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Obstetric Nursing Intervention Models for Hypertensive Disorders of Pregnancy and Their Effect Evaluation

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Abstract: This study evaluated the effectiveness of different obstetric nursing intervention models for Hypertensive Disorders of Pregnancy (HDP). A total of 120 pregnant women with HDP were randomly assigned to a predictive (anticipatory) intervention group, a comprehensive intervention group, or a control group receiving routine care (n=40 per group). Outcomes included delivery mode, anxiety/depression scores (SAS/SDS), and adverse maternal/neonatal outcomes. The predictive intervention group demonstrated a significantly higher vaginal delivery rate (75.00%) than both the comprehensive (65.00%) and control (47.50%) groups (P<0.05). Both intervention groups showed significantly lower pre-delivery SAS and SDS scores compared to the control group (P<0.05), with no significant difference between the two intervention groups. The incidences of adverse maternal (7.50%) and neonatal (5.00%) outcomes were lowest in the predictive group, followed by the comprehensive group. In conclusion, compared to routine care, both nursing models improve psychological outcomes, but the predictive intervention model appears more effective in optimizing delivery mode and reducing clinical complications.

Keywords: Hypertensive diseases in pregnancy; Nursing intervention model; Maternal and infant outcome

Introduction

Hypertensive disorders of pregnancy (HDP) are common conditions that occur in the mid-to-late stages of gestation, accounting for approximately 5%–10% of all pregnancy-related diseases [1,2]. Beginning around 20 weeks of gestation, patients with HDP may progressively develop symptoms such as elevated blood pressure, proteinuria, edema, headache, nausea, and vomiting, all of which can adversely affect both maternal and fetal health. Without timely management, severe HDP may lead to complications including pulmonary edema and heart failure, and may even result in maternal mortality. Fetuses and newborns are also at increased risk of preterm birth, stillbirth, and asphyxia, making HDP one of the leading causes of maternal and neonatal death in obstetrics [3,4]. In addition to symptomatic treatment, effective nursing interventions are widely acknowledged as essential for improving maternal and neonatal outcomes and reducing the incidence of complications. While various nursing models, from routine to comprehensive care, are applied in practice, there is a paucity of comparative research evaluating their relative effectiveness. In particular, the predictive (anticipatory) intervention model, which emphasizes proactive assessment and individualized preventive strategies, has not been systematically compared against standard comprehensive interventions. Therefore, this study aims to evaluate and compare the effectiveness of a predictive obstetric nursing intervention model against a comprehensive model and routine care, to explore the most appropriate intervention strategies for HDP management.

1 Materials and Methods

1.1 General Information

This study was approved by the hospital's Medical Ethics Committee. A total of 120 pregnant women diagnosed with HDP and admitted to the hospital from February 2023 to January 2024 were enrolled. Using a random number table method, they were divided into three groups, with 40 participants in each group.

The predictive (anticipatory) intervention group had a mean age of 29.19 ± 3.83 years; the mean gestational age at delivery was 37.04 ± 1.47 weeks; and the distribution of mild, moderate, and severe HDP was 15, 19, and 6 cases, respectively.

The control group had a mean age of 28.63 ± 2.59 years; the mean gestational age at delivery was 37.66 ± 1.24 weeks; and the distribution of mild, moderate, and severe HDP was 18, 17, and 5 cases.

The comprehensive intervention group had a mean age of 28.78 ± 2.07 years; the mean gestational age at delivery was 37.19 ± 1.39 weeks; with 16, 18, and 6 cases of mild, moderate, and severe HDP, respectively.

There were no statistically significant differences among the three groups in mean age, gestational age at delivery, or the distribution of HDP severity (P > 0.05).

Inclusion criteria:

① Gestational age of 28–30 weeks;

② Singleton pregnancy.

Exclusion criteria:

① Presence of other pregnancy-related complications such as gestational diabetes;

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② Severe psychiatric disorders or cognitive impairments that could hinder cooperation with interventions.

1.2 Methods

Intervention Protocols

Participants in each group received distinct nursing care models, as outlined below. All interventions were delivered by a dedicated team of 5 senior obstetric nurses who received a standardized 8-hour training session on the study protocols prior to participant enrollment. Training covered the specific procedures for each group, with emphasis on standardization for the comprehensive and predictive intervention protocols.

1.2.1 Control Group: Routine Nursing Care

Participants received standard institutional care for HDP, which was reactive and monitoring-focused.

- Monitoring Schedule: Followed a standard outpatient schedule: examinations every two weeks post-enrollment, increasing to weekly after 36 weeks of gestation.
- Clinical Assessment: At each visit, a nurse measured and recorded blood pressure, checked for edema, and reviewed results from routine urinalysis (protein). A brief medical history update was taken.
- Patient Instructions: Patients were given generic verbal instructions to take prescribed medications as directed and to monitor their blood pressure at home if a device was available. No structured education, psychological support, or individualized lifestyle planning was provided.

1.2.2 Comprehensive Intervention Group: Structured Education and Support

This group received routine care plus a structured package of supportive interventions.

Schedule & Education: Participants attended a dedicated, weekly antenatal outpatient visit. During the first visit, they attended a 60-minute standardized health education session in groups of 4-6, led by a trained nurse. The session covered HDP pathophysiology, risks, the importance of medication adherence, and warning signs (severe headache, visual disturbances, epigastric pain). This was supplemented with a take-home pamphlet.

Lifestyle & Psychological Guidance:

- Dietary Guidance: A certified nutritionist provided one 30-minute individual dietary consultation based on a 24-hour recall, offering standardized advice to reduce sodium intake (<5g/day) and increase potassium-rich foods.
- Psychological Intervention: During weekly visits, a nurse used active listening and provided general reassurance. For participants scoring above 50 on the SAS or SDS at enrollment, a referral to the hospital's counseling service was offered.
- Rest Guidance: Standard verbal advice was given to ensure ≥9 hours of sleep nightly and a 1-hour midday rest, preferentially in a left lateral position.

1.2.3 Predictive (Anticipatory) Intervention Group: Proactive, Individualized Management

This group received a proactive, assessment-driven model involving weekly evaluations and tailored interventions.

Weekly Anticipatory Assessment: At each weekly visit, a structured assessment was performed by the study nurse, documenting:

1. Clinical Metrics: Blood pressure (measured twice, seated, 5-min apart), weight, and pedal edema severity (graded 0-3+).
2. Investigations: Urine dipstick for protein; fundoscopic examination for retinal arterial spasm performed by the attending obstetrician.
3. Patient-Reported Log Review: A daily log of blood pressure (twice daily), diet, sleep quality, and emotional state (rated 1-5 scale) was reviewed.

Individualized Intervention Formulation: Based on the weekly assessment, a personalized care plan was created addressing:

1. Dietary Intervention: Tailored guidance was provided. For example, a patient with 2+ edema and a high-sodium diet log received specific menu planning, strict sodium restriction (<3g/day), and prescribed calcium supplementation (1.5g elemental calcium daily).
2. Psychological Intervention: Targeted support was given based on the emotional state log and SAS/SDS trends. For noted anxiety, this included 10-15 minutes of structured cognitive-behavioral techniques (e.g., reframing catastrophic thoughts about birth) during the visit.
3. Rest & Oxygen Therapy: Left lateral rest was emphasized. Intermittent oxygen therapy (2L/min via nasal cannula for 30 minutes, twice daily) was prescribed if maternal SpO2 was <95% or if the nurse noted signs of fetal compromise (e.g., concerning cardiotocography).
4. Medication Management: Detailed, repeated education was given on each prescribed drug's purpose, timing, and side effects. Nurses provided a written schedule and used teach-back to ensure understanding. Blood pressure response and any adverse effects were meticulously tracked.

1.3 Observation Indicators

The following outcomes were compared among the three groups: mode of delivery; negative emotional status—assessed using the Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS), with lower scores indicating greater improvement; and adverse maternal and neonatal outcomes.

1.4 Statistical Methods

Data were analyzed using SPSS version 27.0. Measurement data are presented as mean ± standard deviation (±s). Pairwise comparisons between groups were conducted using the t-test, and comparisons among multiple groups were performed using one-way analysis of variance (ANOVA). Categorical data are expressed as n (%), and comparisons were made using the χ^2 test. A P value < 0.05 indicated statistical significance.

2 Results

2.1 Comparison of Delivery Modes Among the Three Groups

In the predictive intervention group, the rates of vaginal delivery, forceps-assisted delivery, and cesarean section were 75.00% (30/40), 2.50% (1/40), and 22.50% (9/40), respectively. In the comprehensive intervention group, these rates were 65.00% (26/40), 7.50% (3/40), and 27.50% (11/40), respectively. In the control group, the rates were 47.50% (19/40), 10.00% (4/40), and 42.50% (17/40), respectively.

The predictive intervention group had a significantly higher vaginal delivery rate compared with both the comprehensive intervention group and the control group ($P < 0.05$). The vaginal delivery rate in the comprehensive intervention group was also significantly higher than that in the control group ($P < 0.05$).

2.2 Comparison of SAS and SDS Scores Among the Three Groups

In the control group, SAS and SDS scores before delivery were significantly higher than those at baseline ($P < 0.05$).

Both the predictive intervention group and the comprehensive intervention group showed significantly lower pre-delivery SAS and SDS scores compared with the control group ($P < 0.05$). There was no statistically significant difference in SAS or SDS scores between the predictive intervention group and the comprehensive intervention group before delivery ($P > 0.05$).

Table 1. Comparison of SAS and SDS scores among the three groups (mean ± SD, points)

Group	n	SAS (At Enrollment)	SAS (Before Delivery)	SDS (At Enrollment)	SDS (Before Delivery)
Control Group	40	43.16 ± 3.15	48.57 ± 3.82[a]	38.25 ± 2.84	43.48 ± 3.17[a]
Comprehensive Intervention Group	40	43.39 ± 3.27	43.76 ± 3.55	38.02 ± 2.79	38.22 ± 2.83
Predictive Group	40	42.77 ± 3.69	43.14 ± 3.37	39.13 ± 3.02	38.47 ± 2.96
F value	—	1.106	13.253	1.408	11.573
P value	—	0.093	0	0.089	0

Note:a Compared with baseline at enrollment, $P < 0.05$.

2.3 Comparison of Adverse Maternal and Neonatal Outcomes Among the Three Groups

The incidence of adverse maternal outcomes in the predictive intervention group was 7.50%, which was lower than that of the comprehensive intervention group (17.50%) and the control group (37.50%). The comprehensive intervention group also showed a lower incidence than the control group ($P < 0.05$).

The incidence of adverse neonatal outcomes in the predictive intervention group was 5.00%, lower than that of the comprehensive intervention group (17.50%) and the control group (40.00%). Similarly, the incidence in the comprehensive intervention group was lower than that of the control group ($P < 0.05$). See Table 2.

Table 2. Comparison of adverse maternal and neonatal outcomes among the three groups [n (%)]

Group	n	SAS (At Enrollment)	SAS (Before Delivery)	SDS (At Enrollment)	SDS (Before Delivery)
Control Group	40	43.16 ± 3.15	48.57 ± 3.82[a]	38.25 ± 2.84	43.48 ± 3.17[a]
Comprehensive Intervention Group	40	43.39 ± 3.27	43.76 ± 3.55	38.02 ± 2.79	38.22 ± 2.83
Predictive Group	40	42.77 ± 3.69	43.14 ± 3.37	39.13 ± 3.02	38.47 ± 2.96
F value	—	1.106	13.253	1.408	11.573
P value	—	0.093	0	0.089	0

3 Discussion

The etiology of hypertensive disorders of pregnancy (HDP) remains incompletely understood. HDP most commonly develops after 20 weeks of gestation, and many scholars believe it is associated with factors such as obesity, advanced maternal age, and excessive nutrition [5] . Once HDP occurs, elevated systolic or diastolic blood pressure triggers a series of clinical manifestations, including edema, proteinuria, and headache. In late pregnancy, some patients may experience severe symptoms such as convulsions, loss of consciousness, and cardiac or renal dysfunction. HDP also poses significant risks to fetal health. In early pregnancy, it increases the likelihood of miscarriage; in later stages, it heightens the risk of intrauterine asphyxia and preterm birth, and contributes to a higher incidence of neonatal distress. Thus, HDP is a major cause of adverse maternal and neonatal outcomes [6–8].

After HDP is diagnosed, antihypertensive pharmacotherapy is typically employed. However, many pregnant women have limited understanding of HDP prevention and management, resulting in poor treatment adherence and inadequate blood pressure control. As gestation advances, particularly as delivery approaches, symptoms tend to worsen. Concerns about fetal well-being and personal health often intensify negative emotions such as anxiety and depression [9,10].

In the present study, the control group exhibited significantly higher SAS and SDS scores before delivery compared with baseline ($P < 0.05$). In contrast, both the predictive intervention group and the comprehensive intervention group had significantly lower SAS and SDS scores before delivery compared with the control group ($P < 0.05$). There was no significant difference between the predictive and comprehensive intervention groups ($P > 0.05$). These findings indicate that psychological nursing interventions in both groups played a positive role in stabilizing the emotional state of HDP

patients.

Predictive nursing involves evaluating the physiological and psychological conditions of HDP patients, anticipating potential adverse outcomes and influencing factors, and implementing targeted preventive measures. The results of this study further demonstrate that the predictive intervention group experienced significantly lower rates of adverse maternal and neonatal outcomes compared with both the comprehensive intervention group and the control group ($P < 0.05$). The comprehensive intervention group also had better outcomes than the control group. These findings suggest that the predictive nursing intervention model is superior to the comprehensive intervention model.

Conclusion

This study demonstrates that structured nursing interventions, particularly the predictive model, offer significant benefits over routine care in the management of Hypertensive Disorders of Pregnancy (HDP). The findings provide a nuanced comparison of outcomes, highlighting specific areas of improvement. Most notably, the predictive intervention was uniquely effective in optimizing clinical results. It produced the highest rate of vaginal delivery (75.00%), significantly surpassing both the comprehensive (65.00%) and control (47.50%) groups, while also achieving the lowest incidences of adverse maternal (7.50%) and neonatal (5.00%) outcomes. This suggests that proactive, assessment-driven care is superior in mitigating the physical complications of HDP.

Regarding psychological well-being, both structured interventions were equally effective and superior to routine care. While anxiety (SAS) and depression (SDS) scores worsened in the control group as delivery approached, scores in both the predictive and comprehensive intervention groups remained stable and significantly lower. This indicates that the core components of dedicated education, monitoring, and psychological support common to both models are crucial for alleviating the distress associated with HDP, regardless of the specific clinical protocol.

In summary, the predictive, anticipatory nursing model represents a more holistic and effective strategy. It matches the comprehensive model in providing essential psychological support but adds a critical layer of individualized, proactive clinical management that directly improves obstetric and neonatal outcomes. Therefore, the implementation of this predictive intervention model is recommended to enhance the quality of care and optimize health outcomes for both mothers and infants affected by HDP. Future research should investigate the long-term sustainability and cost-effectiveness of implementing this model in diverse clinical settings.

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