications, and precautions. The training content and intervention protocol were reviewed and validated by a panel of three senior obstetricians, a clinical psychologist, and two nursing education specialists for content accuracy, feasibility, and applicability before the study commenced. A pilot study involving 10 PPH patients (not included in the main trial) was conducted to refine the intervention delivery methods, assess patient acceptability, and ensure clarity of educational materials. After passing an assessment, the nursing staff began implementing the nurse-patient interaction standards.

Data Collection

Nurses conducted one-on-one communication with patients to understand the psychological state, family background, education level, and awareness/concern about the condition. This information was used to assess the overall physical and psychological status of the patient.

Care Plan Development

Based on the assessment results, patients were invited to participate in creating a multi-dimensional care plan, which considered the patient's specific condition and abilities. Each interactive session typically lasted between 30 and 45 minutes, tailored to the individual patient's needs and receptiveness. The following interventions were included:

- Hemorrhage Care: Nurses helped minimize postpartum hemorrhage by encouraging early breastfeeding to stimulate oxytocin release, promoting uterine contraction, and reducing blood loss. Nurses closely monitored and recorded the amount and characteristics of the bleeding. In case of excessive bleeding, immediate consultation with the attending physician was arranged. For women with poor uterine contraction, medications like Ximumu were administered to strengthen uterine contractions. Additionally, abdominal massage was provided to help expel blood clots from the uterus.
- Psychological Care: Nurses placed a high emphasis on psychological care, communicating with patients using empathetic listening and Satir's communication stances to assess potential emotional issues. For those with significant mood swings or distress, music therapy, deep breathing exercises, guided imagery, and other interventions were applied to stabilize emotions, enabling patients to cooperate with clinical care. Patients were encouraged to express their feelings and concerns in a supportive environment.
- Cognitive Intervention: Nurses provided education on the causes, treatments, and complications of postpartum hemorrhage through materials like pictures, health brochures, and videos. Information was presented clearly, and patients were encouraged to ask questions to ensure understanding. In cases of misperceptions, corrective guidance was given, and patients were encouraged with positive reinforcement, boosting their confidence in recovery.
- Dietary Care: A scientific and balanced dietary plan was designed in consultation with the patient to meet the nutritional needs of the patient and promote postpartum recovery. The diet emphasized high-calorie, high-protein foods and fresh fruits and vegetables rich in vitamins, while avoiding foods such as strong tea, coffee, and spicy or fried foods. The diet progressed from liquids to solid foods as the patient recovered.
- Rehabilitation Training: Nurses ensured the patient maintained proper warmth and adequate sleep. They used a combination of abdominal massage (clockwise) and gentle vaginal pressure to promote uterine contraction (15 minutes per session). When the patient's condition allowed, early ambulation was encouraged. Specific exercises, including squatting and pelvic movements, were gradually increased based on the patient's tolerance, with daily sessions as appropriate. As pain was managed, aerobic exercises like walking and leg lifting were added.

Implementation

During hospitalization, nurses utilized collective training, scenario simulations, and video demonstrations to enhance patients' disease understanding, nursing skills, and postnatal care techniques. Additionally, a WeChat group was created to provide continuous support and communication, ensuring patients had access to information after discharge.

Follow-Up

After discharge, nurses performed regular follow-ups via the WeChat group at 1 week and 2 weeks post-discharge to monitor patients' recovery. Follow-up results were documented, and additional guidance or corrections were provided for patients experiencing difficulties in recovery.

Observation Indicators

(1) Coping Styles: The Simplified Coping Style Questionnaire (SCSQ)[15] was used to assess the changes in positive coping (0–36 points) and negative coping (0–24 points) in both groups of women before intervention (1 day post-PPH event) and two weeks after intervention. The SCSQ, developed by Xie,[15] has demonstrated good reliability and validity in assessing coping styles among Chinese populations.[16] In the current study, Cronbach's alpha coefficients for the positive and negative coping subscales were 0.86 and 0.81, respectively, at baseline.

(2) Psychological Distress: The Hamilton Depression Rating Scale (HAMD)[17] was used to assess depression in both groups before and after intervention (1 day before discharge which corresponded to approximately 2 weeks post-intervention for most, or at the 2-week follow-up point if discharged earlier). The scale contains 17 items, with scores >24 indicating severe depression, 18–24 indicating moderate depression, and 7–17 indicating mild depression. The HAMD[17] is a widely used, clinician-rated scale with well-established validity and reliability for assessing the severity of depression. The Chinese version utilized has demonstrated good psychometric properties in previous research.[18] Inter-rater reliability for HAMD scores in this study, assessed on a randomly selected 10% of the sample by two independent raters, was high (Intraclass Correlation Coefficient [ICC] = 0.91). The Hamilton Anxiety Rating Scale (HAMA)[19] was used to assess anxiety. The scale consists of 14 items, each scored 0–4, with a total score of 56. Scores ≥29 suggest severe anxiety, ≥21 indicate definite anxiety, ≥14 indicate mild anxiety, and ≥7 indicate possible anxiety. The HAMA[19] is a standard clinician-rated instrument for measuring anxiety severity, with established validity and reliability. The Chinese version has also been validated.[20] In this study, the inter-rater reliability for HAMA scores, assessed similarly to the HAMD, was also high (ICC = 0.89).

(3) Postpartum Recovery: The following indicators of postpartum recovery were recorded: duration of lochia, onset time of lactation, time for the uterus to return to the pelvic cavity, and length of hospitalization.

(4) Quality of Life Score: The World Health Organization Quality of Life Brief Version (WHOQOL-BREF)[21] was used to assess quality of life before and two weeks after intervention. The scale consists of 26 items across four dimensions: Environment (6 items), Physical (6 items), Psychological (6 items), and Social Relations (8 items). Each item is scored from 0 to 5, with higher scores indicating better quality of life. The WHOQOL-BREF[21] is a cross-culturally validated instrument for assessing quality of life. The Chinese version of the WHOQOL-BREF has shown good psychometric properties, including reliability and validity, in various Chinese populations.[22] In this study, Cronbach's alpha for the total WHOQOL-BREF score at baseline was 0.89.

(5) Nursing Satisfaction: Nursing satisfaction was assessed using a locally adapted patient satisfaction questionnaire focusing on nursing care. This instrument was developed based on key domains from established patient satisfaction surveys, such as the Patient Satisfaction with Nursing Care Quality Questionnaire (PSNCQQ),[23] and tailored to the context of postpartum care in our hospital. It comprised 15 items rated on satisfaction, neutrality, or dissatisfaction across dimensions like communication, responsiveness, technical skill, and emotional support. The content validity was confirmed by a panel of senior nurses and obstetricians. For this study, the internal consistency (Cronbach's alpha) of the items contributing to the overall satisfaction rating was 0.82. The survey includes three levels of satisfaction: satisfied, neutral, and dissatisfied. The total nursing satisfaction rate is calculated as: Nursing Satisfaction Rate = (Number of satisfied + neutral patients)/Total number of patients × 100%, reflecting overall contentment with care.

Statistical Analysis

Data were processed using SPSS 21.0 statistical software. For normally distributed continuous data, results are presented as mean ± standard deviation ($\bar{x} \pm s$), and comparisons between groups were conducted using independent samples *t*-test for two-group comparisons or paired *t*-test for within-group pre-post comparisons if applicable (though primary comparisons were inter-group post-intervention). For non-normally distributed continuous data, results are presented as median (interquartile range) [M(P25, P75)], and group comparisons were made using the Mann–Whitney *U*-test. Categorical data are presented as frequency (percentage) [n(%)] and were compared using the chi-square test or Fisher's exact test. A p-value <0.05 was considered statistically significant.

Results

Comparison of General Information Between Groups

There were no significant differences between the two groups in terms of age, pre-pregnancy BMI, gestational weeks, obstetric history, or method of conception ($P > 0.05$). As shown in Table 1, both groups had similar demographic and clinical characteristics, confirming the comparability of the groups at baseline. Specifically, the study group had an average age of 30.64 ± 5.34 years, while the control group had an average age of 30.07 ± 5.01 years ($t = -0.577$, $P = 0.565$). Similarly, other parameters such as pre-pregnancy BMI, gestational age, obstetric history, method of conception, delivery mode, fetal number, gestational hypertension, and uterine inertia were comparable between the two groups ($P > 0.05$).

Comparison of Coping Styles Between Groups

Before the intervention (1 day prior), there were no significant differences between the two groups in negative or positive coping scores ($P > 0.05$). However, two weeks post-intervention, the study group showed significantly lower negative coping scores and higher positive coping scores compared to the control group, with notable differences ($P < 0.05$ for both). As detailed in Table 2, the study group's negative coping score dropped to 6.57 ± 2.13, significantly lower than the control group's 7.43 ± 2.24 ($t = 2.063$, $P = 0.042$). The study group's positive coping score increased to 22.19 ± 2.12, much higher than the control group's 16.93 ± 1.87 ($t = -13.799$, $P < 0.001$). This demonstrates the effectiveness of the intervention in improving coping strategies in the study group.

Table 1 Comparison of General Information Between Groups

Item	Study Group (n = 55)	Control Group (n = 55)	χ^2/t	P
Age (years)	30.64 ± 5.34	30.07 ± 5.01	−0.577	0.565
Pre-pregnancy BMI (kg/m²)	22.18 ± 3.16	22.01 ± 3.76	−0.256	0.798
Gestational Age (weeks)	39.26 ± 1.03	39.07 ± 1.09	−0.940	0.350
Obstetric History			0.940	0.332
- Multiparous	35	30		
- Primiparous	20	25		
Method of Conception			0.327	0.567
- Natural Conception	49	47		
- Assisted Reproductive Technology	6	8		
Delivery Mode			0.390	0.532
- Vaginal Delivery	37	40		
- Cesarean Section	18	15		
Fetal Number			1.310	0.252
- Singleton Pregnancy	50	46		
- Twin Pregnancy	5	9		
Gestational Hypertension	15	11	0.806	0.369
Uterine Inertia	8	5	0.785	0.376

Table 2 Comparison of Coping Styles Between Groups

Item	Time	Study Group (n = 55)	Control Group (n = 55)	t	P
Negative Coping	Pre-intervention (1d)	20.32 ± 3.23	19.87 ± 3.23	−1.542	0.126
	Post-intervention (2w)	6.57 ± 2.13	7.43 ± 2.24	2.063	0.042
Positive Coping	Pre-intervention (1d)	7.41 ± 2.03	7.49 ± 2.08	0.204	0.839
	Post-intervention (2w)	22.19 ± 2.12	16.93 ± 1.87	−13.799	<0.001

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Table 3 Comparison of Psychological Stress Between Groups

Item	Time	Study Group (n = 55)	Control Group (n = 55)	t	P
HAMD	Pre-intervention (1d)	23.23 ± 4.09	23.09 ± 3.97	−0.182	0.856
	Post-intervention (2w)	7.72 ± 1.02	8.76 ± 1.09	5.167	<0.001
HAMA	Pre-intervention (1d)	20.67 ± 3.23	20.45 ± 3.76	−0.329	0.743
	Post-intervention (2w)	9.72 ± 1.08	10.92 ± 1.13	5.693	<0.001

Comparison of Psychological Distress Between Groups

At baseline, there were no significant differences in the HAMD and HAMA scores between the two groups ($P > 0.05$). However, two weeks after the intervention, the study group had significantly lower HAMD and HAMA scores compared to the control group ($P < 0.05$ for both). Table 3 shows that the study group's HAMD score decreased to 7.72 ± 1.02, significantly lower than the control group's 8.76 ± 1.09 ($t = 5.167$, $P < 0.001$). Similarly, the HAMA score for the study group decreased to 9.72 ± 1.08, compared to 10.92 ± 1.13 in the control group ($t = 5.693$, $P < 0.001$). These results suggest that the intervention significantly reduced psychological distress, including both depression and anxiety, in the study group.

Comparison of Postpartum Recovery Between Groups

The study group showed significantly better postpartum recovery compared to the control group in terms of duration of lochia, lactation initiation time, uterine involution, and length of hospitalization. As shown in Table 4, the study group had a shorter duration of lochia (4.23 ± 1.21 days vs 5.87 ± 1.45 days, $t = 6.440$, $P < 0.001$), earlier lactation onset (14.28 ± 2.34 hours vs 15.76 ± 2.43 hours, $t = 3.254$, $P = 0.002$), quicker uterine involution (6.23 ± 1.28 days vs 7.93 ± 1.43 days, $t = 6.569$, $P < 0.001$), and a shorter hospitalization time (2.76 ± 0.67 days vs 4.03 ± 0.75 days, $t = 9.365$, $P < 0.001$). These findings indicate that the intervention significantly improved postpartum recovery outcomes.

Comparison of Quality of Life Scores Between Groups

There were no significant differences in quality of life scores between the two groups before the intervention ($P > 0.05$). However, two weeks after the intervention, the study group had significantly higher quality of life scores across all domains and in the total score compared to the control group ($P < 0.05$). As presented in Table 5, the study group's

Table 4 Comparison of Postpartum Recovery Between Groups

Item	Study Group (n = 55)	Control Group (n = 55)	t	P
Lochia Duration (days)	4.23 ± 1.21	5.87 ± 1.45	6.440	<0.001
Lactation Onset (hours)	14.28 ± 2.34	15.76 ± 2.43	3.254	0.002
Uterine Involution (days)	6.23 ± 1.28	7.93 ± 1.43	6.569	<0.001
Hospitalization Duration (days)	2.76 ± 0.67	4.03 ± 0.75	9.365	<0.001

Table 5 Comparison of Quality of Life Scores Between Groups

Item	Time	Study Group (n = 55)	Control Group (n = 55)	t	P
Environment	Pre-intervention (1d)	18.23 ± 2.32	18.76 ± 2.87	1.065	0.289
	Post-intervention (2w)	24.38 ± 2.18	22.18 ± 2.09	−5.402	<0.001
Physical	Pre-intervention (1d)	18.09 ± 2.43	18.16 ± 2.65	0.144	0.886

(*Continued*)

Table 5 (Continued).

Item	Time	Study Group (n = 55)	Control Group (n = 55)	t	P
	Post-intervention (2w)	24.87 ± 2.09	22.17 ± 2.16	−6.662	<0.001
Psychological	Pre-intervention (1d)	17.92 ± 2.61	18.02 ± 2.34	0.212	0.833
	Post-intervention (2w)	24.65 ± 2.65	23.01 ± 2.39	−3.408	<0.001
Social Relations	Pre-intervention (1d)	20.18 ± 3.28	20.63 ± 3.17	0.732	0.466
	Post-intervention (2w)	31.27 ± 3.07	28.09 ± 3.21	−5.310	<0.001
Total Score	Pre-intervention (1d)	74.42 ± 10.64	75.57 ± 11.03	0.556	0.579
	Post-intervention (2w)	105.17 ± 9.99	95.45 ± 9.85	−5.138	<0.001

Table 6 Comparison of Nursing Satisfaction Rates Between Groups

Item	Study Group (n = 55)	Control Group (n = 55)	χ^2	P
Satisfied	47 (85.5%)	23 (41.8%)	6.346	0.012
Neutral	8 (14.5%)	26 (47.3%)		
Dissatisfied	0 (0%)	6 (10.9%)		
Total Satisfaction Rate	100%	89.09%		0.012

overall quality of life score increased to 105.17 ± 9.99, compared to 95.45 ± 9.85 in the control group ($t = -5.138$, $P < 0.001$). Specifically, the study group scored higher in the environment, physical, psychological, and social relationship domains, reflecting an overall improvement in quality of life.

Comparison of Nursing Satisfaction Rates Between Groups

The study group had a significantly higher nursing satisfaction rate compared to the control group ($P < 0.05$). As shown in Table 6, the proportion of patients who were satisfied or neutral was higher in the study group (55/55, 100%) compared to the control group (49/55, 89.09%). Specifically, 47 (85.5%) patients in the study group were 'satisfied' compared to 23 (41.8%) in the control group. The overall satisfaction rate (satisfied + neutral) was 100% in the study group versus 89.09% in the control group ($\chi^2 = 6.346$, $P = 0.012$, when comparing the distribution across satisfied/neutral/dissatisfied categories, or comparing (satisfied+neutral) vs dissatisfied). This difference highlights the positive impact of the intervention on nursing satisfaction.

Discussion

The interaction standard theory-based multi-care program demonstrated significant clinical benefits in this study. This model, led by senior obstetric staff, involves comprehensive training for nursing personnel and emphasizes collaborative care planning based on individual patient assessment, encompassing hemostatic, psychological, cognitive, and dietary interventions. This approach aims to increase the patient's confidence in treatment and promote recovery. Ouyang et al[24] reported that high-quality nursing care significantly improves the quality of life for patients with gestational hypertension and postpartum hemorrhage, reduces negative emotions, and enhances patient satisfaction. Xia et al[25] found that effective nursing interventions significantly improve nursing management outcomes for postpartum hemorrhage patients and are worth promoting. Recent studies also indicated that effective nursing interventions have high value for postpartum hemorrhage patients.[26,27]

The results of this study show that, two weeks after the intervention, the study group scored significantly lower on negative coping and significantly higher on positive coping compared to the control group ($P < 0.05$). This suggests that the multi-care program can effectively improve the coping mechanisms of postpartum hemorrhage patients. This may be because, during the implementation of this model, nursing staff provide detailed health information to the

patients, improving their understanding of postpartum hemorrhage and helping them face the condition more effectively. The significant improvement in psychological outcomes, evidenced by lower HAMD and HAMA scores, likely contributed to better medical outcomes. Psychological well-being is increasingly recognized as a key factor in physical recovery.[28] Elevated stress, anxiety, and depression can exert negative physiological effects, for example, by impairing immune function, delaying wound healing, and disrupting sleep patterns, all of which can impede postpartum recovery.[29] Conversely, effective psychological support can mitigate these adverse effects. By addressing psychological distress through empathetic communication, emotional support, and cognitive interventions, the multi-care program may have fostered a more favorable physiological environment for healing. For instance, reduced anxiety can contribute to better sleep quality and potentially modulate stress hormone levels (eg, cortisol), which are conducive to physical healing and may positively influence processes like earlier lactation onset.[30] Furthermore, patients who feel psychologically supported and empowered with better coping skills are more likely to actively participate in their recovery. This includes better adherence to dietary recommendations, engagement in early ambulation, and other self-care behaviors, which directly influence outcomes such as uterine involution and the overall length of hospital stay. Another study further indicated that effective nursing interventions can reduce blood loss and improve psychological conditions such as depression, anxiety, and fear.[31] Prokofieva et al[32] emphasized that effective nursing interventions shorten recovery time, improve psychological state, reduce hemostasis and hospitalization times, and increase quality of life and overall nursing satisfaction. In our study, after two weeks, the study group had significantly lower HAMD and HAMA scores than the control group ($P < 0.05$), suggesting that the multi-care program can effectively reduce the HAMD and HAMA scores of postpartum hemorrhage patients and improve their psychological state. This may be attributed to the model's focus on psychological care during implementation, which provides timely communication and emotional support for the patients.

Xu et al[33] showed that effective nursing interventions could improve the psychological condition of women undergoing cesarean sections and facilitate their physical recovery. Ouyang et al[24] found that implementing effective nursing interventions for postpartum hemorrhage patients significantly reduced blood loss and promoted postpartum recovery. Our study indicated that the study group had shorter lochia duration, earlier lactation onset, faster uterine involution, and shorter hospitalization time compared to the control group ($P < 0.05$). This suggests that the multi-dimensional care model can effectively shorten the recovery time of postpartum hemorrhage patients. This could be due to the model's emphasis on nutritional guidance and rehabilitation interventions, which provide the necessary nutrients to support lactation and promote uterine recovery.

Jiang et al[34] found that effective nursing interventions could improve postpartum depression and quality of life, while Tan et al[35] reported that such interventions accelerated recovery and reduced the risk of complications. In our study, the study group had significantly better quality of life than the control group after two weeks ($P < 0.05$), suggesting that the multi-dimensional care model can effectively enhance the quality of life of postpartum hemorrhage patients. This may be because the model consistently prioritizes the psychological state of patients, which encourages cooperation with nursing staff, enhances patients' confidence in overcoming their condition, and promotes overall health.

Luo et al[36] concluded that effective nursing interventions could significantly improve patient satisfaction. Our study found that the study group had significantly higher nursing satisfaction rates than the control group ($P < 0.05$), suggesting that the multi-care program can improve nursing satisfaction. This improvement may result from psychological and dietary interventions that stabilize the patient's psychological state, improve care outcomes, and promote harmonious nurse-patient relationships, ultimately increasing patient satisfaction.

This study has several strengths, including its randomized controlled design, comprehensive intervention, and the use of validated outcome measures. The conducted a priori power analysis also confirmed the adequacy of the sample size for detecting meaningful effects in the primary outcome. However, certain limitations should be acknowledged. First, this was a single-center study, which may limit the generalizability of the findings. Second, the study did not systematically collect data on or control for potential confounding variables such as detailed socioeconomic status, the extent and nature of individual social support systems, or parity (beyond categorizing as primiparous/multiparous in baseline characteristics). These factors could influence postpartum recovery and psychological well-being, and their unmeasured influence represents a limitation. Future studies should aim to prospectively collect and control for these variables to provide

a more nuanced understanding of intervention effects. Third, the follow-up period was relatively short (two weeks); longer-term effects remain unknown. Finally, while data collectors were trained, complete blinding of outcome assessment was challenging given the nature of the nursing intervention, which could introduce some measurement bias.

Future research should aim to replicate these findings in multicenter trials with more diverse populations and longer follow-up periods. Investigating the specific components of the multi-care model that are most effective could help refine the intervention. Cost-effectiveness analyses would also provide valuable information.

In summary, the interaction standard theory-based multi-dimensional care model investigated in this study can significantly enhance the coping abilities, reduce psychological distress (as indicated by HAMD and HAMA scores), improve physical recovery (lochia duration, lactation onset, uterine involution, hospitalization duration), enhance quality of life, and increase nursing satisfaction of postpartum hemorrhage patients. These findings demonstrate the considerable clinical value of this nursing model in improving patient outcomes and facilitating a more holistic recovery.

Conclusion

The interaction standard theory-based multi-care program effectively promotes holistic postpartum recovery, enhances adaptive coping mechanisms, reduces psychological distress, and improves the quality of life in women who have experienced postpartum hemorrhage. This patient-centered nursing approach demonstrates significant clinical value and warrants consideration for broader implementation in postpartum care settings to improve maternal outcomes.

Data Sharing Statement

Data is provided within the manuscript files and its associated tables. Further anonymized data may be available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

The study was approved by the Ethics Committee of Shijiazhuang Obstetrics and Gynecology Hospital (NO.2023-SOG -23). All patients and their families participated voluntarily and signed informed consent forms, and the study was performed in accordance with the Helsinki II declaration. Informed consent was obtained from all the study subjects before enrollment. All participants were provided with a detailed explanation of the study's purpose, procedures, potential risks and benefits, their right to withdraw at any stage without affecting their standard medical care, and the measures taken to ensure the confidentiality of their personal data.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests in this work.

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