

# Observation on the Effect of Parental Participation in Nursing Under the IMCHB Model in Neonatal Hypoxic-Ischemic Encephalopathy

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**Abstract:** *Objective:* To investigate the clinical effects of parental participation in nursing under the Interaction Model of Client Health Behavior (IMCHB) model in neonatal hypoxic-ischemic encephalopathy (HIE). *Methods:* The First Affiliated Hospital of Gannan Medical University included 46 newborns with HIE admitted from October 2021 to October 2023 into the study population. They were divided into a control group and an observation group according to the random number table method, with the control group adopting routine nursing, and the observation group implementing parental participation in nursing under the IMCHB model. The indicators of physical, intellectual, and psychomotor development of the two groups were compared before and after nursing. *Results:* The physical, intellectual, and psychomotor development of the observation group was higher than that of the control group after 3 months of nursing, and the difference was statistically significant ( $P < 0.05$ ). *Conclusion:* The implementation of the IMCHB model of parental participation in the clinical care of HIE neonates can further promote their physical, intellectual, and psychomotor development.

**Keywords:** Interaction Model of Client Health Behavior model; Parental participation nursing; Neonatal hypoxic-ischemic encephalopathy

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## 1. Introduction

Neonatal hypoxic-ischemic encephalopathy (HIE) belongs to the category of critical illness. Due to the high risk of disability and death, in addition to active symptomatic treatment, relevant high-quality nursing care initiatives are necessary, in order to further mitigate or even prevent a variety of risks that may exacerbate the condition<sup>[1]</sup>. The Interaction Model of Client Health Behavior (IMCHB) is an interactive model of health behaviors that emphasizes the interaction of contextual and dynamic variables, and the impact of interactive elements on individual health outcomes<sup>[2]</sup>, and the nursing care guided by this theory can further strengthen the interactive relationship between nurses and patients, and encourage children to further improve their motivation and cooperation in training<sup>[3]</sup>. In addition, taking into account factors such as the young age of HIE patients and the long-term management needs of the disease, parental participation in nursing care is extremely necessary. Some

scholars have suggested that parental participation in nursing care can be carried out under the guidance of the IMCHB model, which can guarantee the effectiveness, scientificity, and continuity of training by guiding parents to participate in the early assessment of the child's condition, and the development and implementation of nursing care programs, thus achieving the goal of improving the prognosis of the child<sup>[4]</sup>. In this study, the First Affiliated Hospital of Gannan Medical University implemented parental participation in nursing under the IMCHB model for 23 neonates with HIE admitted from October 2021 to October 2023.

## 2. General information and methods

### 2.1. General information

46 neonates with HIE admitted to the First Affiliated Hospital of Gannan Medical University from October 2021 to October 2023 were selected and divided into the control group and the observation group with 23 cases/group using the random number table method. There were 13 males and 10 females in the control group, with a mean age of 1–7 ( $4.02 \pm 1.87$ ) days. In the observation group, there were 11 males and 12 females, with a mean age of 1–6 ( $3.96 \pm 1.81$ ) days. There was no statistical significance in the general information between the groups ( $P > 0.05$ ).

Inclusion criteria: (1) Meet the diagnostic criteria of HIE in Pediatrics (9th edition)<sup>[5]</sup>; (2) Confirmation of the disease by clinical symptoms, ultrasound, and other examinations; (3) Neonatal Apgar score  $< 8$ , relatively stable condition; (4) Parents have no history of psychiatric, cognitive, or psychological disorders; (5) Family members are informed and voluntarily sign the relevant certificates. Exclusion criteria: (1) HIE caused by traumatic brain injury, congenital heart disease, etc.; (2) Extremely unstable signs, or those who died during the study; (3) Combined with multiple organ failure, coagulation disorders, and serious systemic infectious diseases; (4) Parents' low compliance with the doctor's instructions, or those who dropped out in the middle of the study. The study was reviewed and approved by the Ethics Committee of the hospital.

### 2.2. Methods

The control group adopted routine nursing, including compliance with medical oxygen, rehydration, regular adjustment of the child's position, timely removal of oral and nasal secretions, timely sputum suction, nebulized inhalation, and other operations; it also included closely monitoring the child's physical signs, ensuring tight tube supervision, standardizing nasal feeding, enhancing skin care, and preventing complications such as convulsions and cerebral edema. Nurses also communicated appropriately with parents, informed them about the child's condition, and provided emotional support as needed.

The observation group received the same nursing care as the control group, and adopted the application of parental participation in nursing under the IMCHB model, with the following specific contents:

- (1) Establishment of a nursing team: The nursing team included a head nurse of the department, three responsible nurses with more than 5 years of nursing experience, and parents of the affected children. They were encouraged to actively learn the relevant theoretical knowledge of the IMCHB nursing model and nursing operation.
- (2) Early assessment: Nurses established an individualized electronic information file by integrating the prenatal maternal health, perinatal condition, clinical classification of HIE, and the child's family situation, in order to scientifically assess and dynamically track the condition.
- (3) Formulation of a nursing plan: Nurses formulated an individualized and feasible nursing plan by combining the results of the early assessment, the parents' demands, and their ability to carry out the plan.

#### (4) Implementation of the nursing plan:

- (a) Group lectures: Nurses encouraged parents to actively participate in order to systematically understand the health knowledge related to HIE and establish a correct view of the disease and nursing mentality.
- (b) Individualized health promotion and psychological care: This involved flexible selection of graphic, video, or face-to-face communication and other forms of education in accordance with the parents' age, education, cognitive ability, etc., focusing on informing the key points of care and precautions for HIE, and carried out random checks occasionally; at the same time, during the exchange, the parents' psychological state was scientifically assessed and targeted measures were taken to ease their negative emotions.
- (c) Guidance to carry out the relevant functional nursing intervention (each training was carried out once a day, each time 10–15 minutes):
  - (i) Auditory function training: In the afternoon, after the child was full and in a good emotional state, gentle and soothing music (at an appropriate volume) was played and parents engaged in gentle conversation to familiarize the child with parental voices and enhance their sense of security. If the condition allowed, gentle rocking could be added appropriately.
  - (ii) Visual function training: Parents used brightly colored and diversified cards and toys to attract children's attention and moved them from side to side to further strengthen children's visual reflexes and improve their ability to identify objects.
  - (iii) Tactile function and motor function training: Upon stabilizing the condition and mood of the child, gentle tactile stimulation and passive movements (including finger bending, lifting of feet, lifting of the head, etc.) were applied in a suitable temperature and humidity environment. This intervention could be complemented with nursery rhymes for motor activities.
- (d) Continuous follow-up: For children with relatively stable conditions, on the basis of obtaining parental consent, telephone or door-to-door follow-up activities were carried out 1–2 times a month, in order to dynamically understand the development of the child's condition and related growth and development indicators; at the same time, nurses solved the parents' questions in real time, corrected any incorrect nursing methods, or affirmed their home care abilities; and for parents experiencing negative psychological emotions, nurses promptly understood the reasons and implemented targeted psychological counseling. Additionally, nurses fully utilized relevant online interactive platforms to offer parents unrestricted time and space for health education and personal consultation services.

### 2.3. Observation indicators

Before nursing and 3 months after nursing, the relevant indicators were scientifically evaluated: (1) Physical development indicators: Head circumference, height, and body mass; (2) Intellectual and psychomotor development: The mental development index (MDI) and psychomotor development index (PDI) were evaluated respectively, and an MDI/PDI lower than 70 points suggests that there is retardation in intellectual/psychomotor development<sup>[6,7]</sup>.

### 2.4. Statistical methods

SPSS25.00 statistical software was used to analyze the data. Measurement data were expressed as mean  $\pm$  standard deviation (SD), and *t*-test was used for comparison between groups; count data were expressed as percentage, and  $\chi^2$  test was used for comparison between groups, and  $P < 0.05$  was taken to indicate that there was

a statistical difference between the two groups.

### 3. Results

The physical development indicators, MDI, and PDI of the two groups before nursing care were compared, and the differences were not statistically significant,  $P > 0.05$ ; after 3 months of nursing care, the head circumference of the observation group was larger than that of the control group, the height was higher than that of the control group, the body mass was heavier than that of the control group, and the scores of MDI and PDI were higher than that of the control group, and the differences between the two groups were statistically significant,  $P < 0.05$  (Table 1).

**Table 1.** Comparison of observation indexes related to nursing effect between two groups (mean  $\pm$  SD)

Groups	Time	Physical development indicators			MDI (points)	PDI (points)
		Head circumference (cm)	Height (cm)	Body mass (kg)		
Control group ( $n = 23$ )	Before nursing	38.35 $\pm$ 5.69	55.87 $\pm$ 9.68	4.25 $\pm$ 1.88	78.05 $\pm$ 16.98	75.41 $\pm$ 15.48
	After 3 months of nursing	39.48 $\pm$ 6.78	58.05 $\pm$ 11.05	5.52 $\pm$ 2.14	81.08 $\pm$ 17.92	80.98 $\pm$ 16.98
Observation group ( $n = 23$ )	Before nursing	38.29 $\pm$ 5.61	55.91 $\pm$ 9.71	4.31 $\pm$ 1.91	79.92 $\pm$ 16.92	75.65 $\pm$ 15.78
	After 3 months of nursing	45.98 $\pm$ 8.22	67.52 $\pm$ 13.12	7.85 $\pm$ 3.44	93.66 $\pm$ 19.45	93.41 $\pm$ 19.25
$t$	Before nursing	0.036	0.014	0.107	0.374	0.052
	After 3 months of nursing	2.926	2.648	2.758	2.287	2.322
$P$	Before nursing	0.971	0.989	0.915	0.710	0.959
	After 3 months of nursing	0.001	0.011	0.008	0.027	0.025

### 4. Discussion

HIE is a critical condition with rapid progression, which may induce serious complications such as convulsions, cerebral edema, metabolic acidosis, and so on<sup>[8]</sup>; at the same time, the relevant innervation areas of the children's brain, such as the nervous system, motor system, language expression system, and so on, will also suffer from various degrees of functional impairment. Untimely or inappropriate clinical interventions will not only affect the normal growth and development of children but also pose a great threat to their lives<sup>[9,10]</sup>.

For children with HIE, conventional nursing was adopted in the past, i.e., the basic nursing procedures such as oxygenation, rehydration, sputum suction, nasal feeding, complication prevention, etc. were standardized to focus on the purpose of "disease improvement," which could statically control the condition in a short period of time but lacked the dynamic assessment of the disease as well as long-term care. As a result, the prognosis of children is unsatisfactory<sup>[11]</sup>. Parental participation is important in pediatric care, especially for children with HIE who need to receive standardized care at home for a long duration, and it is difficult to ensure continuity and systematic care by relying only on full-time nurses<sup>[12]</sup>. The results showed that the physical, intellectual, and psychomotor development of the observation group was significantly better than that of the control group after 3 months of nursing care, with  $P < 0.05$ , which confirms that parental participation in nursing care is more valuable under the IMCHB model. Under the guidance of the IMCHB health behavioral interaction model, parents who are responsible for 24-hour care are included in the clinical nursing work, so that they can continue to provide high-quality nursing care for the children in the time and space not covered by the



nursing staff, as well as to guide and assist the children to carry out effective training. As a result, the children's motor and neurological functions can be improved in a sustained and dynamic manner, and the quality of their prognosis can be effectively enhanced. In addition, the IMCHB model of parental participation in nursing can help parents continuously acquire systematic and scientific nursing knowledge, establish a correct view of the disease, and continuously master reliable nursing skills that are in line with the dynamic conditions of children with HIE, and, at the same time, be able to proactively regulate adverse psychological emotions and cooperate with clinical care in a more positive and proactive attitude<sup>[13]</sup>. He *et al.*<sup>[14]</sup> carried out parental participation in nursing under the IMCHB model for 25 newborn children with HIE and confirmed that after the intervention, the children's total PDI score was  $93.65 \pm 24.32$ , total MID score was  $93.76 \pm 24.99$ , and their height, weight, and head circumference were  $67.38 \pm 18.92$  cm,  $7.82 \pm 1.98$  kg,  $45.99 \pm 12.74$  cm respectively, compared with the control group that only carried out routine care ( $P < 0.05$ ), and the results are consistent with this paper.

## 5. Conclusion

In conclusion, implementing parental participation in nursing under the IMCHB model can assist neonates with HIE to further promote physical, intellectual, and psychomotor development, and has a high value for promotion.

## Disclosure statement

The author declares no conflict of interest.

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