ORIGINAL RESEARCH

Efficacy of Quality Care on Maternal and Infant Outcomes in Patients with Hypertensive Disorders Complicating Pregnancy Complicated with Cerebral Hemorrhage

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ABSTRACT

Objective • This study aimed to evaluate the impact of quality care on maternal and infant outcomes in patients with hypertensive disorders complicating pregnancy (HDCP) complicated by cerebral hemorrhage.

Methods • From February 2020 to September 2021, 68 women with HDCP complicated by cerebral hemorrhage hospitalized at our hospital were included and divided into a routine group (standard care) and a quality group (quality care). Outcome measures included National Institutes of Health Stroke Scale (NIHSS) scores, blood pressure, self-rating anxiety scale (SAS) scores, self-rating depression scale (SDS) scores, and maternal and infant outcomes.

Results • Patients in the quality group (3.22±1.89) had significantly lower NIHSS scores aftercare than those in the routine group (6.15±3.24) ($P < .05$). Quality care resulted in lower diastolic blood pressure (Quality group:81.23±6.15; Routine: 90.58±7.98), systolic blood pressure (Quality group:125.49±13.37; Routine: 139.74±16.67), SAS scores (Quality group: 48.42±2.65; Routine: 58.15±2.43), and SDS scores versus routine care (Quality group:48.42±2.65; Routine: 58.15±2.43)($P < .05$). The quality group showed a lower incidence of adverse maternal and infant pregnancy outcomes than the routine group ($P < .05$).

Conclusion • The findings underscore the positive impact of quality care in reducing adverse maternal and newborn pregnancy outcomes. This reduction is particularly significant for clinical practice, as it is achieved through the amelioration of various factors, such as neurological impairments, blood pressure regulation, and the alleviation of negative emotions, including anxiety and depression, in patients with HDCP complicated by cerebral hemorrhage. The practical implications of these findings for healthcare providers and patients are substantial. They highlight the potential to improve patient outcomes, enhance the overall quality of care, and reduce the burden on healthcare systems. By addressing these factors, healthcare providers can enhance the well-being of both mothers and newborns, leading to improved clinical outcomes and increased patient satisfaction. (*Altern Ther Health Med.* [E-pub ahead of print.])

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INTRODUCTION

The description of hypertensive disorders complicating pregnancy

Hypertensive disorders complicating pregnancy (HDCP) are a unique set of conditions characterized by pregnancy-related high blood pressure, which significantly contributes to maternal (2020)[1] and infant morbidity and mortality (2017).[31] HDCP primarily occurs around 20 weeks of gestation, affecting approximately 11% of pregnancies (2014).[2] Clinical manifestations include elevated blood pressure, swelling, proteinuria, and in severe cases, convulsions, coma, and organ failure, leading to dire consequences for both mothers and infants (2013).[3] Notably, cerebral hemorrhage is a critical factor in maternal and infant mortality among the severe complications (2013).[4] In recent years, the incidence of HDCP complicated by cerebral hemorrhage has been on the rise, emphasizing the need for prevention and treatment (2012).[5] Current standard care for HDCP primarily involves spasm relief, blood pressure management, and sedation to restore maternal health and ensure fetal survival (2012).[6] However, the pathogenesis of HDCP remains unclear and requires further exploration.

The role of traditional Chinese medicine

Traditional Chinese medicine (TCM) practitioners are clinical professionals who practice TCM, a well-established

medical system deeply rooted in traditional Chinese values. TCM includes therapies such as herbal medicine and acupuncture, which are primarily based on traditional theories (2012; 2013).[32,33] In TCM, hypertensive disorders during pregnancy are categorized as "pregnancy swelling," "pregnancy vertigo," and "pregnancy epilepsy." Their pathogenesis is attributed to imbalances such as Yin deficiency and Yang hyperactivity, phlegm and fire disturbance, and blockage of clear orifices (2020).[7] These disorders have a significant impact on maternal and infant health, contributing to maternal and perinatal morbidity and mortality.

In TCM, the most crucial pathogenesis of hypertensive disorders during pregnancy involves deficiencies in both qi (vital energy) and yin (a concept representing the body's cooling and nourishing aspects). During pregnancy, there is an accumulation of yin and blood in the lower part of the body and increased yang (the body's heating and activating aspect), which disrupts the proper flow of qi. Therefore, treatment in TCM aims to restore balance by nourishing qi and yin (2014).[8] Hypertensive disorders during pregnancy treatment in TCM also emphasizes health education and routine care to enhance patient disease awareness, reduce the risk of postpartum hemorrhage, and ensure safety (2018).[9]

The significance of quality care

While previous studies by Ma (2021)[10] and Li (2018)[11] have highlighted the positive impact of nursing care on patients with HDCP complicated by cerebral hemorrhage, there is still a need to address certain research gaps in this field. Specifically, it remains unclear which specific aspects of quality care are most effective in improving the physical and psychological well-being of these patients, enhancing their attitudes toward treatment, and reducing adverse maternal and infant pregnancy outcomes.

Quality care is a patient-centered care model characterized by its scientific and humanistic features, and it aims to compensate for the limitations of traditional disease-focused nursing models (2021).[12] To address the significant health challenges posed by HDCP, our study aimed to explore potential solutions for improving the outcomes of patients with HDCP complicated by cerebral hemorrhage. One such solution is the application of quality care. Our study involved 68 patients admitted to our hospital between February 2020 and September 2021, representing a diverse population with varying ages, demographics, backgrounds, and medical histories.

Our research objectives are twofold: firstly, we aim to identify the specific components of quality care that play a crucial role in enhancing patient outcomes. Secondly, we seek to fill the existing research gap in this field by demonstrating the potential benefits of quality care in the management of HDCP complicated by cerebral hemorrhage. This logical progression from the problem statement to potential solutions and the rationale for our study is intended to help readers better follow our argument

MATERIALS AND METHODS

Participants

We recruited a total of 68 women with HDCP complicated by cerebral hemorrhage who were admitted to our hospital between February 2020 and September 2021 and were recruited and assigned via a random method to receive either routine care (routine group) or quality care (quality group). We used an online web-based randomization tool, accessible at http://www.randomizer.org/, to ensure the random allocation of participants to the two study groups. This tool was instrumental in maintaining a rigorous and unbiased assignment process. To further enhance the allocation concealment and mitigate the risk of selection bias, an independent research assistant, who had no prior involvement in the initial screening or evaluation of study participants, oversaw the randomization procedure and participant assignment. This meticulous approach was implemented to safeguard the integrity of the randomization process and reduce the likelihood of systematic allocation bias.

The original sample size calculation, which determined that 34 patients in each group would be required, was based on the need to detect a 3-point difference between groups. This calculation was made with the intention of conducting a 2-sided significance test with a power of 0.8 and an alpha error level of 0.05. This particular sample size was chosen to ensure that the study had sufficient statistical power to detect meaningful differences between the groups while maintaining a reasonable level of significance.

Undersigned informed consent was obtained from patients before enrollment in this study. The study protocol was approved by the Cangzhou Central Hospital ethics committee. Ethics number: SH-SU20200204. All processes were per the Declaration of Helsinki's ethical guidelines for clinical research.

Inclusion criteria: (1) patients with a diagnosis of HDCP confirmed by clinically relevant tests; (2) patients with a diagnosis of cerebral hemorrhage confirmed by clinically relevant imaging; (3) patients with singleton pregnancy; (4) patients who provided written informed consent.

Exclusion criteria: (1) patients with a history of hypertension before pregnancy; (2) patients with psychiatric disorders; (3) patients with other serious organ diseases; or (4) patients with poor compliance that prevented good cooperation with this study.

The study was reviewed and approved by the Medical Ethics Committee of our hospital, and all mothers and their families were informed and signed the informed consent form for this study.

Methodology

The flowchart of the patient recruitment and allocation process is shown in Figure S1. The routine group received routine care. Routine care included antihypertensive treatment, antispasmodic, vital sign monitoring, fetal heart

sound monitoring, and medication instruction. Among them, women assigned to the nifedipine group were initially administered 10 mg of oral nifedipine. If their systolic blood pressure exceeded 155 mm Hg or diastolic blood pressure exceeded 105 mm Hg after one hour, an additional 10 mg dose could be administered hourly for up to two more doses, with a maximum cumulative dose of 30 mg.[37,38]

The quality group received quality care. (1) Prenatal care: Patients' emotional well-being was actively addressed to alleviate anxiety and depression. Nursing staff provided regular communication, psychological guidance, and education on the disease, along with precautions. Vital signs and blood pressure were closely monitored, and any abnormalities were promptly reported to the physician for necessary treatment.[13] (2) Dietary guidance: nursing staff developed tailored dietary programs to fulfill the patients' daily nutritional requirements.[14] (3) Rehabilitation training: Given the high incidence of hemiparesis in women with HDCP complicated with cerebral hemorrhage, a comprehensive rehabilitation program was developed for the patients. This program included a range of specific exercises and techniques to address motor function, strength, balance, and coordination. Patients engaged in exercises such as range of motion exercises, gait training, and activities to improve upper and lower limb function. These exercises were conducted under the guidance of physicians and trained nurses to enhance the physical recovery of the patients.[15] (4) Delivery care: Nursing staff offered emotional support during delivery to alleviate patients' fears. Continuous monitoring of labor progression and vital sign changes was performed. Contraction progress was closely monitored during the first stage of labor, while the second stage involved continuous monitoring of fetal heart rate and patient blood pressure, along with the administration of oxygen care as needed. The third stage of labor involved stabilizing the patient and administering contractions if necessary.[16] (6) Postpartum care: After delivery, the nursing staff ensured patient comfort, including changing the mattress to prevent pressure sores and assisting with perineal hygiene. (7) Environmental care: The patients' ward environment was maintained with cleanliness, proper lighting, ventilation, and suitable temperature and humidity. Nursing staff provided massages and played soft music to maintain a positive mood and reduce the risk of postpartum depression.

Outcome measures

National Institutes of Health Stroke Scale (NIHSS) score. In our study, the NIHSS was used as an early secondary outcome measure in stroke trials. Specifically, NIHSS scores were assessed at two distinct time points: 24 hours after treatment and again at 5 to 7 days after treatment. This approach allowed for a comprehensive evaluation of neurological status and the impact of the intervention at both early and later stages of the recovery process. The NIHSS measures neurological deficits rather than functional outcomes.[34] NIHSS was used to assess the neurological function of the patients, and the total score of this scale was 42 points. Higher scores indicate more severe neurological deficits.

Blood pressure. The diastolic blood pressure (DBP) and systolic blood pressure (SBP) levels before and after nursing were measured using the EK648 electronic blood pressure monitor produced by Shanghai Yuejin Medical Equipment Co (Abbreviations: DBP = diastolic blood pressure, SBP = systolic blood pressure).

Self-rating anxiety scale (SAS) scores and self-rating depression scale (SDS) scores. The SAS and SDS were used to assess the patient's emotional state, with lower scores indicating better mood.[35,36] The patients' anxiety was evaluated by using SAS with scores of 0-100 points, with 50-59 points for mild anxiety, 60-69 points for moderate anxiety, and 69 points or above for severe anxiety. SDS was used to evaluate patients' depression with a score of 0-100 points, with 53-62 points for mildly depressed, 63-72 points for moderately depressed, and 73 points or above for severely depressed.

Maternal and infant outcomes. Maternal and infant outcomes are divided into adverse neonatal outcomes and maternal delivery. Adverse neonatal outcomes include fetal distress, neonatal asphyxia, and perinatal death. Maternal delivery outcomes included cesarean delivery, preterm delivery, postpartum hemorrhage, and placental abruption.

Statistical analysis

Our data analysis was carried out using SPSS version 21.0 for statistical computations, and GraphPad Prism version 8 was utilized for generating graphical representations. Descriptive statistics were employed to summarize the data. Continuous variables that followed a normal distribution were presented as means ± standard deviations, while categorical data were expressed as counts and percentages.

To compare means between the two groups, we utilized the chi-squared F-test to assess variance homogeneity. For data with homogeneous variances, an independent samples *t* test was employed. In cases where variances were not homogeneous, we applied Welch's *t* test to ensure the reliability of statistical comparisons. Furthermore, within-group pre-post comparisons were conducted using paired samples *t* tests to assess the significance of changes over time.

To mitigate the potential pitfalls of multiple comparisons and uphold the statistical integrity of our analysis, we opted to apply the Bonferroni correction. The Bonferroni correction is a well-established method for controlling the family-wise error rate, which is the probability of making at least one type I error across all conducted comparisons. In essence, this correction adjusts the significance threshold based on the number of comparisons made, making it more stringent. In our study, a corrected *P* value (p_adj) less than adjusted .05 was considered statistically significant, thus reducing the likelihood of erroneously identifying significant results due to multiple testing. By employing the Bonferroni correction, we aimed to enhance the reliability and validity of our findings.

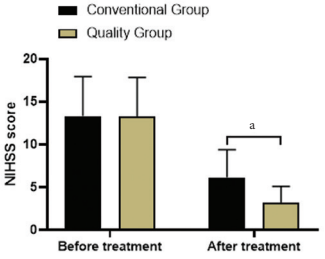
Table 1. Patient characteristics [$\bar{x} \pm s$, n(%)]

	Routine group	Quality Group	t/χ^2	*P* value
Number	34	34		
Age (years)	22-41	23-42		
Average age (years)	27.54±4.13	27.71±4.26	-0.167	.868
Gestational weeks (weeks)	28-40	27-40		
Average gestational weeks (weeks)	37.64±2.11	37.66±2.09	-0.039	.969
Parity			0.059	.808
Primipara	16	15		
Multipara	18	19		

Table 2. Maternal and child outcomes [n(%)]

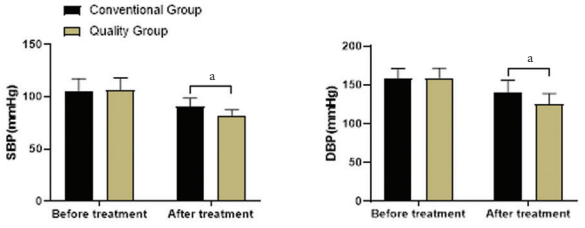
		Adverse neonatal outcomes			Adverse neonatal outcomes			
Group	n	Fetal distress	Neonatal asphyxia	Perinatal death	Cesarean delivery	Premature birth	Postpartum bleeding	Premature abruption of the placenta
Routine group	34	10 (29%)	8(24%)	1(3%)	20 (59%)	9(26%)	11(32%)	3(9%)
Quality Group	34	2(6%)	1(3%)	0(0%)	9(26%)	1(3%)	2(6%)	1(3%)
χ^2	-	18.32	18.882	3.046	22.281	21.335	21.962	3.191
P value	-	<.001	<.001	.081	<.001	<.001	<.001	.074

Figure 1. NIHSS scores ($\bar{x} \pm s$)



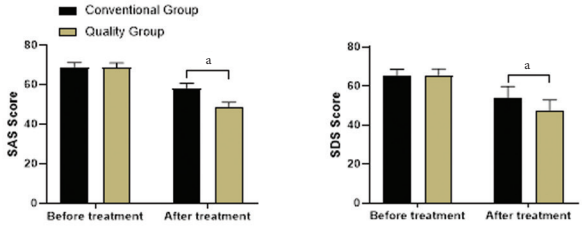
[a]indicates $P < .05$

Figure 2. Blood pressure ($\bar{x} \pm s$)



[a]indicates $P < .05$

Figure 3. SAS and SDS scores ($\bar{x} \pm s$)



[a]indicates $P < .05$

RESULTS

Patient characteristics

Patients in the routine group were aged 22-41 (27.54±4.13) years, with a gestational week of 28-40 (37.64±2.11) weeks, 16 cases of primipara, and 18 cases of multipara. Patients in the premium group were aged 23-42 (27.71±4.26) years, with a gestational week of 27-40 (37.66±2.09) weeks, 15 cases of primipara, and 19 cases of multipara. The patient characteristics were comparable between the two groups ($P > .05$). (Table 1)

NIHSS score

Quality nursing care (81.23±6.15) was associated with a significantly lower NIHSS score compared to routine nursing care (90.58±7.98) ($P < .05$). A lower NIHSS score indicates a less severe neurological impairment, which is a critical indicator of recovery in HDCP patients (Figure 1).

Blood pressure

After receiving care, patients in the quality care (DPB: 81.23±6.15; SBP: 125.49±13.37 mm Hg) group demonstrated significantly lower DBP and SBP levels compared to those in the routine care group (DPB: 90.58±7.98; SBP: 139.74±16.67 mm Hg)($P < .05$). This suggests that quality care effectively manages blood pressure in HDCP patients, reducing the risk of further complications (Figure 2).

SAS and SDS scores

Quality care (SAS scores:48.42±2.65; SDS scores: 48.42±2.65) resulted in significantly lower scores for the SAS and SDS when compared to routine care SAS scores:58.15±2.43; SDS scores: 58.15±2.43 ($P < .05$). These lower scores indicate reduced anxiety and depression levels among patients receiving quality care, highlighting the positive impact of quality nursing on their psychological well-being (Figure 3).

Maternal and infant outcome

The quality care group had significantly fewer negative maternal and infant outcomes compared to the routine care group ($P < .05$). It would be helpful to provide a detailed description of the specific maternal and infant outcomes that improved with quality care. This information could give a clearer understanding of the benefits of quality nursing for HDCP patients, contributing to better overall health for both mothers and infants (Table 2).

DISCUSSION

HDCP complicated by cerebral hemorrhage is attributed to hypertension-induced systemic small artery spasm, damage to vascular endothelial cells, and accumulation of fibrin-like material in the vascular lining, which contributes to increased capillary permeability and results in forced leakage of red blood cells and plasma out of the extravascular space.[17] In the event of poor blood pressure management, the elevated pressure in the cerebral vessels leads to the rupture of the damaged cerebral vessel wall.[18] The management of HDCP with cerebral hemorrhage requires close coordination between neurology, rehabilitation, and obstetric care, and is therefore complicated for a radical cure.[19] Previous clinical treatment for patients with HDCP complicated with cerebral hemorrhage mainly relies on blood pressure control and spasm relief, but the efficacy remains unsatisfactory.

Hypertensive disorders during pregnancy are classified as "dizziness", "swelling", and "eclampsia" in TCM. The

deficiency of liver and kidney yin is the main cause and the hyperactivity of the liver and yang is the symptom. Patients mostly present with deficiency of kidney yin, imbalance of yin and yang, and aggravation of deficiency of both liver and kidney, which induces hypertension during pregnancy in the long run. Therefore, the main principle of treatment is to nourish the yin of the liver and kidney and calm the yang of the liver.[20-21]

Blood pressure management

Ma et al.[7] revealed that reasonable and effective nursing measures ameliorate the physical and psychological status of patients with HDCP complicated with cerebral hemorrhage. The research by Wang et al.[22] also indicated that reasonable nursing measures significantly improve maternal and infant outcomes in women with HDCP complicated with cerebral hemorrhage and ensure the life safety of the mothers and infants. Quality care provides targeted care as per the patient's condition and their actual needs, catering to both the physical and psychological health of the patient, with emphasis on disease knowledge education and instructions to patients to overcome anxiety and fear.[23] In addition, quality care also provides timely monitoring of maternal and infant vital signs to predict possible dangers for rapid countermeasures.[24]

In this study, our findings underscore the potential of quality nursing care in improving patient outcomes in HDCP complicated by cerebral hemorrhage. By providing comprehensive, patient-centered care, quality care addresses not only the physical aspects of the disease but also its psychological and emotional dimensions. It emphasizes health education, psychological support, and tailored interventions, which, as our results indicate, lead to enhanced patient well-being and lower rates of adverse outcomes. These results align with the growing recognition of the importance of holistic and patient-centered care models in maternal-fetal medicine.[39]

Emotional well-being

In TCM nursing, the first method is the four diagnostic nursing and the main means for nurses to identify and administer care. Secondly, disease prevention was performed. The most basic guiding principle of TCM is to prevent diseases before their onset and to instruct pregnant women to avoid negative emotions. The pregnant women were instructed to (1) regulate the spirit and maintain a relaxed mood; (2) exercise to enhance the body's ability to enhance disease resistance; (3) perform a regular living, moderate work, and rest; (4) follow a reasonable diet and ensure the maternal and infant safety. Due to the different physical conditions, environment, and living and working conditions of each, early diagnosis and treatment of the disease should be detected promptly, and appropriate care should be provided to prevent the transmission of the disease.[25]

The results of the current study showed that patients in the quality group had significantly lower NIHSS scores aftercare than those in the routine group ($P < .05$). Quality care resulted in lower DBP, SBP, SAS scores, and SDS scores versus routine care ($P < .05$), which suggests that quality care is effective in mitigating neurological deficits, lowering blood pressure levels, and relieving negative emotions. The reason may be that quality care provides targeted health education to all patients to improve their disease awareness, thereby alleviating their anxiety and fear, and it also develops tailored early rehabilitation training programs for patients to facilitate postpartum recovery. Moreover, the incidence of adverse maternal and infant pregnancy outcomes was significantly lower in the quality group than in the routine group, suggesting that quality care is effective in reducing the incidence of adverse maternal and infant pregnancy outcomes in patients with HDCP combined with cerebral hemorrhage. The excessive stress in women with HDCP complicated by cerebral hemorrhage leads to dysfunction of the central nervous system and consequently to disruption of secretion, which is detrimental to fetal development and the patient's health.[26]

The study suggests that adopting quality care models can significantly reduce adverse maternal and infant outcomes in HDCP complicated by cerebral hemorrhage. Healthcare providers can improve patient care by prioritizing comprehensive, patient-centered protocols, implementing stress management strategies, fostering interdisciplinary collaboration, and emphasizing continuous quality improvement initiatives. Patient education on stress reduction is crucial, and further research into stress-reducing interventions is recommended. These changes aim to optimize care and enhance outcomes for patients facing this complex medical condition.

Maternal and infant outcomes

The starting point of conventional nursing care is usually the degree of completion of nursing work, which is characterized by mechanization and tends to ignore the psychological needs of patients during pregnancy, and lacks emotional and social support, and the formulaic health education only allows patients to have a preliminary understanding of the condition, resulting in a lack of self-control and self-management ability of patients.[27] As a joint intervention, quality care combined with health education provides patients with more comprehensive and scientific nursing services in terms of psychological intervention, health education, and delivery intervention, reduces patients' fear of disease through psychological care, relieves their emotional pressures in an environment of good nurse-patient communication, and enhances patients' trust and dependence on health care professionals.[28] Furthermore, quality treatment mitigates the patient's negative emotions and catecholamine production, which encourages regular uterine contractions and enhances fetal oxygen use, thus lowering the incidence of unfavorable mother and newborn outcomes.[29-30]

Limitations of this study

The limitations of this study are the small sample size and the absence of long-term follow-up. First, the sample size

in this study is relatively small. While we have taken measures to carefully manage the sample, including 68 patients with HDCP complicated by cerebral hemorrhage, it is essential to acknowledge that a larger sample size could provide more statistical power and enable a deeper exploration of the treatment effects. The findings should, therefore, be interpreted with caution. Second, there was a lack of long-term follow-up in this study. HDCP, particularly when complicated by cerebral hemorrhage, can have long-term implications for both mothers and infants. A longer-term follow-up would have allowed us to assess the persistence of the observed effects and provide a more comprehensive evaluation of the treatment's impact on maternal and infant outcomes. In future research, we aim to address these limitations by conducting studies with larger sample sizes and implementing long-term follow-up protocols. This approach will ensure the generation of more reliable and robust data, offering a more comprehensive understanding of the efficacy of quality nursing care for HDCP patients complicated by cerebral hemorrhage.

This study sheds light on the management of HDCP complicated by cerebral hemorrhage, emphasizing the importance of comprehensive care and interventions. HDCP complicated by cerebral hemorrhage poses a significant health risk to both mothers and infants, with its etiology rooted in hypertension-induced vascular spasm, endothelial damage, and increased capillary permeability. While conventional treatments mainly focus on blood pressure control and spasm relief, the efficacy has remained unsatisfactory. TCM principles highlight the importance of balancing yin and yang and nourishing the yin of the liver and kidney to manage HDCP during pregnancy. This study advocates for an integrated care approach that combines conventional medical treatment with TCM nursing practices to achieve better patient outcomes. Quality care, which includes targeted health education, psychological support, and patient monitoring, emerges as an effective approach for mitigating neurological deficits, lowering blood pressure, and relieving negative emotions in HDCP patients complicated by cerebral hemorrhage. This approach also significantly reduces the incidence of adverse maternal and infant pregnancy outcomes, demonstrating its potential in improving overall patient care.

Moreover, patient selection is a crucial aspect of our study, and we recognize the potential for biases during this process. We focused on individuals with HDCP complicated by cerebral hemorrhage, a condition with unique challenges due to its relatively low prevalence. To enhance the internal validity of our study, we implemented key measures. First, we used a randomization process to allocate patients into the routine care (routine group) and quality care (quality group) arms, conducted through an online web-based tool (http://www.randomizer.org/). An independent research assistant, not involved in participant screening or evaluation, carried out this randomization to ensure unbiased group allocation.

Second, we made efforts to maintain allocation concealment. The same independent research assistant, responsible for randomization, managed the assignment process, maintaining the integrity of the allocation procedure and minimizing the potential for selection bias. Additionally, in our statistical analyses, we considered baseline patient characteristics and potential covariates influencing study outcomes to account for and mitigate confounding factors that could affect internal validity.

While these measures aimed to minimize biases and enhance internal validity, we acknowledge that no study is entirely free from potential biases. However, we believe that our rigorous methodology and these steps have substantially reduced the likelihood of selection bias and other biases that could compromise the credibility of our findings.

Future research

In conclusion, this study underscores the significance of quality care, integrating TCM principles, to improve the management of HDCP complicated by cerebral hemorrhage. It offers a holistic and patient-centered approach to care, potentially reducing the health risks faced by both mothers and infants. Future research and clinical practice should further explore the benefits of such an integrated care model to enhance patient outcomes in this challenging medical condition.

First, future research should delve into the specific TCM interventions employed in the integrated care model. Investigating the efficacy of individual components, such as herbal formulations, acupuncture, or dietary modifications, can provide valuable insights into their mechanisms of action and their impact on patient outcomes.

Secondly, determining the most effective timing for integrating TCM principles into the care of HDCP complicated by cerebral hemorrhage is crucial. Future studies could explore whether initiating TCM interventions preconception, during pregnancy, or postpartum yields optimal results. Additionally, investigating the duration of TCM integration and its long-term effects on maternal and infant health outcomes is essential.

Given the heterogeneity of patients with HDCP, personalized treatment approaches based on individual characteristics and TCM diagnostic principles should be explored. Future studies could investigate how tailoring interventions to specific patient profiles influences the effectiveness of integrated care, fostering a more personalized and precise approach.

Moreover, long-term follow-up studies are warranted to assess the impact of integrated care on maternal and infant outcomes beyond the immediate postpartum period. Investigating factors such as neurodevelopmental outcomes in infants and the potential for long-term cardiovascular consequences in mothers will contribute to a more comprehensive understanding of the lasting benefits of integrated care.

Exploring the economic implications of integrating TCM into routine care for HDCP complicated by cerebral hemorrhage is essential. Cost-effectiveness analyses and

assessments of the feasibility of implementing such integrated care models in diverse healthcare settings can guide policymakers and clinicians in adopting and scaling effective interventions.

By addressing these areas, future research can build upon our findings, refining and expanding the evidence base for integrated care in HDCP. Ultimately, a comprehensive and nuanced understanding of the role of TCM principles in this context will pave the way for more effective, patient-centered, and personalized care strategies, leading to improved outcomes for both mothers and infants.

CONCLUSION

Quality treatment contributes to lowering the frequency of unfavorable maternal and newborn pregnancy outcomes by mitigating neurological impairments, blood pressure levels, and negative emotions such as anxiety and depression in patients with HDCP and cerebral hemorrhage.

DATA AVAILABILITY STATEMENT

All data generated or analyzed during this study are included in this published article.

CONFLICT OF INTEREST

All authors declared that they have no financial conflict of interest.

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No funds were received.

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Figure S1. Patient Recruitment and Allocation Process