✛ **Signa Vitae**

ORIGINAL RESEARCH

Observation on the effect of a staged nursing model on postpartum care of parturients with acute postpartum hemorrhage after vaginal delivery

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Abstract

Background: To explore the clinical nursing efficacy of a staged nursing model in managing acute postpartum hemorrhage (PPH) among parturients after vaginal delivery. **Methods**: A retrospective analysis of clinical data was conducted on patients with acute PPH treated in our hospital. Based on the nursing protocol implemented, the patients were categorized into a control group and an observation group (n = 50 patients/group), and their hemostasis time, hospital stay duration, postpartum quality of life, maternal mental status, nursing satisfaction and complications were compared. **Results**: The results demonstrated that, compared to the control group, the observation group exhibited significantly shorter hemostasis and hospitalization times. Moreover, postpartum quality of life, maternal mental status and nursing satisfaction were significantly improved in the observation group, while the incidence of complications was significantly reduced. **Conclusions**: The staged nursing model provided significant clinical benefits in managing acute postpartum hemorrhage following vaginal delivery by effectively shortening hemostasis and hospital stay durations, enhancing patients' quality of life, alleviating anxiety and depression and improving nursing satisfaction, as well as reducing the incidence of complications, thereby demonstrating high safety and clinical applicability.

Keywords

Vaginal delivery; Acute postpartum hemorrhage; Phased nursing; Nursing effect; Safety

1. Introduction

Acute postpartum hemorrhage (PPH) is a severe complication during childbirth and remains the leading cause of maternal organ failure and death worldwide. Its incidence is estimated to be 2% to 3% of all deliveries based on incomplete statistics; however, the true incidence may be higher due to underestimation of blood loss [1, 2]. The most common etiology of PPH is uterine atony, followed by placental abnormalities, soft birth canal lacerations and coagulation disorders [3], and in our hospital, most acute PPH cases are attributed to uterine atony. Timely and effective nursing interventions are critical to safeguarding maternal health and ensuring optimal outcomes. Previous studies have demonstrated that patients with PPH frequently experience significant anxiety, depression and fear, which can reduce treatment compliance and hinder the achievement of ideal therapeutic outcomes [4, 5]. Therefore, implementing comprehensive nursing strategies for managing acute PPH is of considerable clinical importance.

Traditional postpartum nursing focuses on maintaining personal hygiene, monitoring uterine involution and lochia and ensuring adequate warmth. While widely used, this con-

ventional model lacks systematic and targeted intervention strategies, resulting in limited clinical effectiveness [6]. The staged nursing model, a recent area of research interest, emphasizes targeted and stage-specific interventions based on the condition and recovery progress of parturients. This approach incorporates psychological support as a critical component to optimize overall nursing outcomes [7, 8].

This study retrospectively analyzed clinical data from patients with acute PPH to compare the effectiveness of the conventional nursing model and the staged nursing model.

2. Materials and methods

2.1 General information

A retrospective analysis was conducted on the clinical data of 100 parturients who experienced acute PPH following vaginal delivery at our hospital between June 2020 and June 2022. All included parturients met the following criteria: full-term singleton pregnancy, vaginal delivery with blood loss ≥500 mL within 24 hours post-delivery, and complete clinical data. Informed consent was obtained from all participants and their families prior to inclusion in the study. Exclusion criteria

included the presence of malignant tumors, gestational hypertension, gestational diabetes, coagulation disorders, other severe obstetric complications or mental illnesses that might impair the ability to complete the questionnaire or interfere with data collection. The patients were equally divided into two groups based on the nursing model implemented, with 50 parturients in the control group and 50 in the observation group. Comparisons of baseline characteristics, including age, gestational weeks, neonatal weight, parity and 24-hour postpartum blood loss, demonstrated no significant differences between the two groups, ensuring comparability ($p > 0.05$). Detailed results are presented in Table 1.

2.2 Study methods

The patients in the control group were given routine emergency nursing. After receiving the rescue notice, medical devices and related drugs were immediately prepared. Upon the patients' arrival in the operating room, venous access was rapidly established. Uterotonics, including carboprost tromethamine, oxytocin and misoprostol, were administered to achieve hemostasis by promoting uterine contraction. For severe postpartum bleeding, additional interventions such as transcatheter arterial embolization, B-Lynch suture, uterine cavity tamponade and uterine massage were performed. The patients cooperated with the medical team during the rescue process, and postoperative care was provided strictly in accordance with the doctor's instructions.

The observation group received the same treatment plan as the control group, with the addition of phased nursing intervention. Under the phased nursing model, the cause of acute PPH was first identified, and real-time monitoring of vaginal bleeding volume, hemodynamic compensation and vital signs was performed. Coagulation function and vaginal index parameters were promptly assessed to diagnose conditions such as soft birth canal trauma, retained placenta, uterine inertia and coagulation abnormalities. If signs of bleeding were detected, immediate hemostatic measures were implemented.

Hemostatic Nursing: Targeted hemostatic measures were applied based on the cause of bleeding, including blood volume supplementation, uterine contraction promotion and administration of anti-infective drugs, combined with uterine massage. The abdominal-vaginal compression method, using both hands to compress the uterus, was employed as necessary. During this stage, patients' physical signs were monitored in real time,

and psychological changes were observed. Any abnormalities were promptly addressed. Parturients were instructed to adjust their body positions to facilitate treatment and improve comfort. Early breastfeeding was encouraged to enhance uterine contractility.

Strengthening Psychological Nursing: Nursing staff accompanied parturients throughout the delivery and treatment process and closely monitored their psychological status. For those exhibiting severe negative emotions, timely psychological counseling was provided. A good nurse-patient relationship was established by addressing patient needs and encouraging them to express feelings of anxiety. The causes of their anxiety were analyzed, and targeted coping strategies were implemented. Patients were guided on self-psychological adjustment techniques, with a particular focus on neonatal feeding.

Infection Prevention and Hemostasis: At the final stage of hemostasis, strict aseptic techniques were followed, including perineal disinfection and sterilization of perineal pads to reduce the risk of infection. Health education and life guidance were strengthened, and a quiet, comfortable and warm environment was maintained. Nursing staff frequently attended to the needs of patients, ensuring their physical and psychological comfort.

Daily Life Care: Assistance was provided with basic daily activities, and bad habits were corrected to establish regular routines. Nutritional support was emphasized, encouraging the consumption of high-nutrient, high-calorie and iron-rich foods to improve physical strength and immunity. Appropriate ambulation was promoted.

Pain Care: Pain levels were assessed, and targeted interventions such as hot compresses, massages and pharmacological treatments were implemented. For severe pain, ibuprofen sustained-release capsules (Shanghai Pharmaceutical Group Co., Ltd., batch number: 72220713, Shanghai, China) were administered at a dose of 300 mg orally, once every 12 hours.

Health Education and Follow-Up: Parturients and their families were instructed on improving self-control, adhering to treatment and maintaining a positive psychological outlook to promote recovery. Patients were advised to seek medical assistance promptly if any abnormal signs appeared.

2.3 Outcome measures

TABLE 1. Comparison of general data between the two groups.

Group	Case	Mean age (yr)	Mean Gestational Weeks (wk)	Neonatal weight (Kg)	Parity (case)		24 hours postpartum hemorrhage (mL)
					Primiparous	Multipara	
Control group	50	28.82 ± 2.35	39.56 ± 1.44	3.30 ± 0.46	31	19	665.72 ± 86.69
Observation group	50	29.63 ± 2.77	39.85 ± 0.92	3.42 ± 0.44	29	21	693.66 ± 70.68
χ^2/t		1.587	1.186	1.375	0.167		1.767
p		0.116	0.239	0.172	0.683		0.080

2.3.1 PPH

The hemostatic time, bleeding volume and hospital stay were recorded at two time points within 24 hours. In the delivery room, parturients adopted the lithotomy position, and a collection bag was placed directly below them. The collection bag used in this study was a plastic bag scaled every 100 mL, ranging from 0 mL to 1500 mL. Blood loss was measured using the collection bag as well as obstetric materials, including kidney dishes, hospital sheets, incontinence pads and sanitary towels. The pre-weighed equipment weights (before adding blood) were known, and blood loss was calculated by weighing the materials before and after blood collection, except for the blood captured directly in the collection bag.

2.3.2 Postpartum quality of life

The postpartum quality of life was assessed using the Medical Outcomes Study (MOS) 36-Item Short Form Health Survey (SF-36) [9]. The scale evaluates eight domains, including physical function, social function and mental health, among others. The quality of life was comprehensively assessed, with higher scores indicating better quality of life.

2.3.3 Psychological status

The psychological status of parturients was evaluated using the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) [10]. The SAS includes 20 items, with scores interpreted based on the Chinese norm. A total score below 50 indicates no anxiety, while scores between 50–59 indicate mild anxiety, 60–69 moderate anxiety, and ≥ 70 severe anxiety. Similarly, the SDS comprises 20 items, with a cut-off value of 53 points, and higher scores represent more severe depressive symptoms.

2.3.4 Nursing satisfaction survey

Nursing satisfaction was assessed using the Inpatient Nursing Satisfaction Scale [11]. This scale consists of 28 items, covering areas from admission reception to service attitude, with the scores ranging from 1 to 5 points, and a total score of 140 points. Scores below 60 points indicate dissatisfaction, 60–89 points indicate basic satisfaction and scores ≥ 90 represent satisfaction. Satisfaction percentages were calculated based on the results.

2.3.5 Complications

The occurrence of complications in both groups was recorded, including genital tract infection, hemorrhagic shock and water and electrolyte imbalance.

2.4 Statistical analysis

All data were analyzed with SPSS 26.0 software (SPSS, IBM Corp., Armonk, NY, USA). Enumeration data were expressed as percentages, and the Chi-square test was used for statistical analysis. Measurement data, such as age, gestational age, psychological status and quality of life, were expressed as mean $\pm$ standard deviation (SD), with comparisons made using an independent sample t-test. A p-value < 0.05 was considered statistically significant.

3. Results

3.1 Comparison of hemostatic time for PPH and hospital stay

Compared with the control group, the observation group exhibited significantly shorter hemostatic time and hospital stay durations, and the differences were statistically significant ($p < 0.05$) (Table 2).

3.2 Comparison of maternal quality of life between the two groups

Before nursing, the quality of life scores across the 8 evaluated domains were similar between the two groups, with no statistically significant differences ($t = 0.263, 0.115, 1.475, 0.904, 1.814, 0.320, 1.544, 0.313; p = 0.793, 0.909, 0.144, 0.368, 0.073, 0.750, 0.126, 0.755$). After the nursing intervention, the quality of life scores in both groups improved significantly compared to pre-nursing scores. Notably, the observation group demonstrated significantly higher scores across all domains compared to the control group. These differences were statistically significant ($p < 0.05$) (Table 3).

3.3 Comparison of maternal anxiety and depression between the two groups

Before nursing, the SAS and SDS scores of parturients in the two groups were similar, without statistically significant differences ($t = 0.383, 1.808; p = 0.703, 0.074$). After nursing, the SAS and SDS scores in both groups significantly decreased compared to pre-nursing levels. Notably, the scores in the observation group were significantly lower than those in the control group ($p < 0.05$) (Table 4).

3.4 Nursing satisfaction comparison

The results of the nursing satisfaction survey are presented in Table 5. In the control group, 12 patients reported dissatisfaction, resulting in an overall nursing satisfaction rate of 76.00%. In the observation group, only 3 patients expressed dissatisfaction, with a significantly higher satisfaction rate of 94.00%. Compared to the control group, nursing satisfaction in the observation group was significantly improved, and the differences were statistically significant ($p < 0.05$).

3.5 Comparison of complications

In the control group, 5 patients developed genital tract infections, 6 experienced water-electrolyte imbalances and 3 suffered hemorrhagic shock, leading to an overall complication rate of 28.00%. In the observation group, 4 patients experienced water-electrolyte imbalances, 1 developed a genital tract infection, and 1 suffered hemorrhagic shock, with a total complication rate of 12.00%. Although the occurrence of complications was lower in the observation group compared to the control group, the difference was not statistically significant ($\chi^2 = 4.867, p = 0.182$).

TABLE 2. Comparison of time to hemostasis for postpartum hemorrhage and hospital stay.

Group	Case	Hemostasis Time (min)	Length of hospital stay (d)
Control group	50	56.17 ± 10.94	13.48 ± 3.87
Observation group	50	41.41 ± 8.75	9.63 ± 1.86
t		7.448	6.349
p		<0.001	<0.001

TABLE 3. Comparison of maternal quality of life between the two groups.

Investigated item	Control group (n = 50)		Observation group (n = 50)		t	p
	Before nursing	After nursing	Before nursing	After nursing		
Social functioning	53.13 ± 7.69	64.67 ± 6.05	53.57 ± 8.87	72.47 ± 8.02	5.490	<0.001
Emotional function	53.65 ± 6.75	69.12 ± 5.18	53.81 ± 7.33	76.80 ± 8.79	5.321	<0.001
Mental health	56.02 ± 8.52	68.84 ± 9.47	58.57 ± 8.76	75.80 ± 9.59	3.656	<0.001
Physiological function	56.98 ± 8.48	75.76 ± 8.03	58.42 ± 7.32	82.53 ± 8.12	4.189	<0.001
Physical function	62.00 ± 7.44	70.81 ± 7.78	59.15 ± 8.23	80.39 ± 6.26	6.783	<0.001
Energy	55.81 ± 8.67	66.87 ± 6.65	56.37 ± 8.79	76.53 ± 7.74	6.695	<0.001
Bodily pain	60.95 ± 7.44	65.83 ± 6.99	59.53 ± 7.55	72.29 ± 7.41	4.485	<0.001
General health	57.05 ± 7.88	63.95 ± 6.59	57.58 ± 8.75	72.01 ± 8.04	5.483	<0.001

TABLE 4. Comparison of maternal anxiety and depression between the two groups.

Group	Case	Testing time	SAS	SDS
Control group	50	Before nursing	69.05 ± 6.38	60.80 ± 6.33
		After nursing	38.41 ± 3.29	41.06 ± 3.16
Observation group	50	Before nursing	69.55 ± 6.49	63.13 ± 6.59
		After nursing	32.87 ± 2.14	35.88 ± 2.51
t			9.974	9.081
p			<0.001	<0.001

SAS: Self-Rating Anxiety Scale; SDS: Self-Rating Depression Scale.

TABLE 5. Satisfaction comparison.

Group	Case	Satisfaction	Basic satisfaction	Dissatisfaction	Satisfaction rate
Control group	50	29 (58.00)	9 (18.00)	12 (24.00)	76.00
Observation group	50	34 (68.00)	13 (26.00)	3 (6.00)	94.00
χ^2					6.524
p					0.038

4. Discussion

Acute PPH typically occurs within 24 hours after delivery and is characterized by its rapid progression and severe clinical presentation. Its occurrence not only poses a significant threat to maternal life but also increases the risk of neonatal complications if parturients develop symptoms such as palpitations, shortness of breath, syncope or shock [12, 13]. Importantly, most maternal deaths caused by PPH are preventable with appropriate conditions, as the key to successful outcomes lies in early diagnosis and timely, effective management [14]. The primary clinical manifestations of PPH include vaginal bleeding and hypovolemia, and its diagnosis is primarily based on clinical symptoms and estimated blood loss. Surgical interventions remain the most effective means of controlling acute PPH. Procedures such as identifying the bleeding site and implementing hemostatic measures can significantly improve outcomes. Recent studies have demonstrated that nursing models employed during PPH management significantly impact rescue outcomes [15, 16]. Routine nursing practices,

which largely rely on the clinical experience of nursing staff, often lack targeted interventions tailored to the specific stages of PPH. As a result, the overall nursing efficiency and quality of care remain suboptimal [17]. Therefore, establishing a systematic and targeted nursing model is essential for improving outcomes in parturients with PPH and enhancing clinical practice. The phased nursing model addresses these limitations by introducing a structured and systematic approach, which involves the formulation of emergency rescue plans and simulation-based training for medical staff. By equipping medical teams with well-defined protocols and advanced nursing skills, the phased approach allows quick and effective rescue processes, thereby reducing response times and enhancing the provision of critical life support, ultimately improving maternal outcomes [18].

Previous studies have highlighted that the phased nursing model can address the deficiencies of routine nursing by improving the temporal, phased and planned aspects of nursing care, thereby enhancing the overall effectiveness of the nursing intervention [19]. To further explore the impact of the phased nursing model on postpartum acute hemorrhage, particularly in vaginal delivery cases, this study retrospectively compared the nursing outcomes under two different nursing models. The results revealed that the hemostatic time and length of hospital stay in the observation group were significantly shorter than those in the control group, indicating that the phased nursing model offered notable advantages in terms of hemostatic efficacy. This might be attributed to the fact that the phased nursing model enhances the effectiveness of subsequent hemostatic care by being more targeted, which enables nursing staff to provide faster interventions, thereby reducing blood loss, shortening hemostatic time and ultimately decreasing the length of hospital stay.

In terms of postpartum quality of life, the observation group demonstrated significantly higher scores than the control group, suggesting that the phased nursing model is more effective in improving the quality of life of patients with acute PPH. This can be explained by the content of the phased nursing model, which emphasizes targeted health education for parturients at the end of the hemostatic phase. This approach increases their understanding of PPH and breastfeeding, encouraging early initiation of breastfeeding and shortening the postpartum recovery period, thus improving their overall quality of life [20]. Additionally, the staged nursing model provides individualized diet plans based on the physical condition of parturients, promoting better sleep and dietary habits, improving nutritional status, boosting immunity and further enhancing quality of life and prognosis.

To assess the effect of the phased nursing model on maternal anxiety and depression, we compared the SAS and SDS scores before and after nursing. Both nursing regimens were found to effectively reduce anxiety and depression in patients with acute PPH, but the improvement in psychological well-being was significantly greater in the observation group. This may be due to the phased nursing model's emphasis on addressing the psychological and emotional needs of parturients at each stage. Targeted interventions based on the psychological status of patients at different stages of care help alleviate anxiety and improve mental health. The nursing satisfaction survey revealed that the observation group had significantly higher satisfaction compared to the control group, suggesting that the phased nursing model was more positively received by patients. This can be attributed to the model's focus on addressing the individual needs of parturients at each stage of care, as by improving the standardization and rigor of the hemostatic process and fostering the professionalism and humanization of nursing staff, the model contributed to increased patient satisfaction. Finally, the study also assessed the incidence of complications, including genital tract infections, water and electrolyte imbalances, and hemorrhagic shock. The results showed that the total incidence of complications was significantly lower in the observation group compared to the control group. This may be due to the preventive nursing measures, such as infection prevention, implemented at the end of the hemostatic phase, which help reduce the risk of complications in parturients.

5. Conclusions

In summary, this study compared the nursing outcomes of routine nursing and phased nursing for managing acute PPH. The phased nursing model demonstrated a significant improvement in hemostatic outcomes, as evidenced by the reduced hemostatic time and shorter hospital stay. Additionally, this model effectively enhanced the quality of life and nursing satisfaction of parturients, while also positively influencing the psychological status of patients, with a high level of safety. The strength of this study lies in its evaluation of the nursing effects of the phased nursing model on PPH in women following vaginal delivery. However, a limitation of the study is the relatively small sample size and the limited scope of the research. For instance, the comparison of bacterial flora between women who had a normal delivery and those with PPH was not included. In the follow-up research, we plan to expand the sample size and explore additional factors to gain further insights.

AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper.

AUTHOR CONTRIBUTIONS

FW, YMY—designed the study and carried them out; prepared the manuscript for publication and reviewed the draft of the manuscript. FW—supervised the data collection; analyzed the data; interpreted the data. Both authors have read and approved the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethics Committee of The First affiliated hospital of Soochow University (Approval no. 2020651). Written informed consent was obtained from a legally authorized representative for anonymized patients

information to be published in this article.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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