

# Application Analysis of Accompanying Nursing Mode Combined with Health Education in Hyperbaric Oxygen Therapy for Infants with Hypoxic Ischemic Encephalopathy

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To study application effect of accompanying nursing mode and health education on infants with hypoxic ischemic encephalopathy (HIE) treated with hyperbaric oxygen therapy (HBOT) via pure oxygen chamber. 124 cases of HIE infants treated with pure oxygen chamber HBOT admitted to our department (December 2018-December 2019) were chosen as the research samples, and split into experimental group and control group according to the order of admission, with 62 cases in each group. The control group received routine nursing while and the experimental group received accompanying nursing mode combined with health education to compare the mental development index (MDI), psychomotor development index (PDI), height, weight, neurological sequelae, efficacy and family members' satisfaction with HBOT between the two groups. After nursing, MDI and PDI in experimental group were obviously higher compared with control group ( $P < 0.001$ ); After nursing, the height and weight indexes in experimental group were obviously higher compared with control group ( $P < 0.05$ ); After nursing, the total incidence of neurological sequelae in experimental group (3.2%) was obviously lower compared with control group ( $P < 0.05$ ); After nursing, the total number of effective infants in experimental group was obviously higher compared with control group ( $P < 0.05$ ); After nursing, the number of family members satisfied with HBOT in experimental group was obviously higher compared with control group ( $P < 0.05$ ). The accompanying nursing mode combined with health education can greatly improve clinical indicators of HIE infants treated with pure oxygen chamber HBOT, promote their physical and mental development, and then improve the satisfaction of the family members with pure oxygen chamber HBOT, which should be promoted and applied in clinical practice as a high-quality nursing mode.

**Keywords:** accompanying nursing, health education, hyperbaric oxygen in a pure oxygen chamber, infants

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**H**ypoxic ischemic encephalopathy (HIE) in infants refers to a severe complication caused by perinatal asphyxia, pulmonary infection, shock, etc. This disease not only has a significant

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negative impact on the intellectual development of infants, but also substantially increases the probability of death, which is extremely detrimental to the life and health of infants. Nowadays, with the prosperity and development of hyperbaric oxygen medicine, hyperbaric oxygen therapy (HBOT) with pure oxygen chamber has been confirmed to have a remarkable effect on the treatment of HIE. Since it is difficult to apply HBOT to infants for their poor treatment compliance, how to improve the effect of HBOT on HIE infants by means of high quality nursing is a key problem to be solved in clinic <sup>1-3</sup>. In addition, the family members of some children with HIE have doubts about the safety of HBOT, which to some extent hampers the application and promotion of HBOT. Therefore, nursing staff should provide scientific and efficient health education for the family members of infants to improve their trust and satisfaction with HBOT, facilitating the popularization of HBOT. Accompanying nursing refers to a “whole-process accompanying” high quality care model oriented by the needs of infants, which can not only improve the nursing quality and nursing efficiency, but also

reassure infants and their family members <sup>4-7</sup>. At present, there are few theoretical studies on accompanying nursing associated with HBOT in HIE infants. Based on this, in order to investigate the effect of accompanying nursing and health education on HIE infants treated with HBOT, 124 HIE children treated with pure oxygen chamber HBOT admitted to our department (December 2018-December 2019) were chosen as samples for study, with the research results as below.

## MATERIALS AND METHODS

### General Information

124 cases of HIE infants treated with pure oxygen chamber HBOT admitted to our department from December 2018 to December 2019 were chosen as the research samples, and split into experimental group and control group based on the order of admission, with 62 cases in each group. There was no obvious difference in general information between the two groups ( $P>0.05$ ) and the infants could be taken as the research objects. General information of the infants was shown in Table 1.

Table 1.  
Comparison of general data in infants

Group	Experimental group(n=62)	Control group(n=62)	X <sup>2</sup> /t	P
Gender			0.032	0.857
Male	30	29		
Female	32	33		
Gestational age (weeks)	38.7±1.2	38.6±1.1	0.484	0.630
Birth weight (g)	3179.2±331.0	3178.1±332.1	0.018	0.985
Clinical degree				
Mild	18	18	0.000	1.000
Moderate	32	30	0.129	0.719
Severe	12	14	0.195	0.659
Agitation score of infants	12.2±3.1	12.1±3.2	0.177	0.860
Education of family members			0.131	0.717
High school and below	28	26		
University and above	34	36		

### Inclusion Criteria

The inclusion criteria of this study were as follows: ① The family members of the infants had a full understanding of the study process and signed the informed consent; ② This study got approval

of the hospital lethics committee; ③ The infants met the HIE diagnostic criteria of HIE; ④ The infants were aged 0-6 months.

### Exclusion Criteria

The exclusion criteria for this study were as follows: ① The infants had other organ diseases, including congenital and genetic diseases; ② The infants had a large number of intracranial hemorrhage; ③ The infants had received surgical treatment.

### Methods

#### Control group

The control group received routine nursing. The nursing staff closely monitored the physical signs of the infants, and timely sterilized pure oxygen chamber.

#### Experimental group

The experimental group received accompanying nursing mode combined with health education with the main implementation steps as follows. ① Admission nursing. A strict responsibility-to-individual system was established. The infants were under the close supervision of the nursing staff since admission and the nursing staff were not changed to ensure that the infants received efficient and coherent nursing. To ensure nursing quality, the staff should have a comprehensive understanding of the data of infants, divide them according to age, cognitive level and cooperation degree, and formulate nursing plans according to their personal situation. Besides, the nursing staff should introduce the relevant information of the hospital and the department to the family members of the infants to promote their familiarity with the hospital and soothe their emotions<sup>8-11</sup>. ② Nursing before entering the chamber. The staff should routinely sterilize the pure oxygen chamber, ensure the appropriate temperature and humidity in the chamber, and inform the family members of the action principle and precautions of HBOT, improving their ability to identify risk factors and alleviating their fear and confusion due to the unknown. The family members were reminded to change clothes for the infants to avoid static electricity. ③ Nursing after entering the chamber. The nursing staff should accompany the infants throughout the whole process throughout the whole process, and should

not leave without permission. During the HBOT, the staff should pay close attention to the changes of physical signs of the infants, observe whether there was any adverse situation, report it immediately if any, and inform the families of the reasons for the adverse situation, so as to reduce their anxiety. ④ Nursing after leaving the chamber. Family members were asked to strengthen skin care for infants and prevent symptoms such as cold. Then the pure oxygen chamber was sterilized<sup>12-15</sup>. ⑤ Nursing in the ward. The staff should pay attention to the light in the ward at any time, adjust the light according to time change, apply the shading light to the incubator, and build a “bird’s nest” for the infants with baby quilts, and imitate the light and touch in the uterus to improve their sense of security and trust of the infants during the rest and reduce their restlessness and discomfort. During rehabilitation nursing, massage, touch and other nursing steps were applied to infants, and soothing and soft music was played. In addition, hands of the staff should be cleaned before nursing<sup>16-19</sup>. ⑥ Health education. In addition to health education for the family members during HBOT, the staff should fully inform families of HBOT effect to improve treatment confidence and cooperation of the family members, and inform them of the significance of the nursing steps before the implementation of nursing to dispel their doubts.

### Observation Indexes

The observation indexes of this study are as follows. ① Comparison of MDI and PDI between the two groups. The MDI and PDI of infants before and after nursing were compared according to the *Infant Intelligence Development Scale* compiled by China Children Development Center (CDCC); ② The height and weight of infants were compared. The height and weight data of infants before and after nursing intervention were collected and compared between groups and within groups; ③ The neurological sequelae of infants were compared between the two groups and the proportion was calculated, including mental retardation, motor development retardation and

cerebral palsy. ④ The efficacy was compared between the two groups of infants. Routine examination was performed on the infants, and the clinical indicators were observed. The symptoms disappeared within 7 days, which was markedly effective; The symptoms disappeared within 14 days, which was effective; The symptoms did not disappear after 14 days, which was ineffective.⑤ The family members' satisfaction with HBOT was compared between the two groups, with the score range as 0-5 stars, 5 stars as fully satisfied, 3-4 stars as satisfied, and 2 stars and below as dissatisfied. The total number of family members who were satisfied was counted.

### Statistical Treatment

In this study, SPSS20.0 was selected as the data processing software, and GraphPad Prism 7 (GraphPad Software, San Diego, USA) was used to draw pictures of the data. The study included count data and measurement data, tested by  $X^2$  and  $t$  test. The difference was statistically significant when  $p < 0.05$ .

## RESULTS

### Comparison of MDI and PDI

After nursing, MDI and PDI in experimental group were obviously higher compared with control group ( $P < 0.001$ ), as shown in Table 2.

Table 2.  
Comparison of MDI and PDI ( $\bar{x} \pm s$ , points)

Indexes	Experimental group		Control group		t	P
MDI	Before nursing	72.5 $\pm$ 5.1	Before nursing	72.4 $\pm$ 5.2	0.108	0.914
	After nursing	92.7 $\pm$ 6.1	After nursing	80.2 $\pm$ 6.1	11.409	0.000
	t	20.004	t	7.662		
	P	0.000	P	0.000		
PDI	Before nursing	75.9 $\pm$ 5.2	Before nursing	75.8 $\pm$ 5.3	0.106	0.916
	After nursing	89.5 $\pm$ 6.9	After nursing	82.1 $\pm$ 6.5	6.147	0.000
	t	12.394	t	5.915		
	P	0.000	P	0.000		

### Comparison of Height and Weight

After nursing, the height and weight indexes in experimental group were obviously higher

compared with control group ( $P < 0.05$ ), as shown in Table 3.

Table 3.  
Comparison of height and weight ( $\bar{x} \pm s$ )

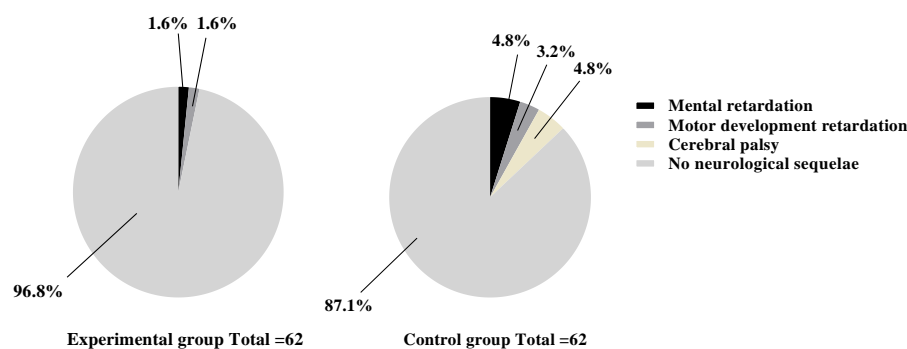
Indexes	Experimental group		Control group		t	P
<b>Height</b> (cm)	Before nursing	50.2 $\pm$ 2.5	Before nursing	50.3 $\pm$ 2.4	0.227	0.821
	After nursing	63.2 $\pm$ 1.2	After nursing	60.1 $\pm$ 2.0	10.465	0.000
	t	36.913	t	24.700		
	P	0.000	P	0.000		
<b>Weight</b> (kg)	Before nursing	4.5 $\pm$ 1.2	Before nursing	4.6 $\pm$ 1.3	0.445	0.657
	After nursing	6.5 $\pm$ 0.7	After nursing	6.1 $\pm$ 0.9	2.762	0.007
	t	11.336	t	7.470		
	P	0.000	P	0.000		

### Comparison of Neurological Sequelae

After nursing, the total incidence of neurological sequelae in experimental group (3.2%)

was obviously lower compared with control group ( $X^2=3.916, P=0.048$ ), as shown in Figure 1.

Figure 1.  
Comparison of neurological sequelae [n(%)]



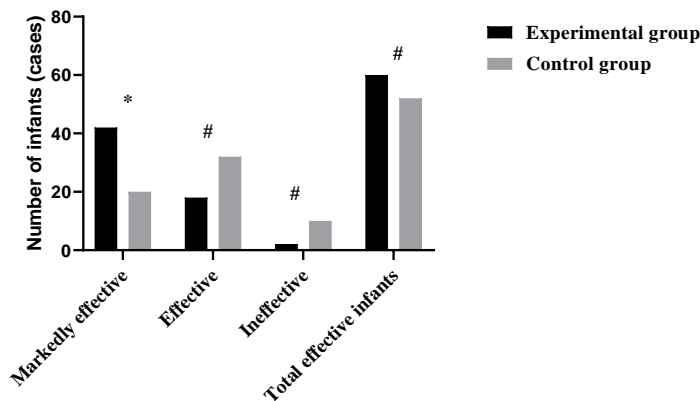
Note: The black area, dark gray and yellow area and light gray area represent mental retardation, motor development retardation, cerebral palsy and no neurological sequelae. The number of the four items in the experimental group was 1 case (1.6%), 1 case (1.6%), 0 case (0.0%), and 60 cases (96.8%), respectively while that in the control group was 3 cases (4.8%), 2 cases (3.2%), 3 cases (4.8%), and 54 cases (87.1%), respectively. Percentages were rounded off.

### Comparison of Efficacy

After nursing, the total number of effective infants in experimental group was obviously higher

compared with control group ( $X^2=5.905,P=0.015$ ), as shown in Figure 2.

Figure 2.  
Comparison of efficacy (n)



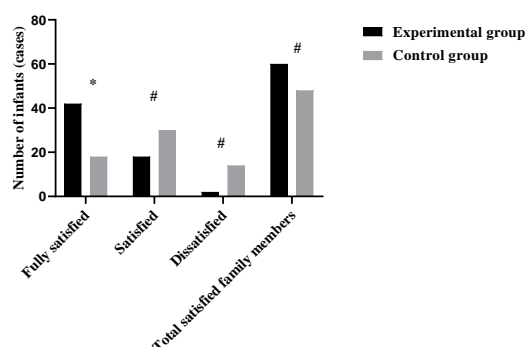
Note: The abscissa from left to right in Figure 2 represents markedly effective, effective, ineffective and total effective infants respectively, and the ordinate represents the number of infants (cases). The number of markedly effective, effective, ineffective and total effective infants in the experimental group was 42 cases, 18 cases, 2 cases and 60 cases while that in the control group was 20 cases, 32 cases, 10 cases and 52 cases. \* indicated  $P<0.001$  and # indicated  $P<0.05$ .

### Comparison of Family Members' Satisfaction with HBOT

After nursing, the number of family members

satisfied with HBOT in experimental group was obviously higher compared with control group ( $X^2=10.333,P=0.001$ ), as shown in Figure 3.

**Figure 3.**  
**Comparison of family members' satisfaction with HBOT(n)**



Note: The abscissa from left to right in Figure 3 represents fully satisfied, satisfied, dissatisfied and total satisfied family members respectively, and the ordinate represents the number of infants (cases). The number of fully satisfied, satisfied, dissatisfied and total satisfied family members in the experimental group was 42, 18, 2 and 60 while that in the control group was 18, 30, 14 and 48.

## DISCUSSION

Nowadays, the medical community has generally agreed that the efficacy of HBOT in the treatment of HIE in infants is better than that in adults. However, due to younger age and low degree of cooperation of infants, as well as doubts about the safety and efficacy of HBOT from the family members, the clinical promotion of HBOT has encountered certain obstacles. In order to improve the overall efficacy of HIE infants treated with HBOT, it is essential to implement high quality nursing. Good accompanying nursing can not only facilitate the comfort and trust of infants and their families, but also reduce the possibility of operating errors in HBOT, which is extremely important for improving the clinical indexes of children. In addition, the family members' conflict mostly comes from the unfamiliarity with HBOT. Therefore, nursing staff should carry out efficient and comprehensive health education, and explain the knowledge throughout the whole process of HBOT to the family members, which can enable them to fully understand the relevant knowledge of HBOT and HIE, eliminate their doubts, and then improve their treatment cooperation<sup>20-22</sup>.

In this study, the MDI and PDI in experimental group after nursing were obviously higher compared with control group ( $P < 0.001$ ),

and the height and weight indexes in experimental group after nursing were also obviously higher compared with control group ( $P < 0.05$ ), indicating that accompanying nursing can play an all-round and multi-level role in the process of HBOT in infants to ensure that infants can receive high quality and coherent nursing. The total number of effective infants in experimental group was obviously higher compared with control group ( $P < 0.05$ ), which also confirmed that the overall efficacy of the experimental group was more ideal. Scholar Daniel Wallence divided HIE infants treated with HBOT into study group (accompanying nursing and health education) and control group (routine nursing), and found that the total effective rate in study group was 96.7% (58/60), obviously higher compared with control group ( $P < 0.05$ )<sup>23, 24</sup>. His study demonstrates that accompanying nursing combined with health education can improve the overall efficacy of infants, which was consistent with the research results obtained in this paper.

In addition, the total incidence of neurological sequelae in experimental group was obviously lower compared with control group ( $P < 0.05$ ), indicating that health education for family members of HIE infants treated with HBOT improves their cognition, then enhances their nursing ability and

identification ability for risk factors, and leads to a lower incidence of adverse sequelae in the infants. Since the overall efficacy and physical and mental indexes in experimental group were better, the number of family members who were satisfied with HBOT treatment in the experimental group was 60, obviously higher compared with control group ( $P < 0.05$ ). This proves that trust of family members has been generally enhanced, which is more conducive to the further promotion of this therapy in clinical practice.

In conclusion, accompanying nursing mode combined with health education can effectively improve the physical and mental development of HIE infants treated with pure oxygen chamber HBOT, reduce the possibility of adverse sequelae, and further and improve the trust of family members, which should be further promoted and applied in clinical practice.

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