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CLINICAL RESEAPCH

Analysis of the Effect of Stage Modified Early Warning Score-based Management Process on Suppurative Encephalitis Child Patients

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Keywords

Modified early warning score, Stage management process, Suppurative encephalitis, Nursing administration

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Abstract

Objective To analyze the effect of modified early warning score (MEWS)-based staged management process on suppurative encephalitis children, so as to provide reference for the nursing administration of suppurative encephalitis children. **Methods** A total of 90 child patients with suppurative encephalitis, who were diagnosed and conformed to the inclusion criteria in our hospital from Mar. 2018 to Mar. 2020 were selected, and they were divided into observation group and control group. The control group was treated with routine nursing, and the observation group was treated with staged management process based on MEWS. The clinical index, clinical effects and living quality were compared between the two groups. **Results** The clinical index, clinical effects and living quality of the observation group were significantly better than those of control group (P<0.05). **Conclusion** The staged management process based on MEWS can promote the recovery of children's bodily functions and improve the living quality of children, and has a high short-term and long-term clinical efficacy.

Introduction

Suppurative encephalitis is a common neurological disease in children, with a high incidence, and can easily lead to permanent brain injury and affect the quality of life for the affected children. Currently, about 1/3 of children with suppurative encephalitis have sequelae such as mental retardation, epilepsy, and hydrocephalus after treatment [1-4]. Modified early warning score (MEWS), which can be used to improve medical staff’s cognition of children's disease risk by using a quick scoring system and provide reference for clinical intervention, has been widely used in pediatric emergency and pre-hospital rescue [5-7]. Staged nursing is a step-by-step nursing intervention mode, based on the acceptance degree and rehabilitation characteristics of affected children at various stages, aiming at fully meeting the nursing needs of affected children [8,9]. In this study, a staged management process based on MEWS was adopted to intervene in children with suppurative encephalitis, which achieved good efficacy. The results were reported as follows.

Materials and Methods

Clinical information

Study subjects

A total of 90 children with suppurative encephalitis, who were diagnosed in our hospital from March 2018 to March 2020 and met the inclusion criteria, were selected as the research objects, and they were divided into an observation group and a control group, with 48 cases in the observation group and 42 cases in the control group. All family members of the children gave informed consent. There was no significant statistically difference between the two groups in general information such as gender, age, and disease course (P>0.05), and the data were comparable (P>0.05), as shown in Table 1.

Table 1. Comparison between the two group in general information

Groups	n	Gender[n(%)]		Age	Course of diseases ($\bar{x}$±s,
		Male	Female	($\bar{x}$±s, year old)	month)
Observation group	48	25	23	2.79±0.52	8.63±1.47
Control group	42	23	19	2.82±0.55	8.59±1.63
χ^2/t		0.065		-0.266	0.122
P		0.799		0.791	0.903

Inclusion criteria

① Confirmed as suppurative encephalitis via clinical diagnosis; ② The child having normal intelligence and growth prior to the disease

Exclusion criteria

① Premature infants, newborns, or postterm infants; ② Meningitis with moderate to severe malnutrition, mental disorders, or infection by other types of pathogen

Methods

Control group

The children in the control group received routine care, were given close attention to the changes of vital signs of the children; routine medication guidance and life guidance were carried out to the children; the corresponding health education was provided to the families of the children.

Observation group

The children in the observation group received staged management based on early warning, as detailed as below:

MEWS assessment

Brigton's MEWS scale was used to assess the children from three aspects: response, cardiovascular system, and respiratory system, as shown in Table 2. Related nursing was carried out according to the results of children's condition assessment. For the children with a score ranging from 0 to 1, no treatment was required and the observation was continued; For the children with a score of 2, the nurse in charge was notified, the urine output and fluid balance were recorded and calculated, and the likelihood of pain and fever were included in consideration; For the children with a score a score of 3, a dynamic assessment was performed and the specialist nurse was notified; For the children with a score a score of 4, the pediatric resident was notified to be present within 15 minutes and the children were transferred to the intensive care unit.

Urgent nursing

① Respiratory related care: assisting the children to take the head 20° ~30° high, reducing venous return, tilting the head of the vomiting children to the side, avoiding the vomit from entering into the respiratory tract, and keeping the children's respiratory tract unblocked ②High fever related care: physical

cooling of the children through cooling instrument treatment which included wiping off the child's sweat in time, changing sheets frequently, and measuring the child's temperature every 30 minutes. For the children with persistent high fever, the "artificial hibernation" method was adopted to cool down; For the children combined with epilepsy, they were provided with appropriate sedation care, kept in a quiet environment and protected from stimulations caused by external factors, meanwhile with appropriately increases in the height of the children's bed railing, and also the family members were asked not to leave the ward easily lest the children fall from the bed. ③Language stimulation: For children who had fallen into a coma, their parents were instructed to repeatedly call the children's name or tell them stories, and appropriate music was played to stimulate the children and promote their awakening. ③Diet care: performing nasal feeding for dietary care of children, during which attention was paid to the oral hygiene maintenance of the children, and the children were instructed to eat more high-protein, high-calorie and high-vitamin foods to ensure their own energy supply. For children with malnutrition, intravenous nutritional supplementation is used.

Stable-period nursing

① Child related nursing care: regularly massaging the children's muscles in the early stage to prevent the children's muscle atrophy and joint atrophy, and assisting the children to perform systemic functional exercises. For children who could swallow on their own, the gastric tube was taken out as soon as possible for oral eating to promote the rehabilitation of the children's sense of taste and chewing function; In the later stage, according to the functional recovery of the children, the children were instructed to perform proactive and passive movement with a large range and daily living training. ②Health education for the children's family members: launching health education activities via distributing brochures, watching promotional videos and carrying out one-to-one propaganda and education by explaining in detail the etiology, symptom management, treatment plan, and common complications and methods to prevent recurrence of pediatric suppurative encephalitis; During the period, the importance of stable-period nursing should be emphasized to the family members.

Post-discharge nursing

When the children were discharged from hospital, the discharge plan was issued to them and the health management file of the children was established; After discharge, the children were followed up through outpatient reexamination, telephone return visit and WeChat inquiry, which were conducted for understanding the rehabilitation condition of the children, solving the problems encountered in the rehabilitation process of the children, and guiding the family members to carry out rehabilitation training and health care such as training for language function, sensory function and motor function for the children.

Tablet 2 MEWS assessment scale

Dimensions	0 points	1 point	2 points	3 points
Responses	Normal	Lethargy	Irritability	Coma or unconscious
Cardiovascular system	Ruddy complexion, CRT<2 s	Pale complexion，3 s<CRT<4 s	Grey complexion, CRT>4 s, increased heart rate 20 min/per time	Grey complexion, clammy skin，CRT≥5 s, increased heart rate 30 min/per time or bradycardia
Respiratory system	Normal, no aspiratory pitting	Increased breathing rate 10 times/min or a three-concave sign, or	Increased breathing rate 20 times /min or a three-concave sign,	Increased breathing rate 30times/min or decreased breathing rate 3times/min，a

	oxygen concentration≥30%	or oxygen concentration≥40%	three-concave sign, or oxygen concentration≥40%

Note: As long as one item in the same project meets the standard, the points can be earned. When there is more than one standard in the same project, the highest score will be taken and will not be accumulated.

Observation index

Clinical index

The time for symptoms to disappear, the time for body temperature to be corrected, the time for peripheral white blood cells to recover, the time for cerebrospinal fluid white blood cells to recover and the time of hospital stays in the two groups were observed and compared.

Clinical efficacy

The total effective rate of clinical treatment is used to evaluate the short-term curative effect on the children [10]: complete disappearance of the clinical symptoms and cerebrospinal fluid examined to be normal are considered as cured; disappearance of most of the clinical symptoms and significantly improved results of cerebrospinal fluid examination were considered as improved; Neither the clinical symptoms nor the results of cerebrospinal fluid examination showing significant improvement was considered as invalid; Total effective rate of clinical treatment= (cured + improved) /Total number of cases ×100%; The Glasgow Coma Score (GCS) was used to evaluate the long-term efficacy of children [11]: a GCS score of 1 to 4 indicates that the children have died or had serious sequelae, and the long-term effect was poor; A score of GCS>5 indicates that the children had no sequelae or mild sequelae; The higher the score was, the better the long-term curative effect on the child would be.

Quality of Life

The Children's Subjective Quality of Life Questionnaire (ISLQ) was used to evaluate and compare the quality of life of the two groups of children from 8 dimensions: family life, peer life, school life, living environment, self-cognition, depression experience, anxiety experience and physical emotion.

Statistical analysis

Statistical analysis was performed using SPSS 20.0. The count data were compared by the $\chi 2$ test, and the measurement data were expressed as mean ± standard deviation ($\bar{x}\pm s$) and compared by the *t*-test. $P<0.05$ was considered as statistically significant.

Results

Comparison between the two groups in the clinical indices of the children

The time for symptoms to disappear, the time for body temperature to be corrected, the time for peripheral white blood cells to recover, the time for cerebrospinal fluid white blood cells to recover and the time of hospital stays of the observation group was significantly lower than that in the control group ($P<0.05$), as shown in Table 3.

Table 3 Comparison between the two groups in the clinical indices of the children（$\bar{x}\pm s$）

Groups	N	Time for symptom to disappear	Time for body temperature to be corrected	Time for peripheral white blood cells to recover	Time for cerebrospinal fluid white blood cells to recover	Time of hospital stays
Observation group	48	7.24±1.45	2.36±0.55	5.72±1.31	12.56±2.13	16.54±3.21
Control	42	8.12±1.63	3.25±0.61	7.65±1.96	16.62±3.37	17.99±3.45

group					
t	-2.711	-7.278	-5.552	-6.918	-2.065
P	0.008	0.000	0.000	0.000	0.042

Comparison between the two groups in the clinical effect on the children

The total effective rate and GCS score of the observation group were significantly higher than those of the control group (P<0.05), as shown in Table 4.

Comparison between the two groups in the quality of life of the children

The scores of all dimensions of quality of life in the observation group were significantly higher than those in the control group (P<0.05), as shown in Table 5.

Table 4 Comparison between the two groups in the clinical effect on the children

Groups	n	Cured	Improved	Invalid	Total effective rate[n(%)]	GCS score（points）
Observation group	48	30	16	2	46（95.83）	7.37±1.29
Control group	42	22	11	9	33（78.57）	5.62±1.83
χ^2/t					6.221	5.293
P					0.014	0.000

Table 5 Comparison between the two groups in the quality of life of the children（$\bar{x}\pm s$）

Dimensions	Observation group（n=48）	Control group（n=42）	*t*	*P*
Family life	$20.37^{\pm}4.68$	15.62±4.57	15.081	0.000
Peer life	$18.62^{\pm}3.67$	14.62±3.48	5.284	0.000
School life	$26.54^{\pm}4.05$	18.37±3.21	10.500	0.000
Living environment,	$15.28^{\pm}3.41$	15.21±3.39	0.097	0.923
Self-cognition	$18.12^{\pm}3.88$	14.23±3.09	5.210	0.000
Depression experience	$22.65^{\pm}3.64$	21.64±3.57	1.325	0.189
Anxiety experience	$27.62^{\pm}5.84$	23.24±4.23	4.023	0.000
Physical emotion	$20.15^{\pm}3.66$	16.35±3.14	5.247	0.000

Discussion

Suppurative encephalitis is a more serious intracranial infection, which usually manifests as headache, vomiting, fever in clinic, with a higher incidence in infants and young children. Suppurative encephalitis has no obvious regularity in the change of its condition, and is easy to cause subdural effusion, damage the nerves of the affected children, and endanger the life of the affected child. Studies have concluded that [15] interventions based on reasonable rehabilitation and health-care measures can lay the foundation for the benign development of children's diseases, thus improving the prognosis of the affected children. Currently, routine nursing is usually used clinically in the management of children with suppurative encephalitis, but it lacks standardization

and planning and has poor clinical efficacy [16-18]. In this study a staged management process based on MEWS was adopted to intervene in children with suppurative encephalitis, which achieved good results. This study found that MEWS-based staged management process can significantly shorten the time for symptoms to disappear, the time for body temperature to be corrected, the time for peripheral white blood cells to recover, the time for cerebrospinal fluid white blood cells to recover and the time of hospital stays, eventually improving the short-term and long-term curative effect on children with suppurative encephalitis. The reason for the above phenomena lay in ①MEWS assessment: MEWS conducted a comprehensive and rapid assessment of the child's condition from the three aspects, namely behavior, cardiovascular system, and respiratory system, and quantifies the score of affected children's condition, so that nursing staff can promptly identify critically ill children and children with a potential risk of disease deterioration. Gang Ye et al. [19] have demonstrated that when the MEWS score is more than 2.5 points, it had 90% specificity and 65% sensitivity in predicting the deterioration of children's disease. Therefore, MEWS assessment can provide a theoretical basis for the clinical diagnosis and treatment of children with suppurative encephalitis; meanwhile, targeted interventions are carried out on affected children according to their different scores of MEWS, which is conducive to improving the accuracy of early treatment and nursing management of the children, thus improving the clinical indicators of the children. ②Urgent nursing: Jia L's research has shown [20] that reasonable nursing in the acute phase is key to improving the curative effect on children with encephalitis. This study carried out respiratory care for the affected children in the acute period so as to ensure the smooth airway of the children during the treatment and avoid the effect of respiratory obstruction on the curative effect on the children, and adopted different nursing methods to carry out targeted nursing which was also combined with reasonable diet intervention and nutrition management for children with high fever, children with epilepsy and children in coma, which was effectively conducive to promoting the rehabilitation of different types of the children and improving the short-term and long-term the curative effect on the children.

At the same time, this study found that MEWS-based staged management process can significantly improve the quality of life of the affected children, which is inseparable from the stable-period and post-discharge nursing of the children. ①Stable-period nursing: By associating the results of the previous nursing with the children's rehabilitation condition, we strengthened the rehabilitation training of those functions of children, laying a foundation for the improvement of the children's quality of life; moreover, we provided health education to the family members of the children to improve their cognition of pediatric suppurative encephalitis, which enables the family members to better assist the nursing staff to provide reasonable care to the children, improve the quality of nursing, and promote the children's quality of life; ②Post-discharge nursing: owing to the fact that the quality of care after discharge is also key to the quality of life of the children, this study followed up the children discharged from the hospital in a variety of ways, so that the nursing staff can be timely aware of the disease changes of the children after discharge, and provided professional guidance for the care of the children after discharge through guiding the children's family members to strengthen the rehabilitation training of the children's language, motor and cognitive functions to further improve the quality of life of the children.

In conclusion, MEWS-based staged management process can promote the rehabilitation of suppurative encephalitis-affected children's physical functions, improve the quality of life of the children, with better short-term and long-term curative effects.

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Declaration of conflict-of-interest

The authors declare no conflict-of-interest.

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