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The Implementation Value of Trajectory Nursing Model in Children with Neuroblastoma

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Abstract

Nursing practices aiming at the best pediatric neuroblastoma patients receiving chemotherapy ought to be stressed. This research evaluates the effectiveness of trajectory nursing model on outcomes of the pediatric patients. We included 78 patients with neuroblastoma seen and treated at our institution from February 2021 to February 2023. They were evenly and randomly assigned to a control group (n=39) where only standard nursing was offered and an experimental group (n=39) which received trajectory nursing intervention. Children in the group who received the experimental intervention reported lower levels of tiredness than children in the control group, and the difference was statistically significant ($P < 0.05$). The quality of life scores using the 'Medical outcome study short form 36, SF-36' and the 'European organization for research and clinical oncology quality of life questionnaire, EORTC-QLC-C30' improved significantly in both groups after nursing and the experimental group reported significantly better improvement in physical function, emotional situations and social function ($P < 0.05$). Furthermore, other symptoms like nausea, pain and breathlessness, as well as appetite loss were more reduced in the experimental group ($P < 0.05$). Moreover, nursing, the trajectory way, decreased physical fatigue, and heightened the quality of life, thus minimizing the side effects in children with neuroblastoma, as identified in this study. Also, a strong nurse-patient relationship was developed and families were left satisfied with the produced care, meanly because it was a nursing care modality that was one of the foundation of pediatric oncology care which can be taken off in cancer treatment of children,

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Keywords: - trajectory nursing model; neuroblastoma; nursing intervention

INTRODUCTION

Neuroblastoma is an abnormal lump of cells that happens most frequently in kids; it ordinarily starts in the medulla of the adrenal glands or the meeting point of the sympathetic cells which are in the chest and belly of the body. Its frequency is just lower than the neuroblastoma of the central nervous system and the leukemia in the pediatric sector, which is the cause of about 8–10% of all children's cancer cases【1-2】. Although the figures of the mentioned group of tumors are very high, they also meet the age of 5 in the process. The figures of neuroblastoma are mainly between 17–22 months which is the middle-range among one-year-old infants. They show before the age of five. Neuroblastoma may be considered to be a great risk to a child's life because of its fast spreading, aggressiveness, critical clinical influences, and the number of patients who have survived the attack【3-4】. The treatment of neuroblastoma frequently consists of different methods including surgery, radiotherapy, chemotherapy, immunotherapy, and target therapies at the molecular level. Of late the progress in precision medicine and genomic profiling has introduced the novel therapeutic aims such as ALK inhibitors and GD2-directed immunotherapy【5】. The advances are not without limitations as the rates of survival especially in high-risk neuroblastoma patients are still low touching about 40–50% within a period of five years. Our ability to fight neuroblastoma is enhanced by the use of comprehensive treatment which takes the advantage of recent advances in radiotherapy, chemotherapy, and immunotherapy. The inclusion of biological agents and tumor vaccination represent the other important aspects of improved patient treatment. From the very beginning, patients will be matched to these new therapies based on their individual genomic information along with the development of cutting-edge technology for DNA diagnostics【6-7】. Therefore, a real holistic solution is the need of the hour and for nursing as well to make the complications less during the treatment, to ensure better QoL, and to help recovery.

In recent years, changes in medical practices have focused more on patient-centered care, leading to new clinical nursing models【8】. One such model, the trajectory nursing model, has shown potential. This model was adapted from chronic disease trajectory theory and individualizes nursing care according to the symptom and demand characteristics of patients in different stages of disease by utilizing primary prevention strategies and personalized nursing intervention programs to promote the effectiveness of the medical treatment and

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quality of life (QoL)【9-10】. The application of a trajectory nursing model in chronic diseases such as diabetes mellitus and breast cancer has been verified, which can improve the compliance, relieve symptoms and improve QoL. However, research on its suitability in pediatric oncology or neuroblastoma is still lacking【11】. Therefore, our research evaluated whether a trajectory nursing model could increase QoL, reduce adverse events and enhance overall survival (OS) by reducing off-time treatment for patient with neuroblastoma that would be conducted in response to concerns surrounding several vulnerabilities related to the rarity, complexity, evolving eligibility criteria for clinical trials, therapeutic innovations for managing relapsed/refractory disease throughout therapy development and improving health-related quality of life (HRQoL). The entire data obtained from this study will help provide insight into whether this kind of model should be applied to pediatric oncology. By providing a structured and tailored approach, this model has the potential to enhance supportive care for children with neuroblastoma, leading to better clinical outcomes and an improved quality of life for these young patients.

METHODOLOGY

Data and methods

Normal data

As the research subjects, 78 children with neuroblastoma who were being treated in our hospital between February 2021 and February 2023 were separated into the controlling team (n=39) and the research team (n=39) using various nursing techniques. And a retrospective analysis of their clinical data was performed. There were 14 female and 25 male patients in the experimental group with a mean age of (2.20±0.80). There were 8 patients of stage II for clinical stage, 22 patients of stage III for clinical stage, and 9 patients of stage IV for clinical stage. The experimental group consisted of 24 male and 15 female children with a mean age of (2.30±0.70). According to the clinical stage there were 10 children of stage II,21 children of stage III, and 8 children ofstage IV. After statistical analysis, there was no discernible disparity between the two teams of children's baseline data (P <0.05). See Table 1.

Table 1 Analysis of the two teams' baseline data

team	n	Gender (Male/Female)	Age （years）	Clinical points (II/III/IV)
control team	39	25/14	2.20±0.80	8/22/9
research team	39	24/15	2.30±0.70	10/21/8

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x^2 / t	0.055	0.289	0.268
P	0.815	0.774	0.874

1.1 Inclusion and Exclusion Criteria

Inclusion criteria: (1) All of the clients had neuroblastoma, according to the diagnostic standards [11]; (2) All patients underwent pathological examination and were clearly diagnosed as neuroblastoma; (3) The patients with more than 6 months of expected survival time; (4) The patients with normal intellectual development; (5) The research's informed consent was obtained from the kids' parents; (6) The hospital's ethics committee gave it its blessing.

Exclusion criteria: (1) non-caregivers of the parents of the children; (2) Those with severe gastrointestinal reactions; (3) Those with severe infection; (4) Those with peripheral vascular disease; (5) Those with poor compliance and not cooperating with the researcher .

Methods

Children in the control group received routine nursing intervention, and nursing staff were required to implement nursing measures in accordance with doctor's orders and policies, including routine health education, psychological counseling, nutritional support, vital sign monitoring, and discharge guidance and so on.

The children in the study group were intervened with the trajectory nursing model, including: (1) Admission assessment and trajectory staging preparation. The disease condition data of children with neuroblastoma were collected, and the children with neuroblastoma were evaluated by daily life behavior, disease-related behavior and self-concept behavior, and their trajectory stages were clarified, which were divided into four stages of onset diagnosis period, perioperative period, radiotherapy and chemotherapy period and stable period. (2) Goal setting. According to the clinical data and trajectory stage of children with neuroblastoma, individualized nursing goals were formulated for them, and the goals were optimized and ranked, while helping children build confidence in active treatment and enhance their treatment compliance. (3) Plan. According to the condition and the trajectory stage of children with neuroblastoma, hospital of taking care of the children were needed for intervention. (4) Implementation. It was necessary to communicate with parents according to the trajectory stage, environment and specific problems of children with neuroblastoma, carry out health education, care, monitoring and motivation and other nursing measures, and at the same time provide individual cases and support nursing concepts during the nursing process. The nursing

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staff should explain each trajectory stage of neuroblastoma, and make targeted and real-time adjustments at the same time, 30min/time, each trajectory stage should be intervened 3 times. Including: ①Explaining neuroblastoma-related knowledge, treatment methods, possible complications, precautions, etc.; ②Carrying out psychological nursing interventions for children with neuroblastoma and their parents, often caring for children and helping them improve their negative emotions and erroneous cognition, so that they can face the disease with a positive attitude; ③Choosing good cases to motivate children with neuroblastoma, and enhance the confidence of children and their parents in treatment.

Observation indicators

(1) Fatigue degree: The Piper Fatigue Scale, which ranges from 0 to 7, classified children with neuroblastoma in the two teams as either mildly or not at all fatigued (0-3 points), moderately fatigued (4-6 points), or severely fatigued (>7 points). (2) Quality of life: The SF-36 quality of life scale, which includes five categories of physical function, role function, emotional function, social function, and overall health, was used to compare the two teams of children with neuroblastoma. The children's functional condition improves as the grade rises. (3) Quality of life:The life quality rating scale was used to compare the two teams' children with neuroblastoma in terms of their life quality (EORTC-QLC-C30), including six dimensions of fatigue, vomiting, pain, shortness of breath, insomnia and loss of appetite. The higher the score, the more severe the disease in children. (4) Adverse reactions: Children with neuroblastoma in the two groups had adverse responses that were recorded, treated quickly and effectively, and the incidence of adverse responses was determined. (5) Nursing contentment: In order to determine the overall nursing contentment, the nursing contentment of parents of children with neuroblastoma in the two teams was compared.

Statistical methods

SPSS 21.0 was used for data analysis. Enumeration data were represented by n (%), and pairwise comparisons were performed by x^2 test; measurement data conforming to the normal distribution were represented by ($\bar{x}\pm s$), pairwise comparisons were performed by independent sample t test. P <0.05 meant the difference was significant.

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3. Results

Analysis of the fatigue degree of the two groups

There were 29 cases of mild or no fatigue, 5 cases of moderate and 5 cases of severe fatigue among the study population. 20 controls were in mild/no fatigue, 13 moderate and 6 severe fatigue. Weariness among study team was much lower than that of the control group (P 0.05). See Table 2, Figure 1

Table 2 Contrast of fatigue levels between the two teams [n (%)]

team	n	mild or none	Moderate	severe
control team	39	20 (51.28)	13 (33.33)	6 (15.38)
research team	39	29 (74.36)	5 (12.82)	5 (12.82)
x^2		4.446	4.622	0.106
P		0.035	0.032	0.745

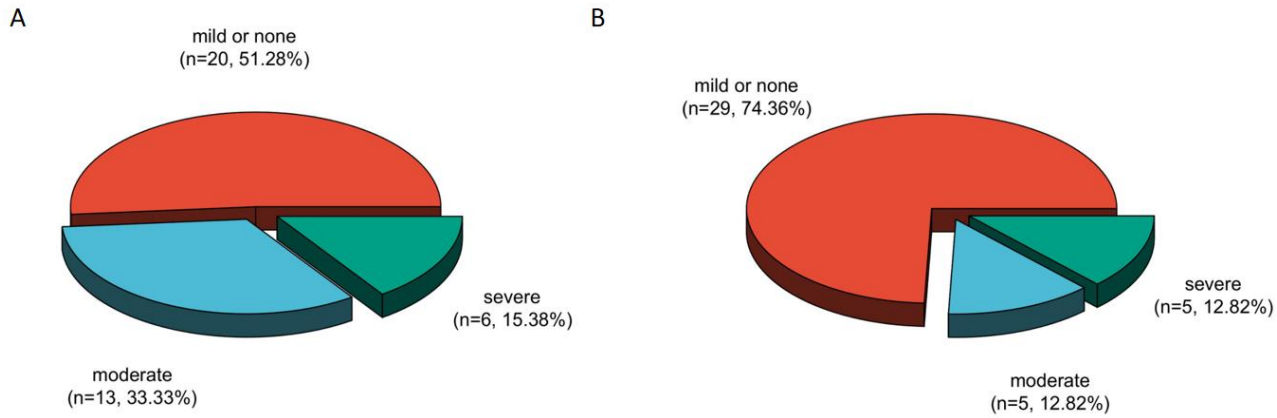

Figure 1 The distribution of the fatigue degree of the two groups

Note: Figure A is the fatigue degree distribution map of the control group; Figure B is the fatigue degree distribution map of the study group

Evaluation of the life quality in the two teams

The children in the two teams scored much higher on measures of physical function, role function, emotional function, social function, and overall health after nursing than they did before (P<0.05);and after nursing, the study team's grades on the aforementioned tasks improved more considerably than those of the controlling team's(P <0.05). See Table 3, Figure 2.

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Table 3 Contrast of SF-36 grades between the two teams ($\bar{x} \pm s$)

group	time	bodily function	role function	emotional function	social function	overall health
control group (n=39)	Before Nursing	48.27±12.34	33.41±12.12	49.66±13.33	63.14±15.66	60.45±14.28
	after care	57.66±15.22 *	45.12±14.44 *	58.12±15.56 *	70.25±16.22 *	69.56±15.12 *
Research group (n=39)	Before Nursing	48.34±12.64	33.98±12.25	49.89±13.45	63.66±15.77	60.56±14.49
	after care	68.12±18.23 *#	56.69±16.89 *#	67.12±15.89 *#	79.13±17.11 *#	78.23±16.56 *#

Note: Compared with before nursing, * indicates$P$ <0.05; contrasted with the controlling team after nursing, # indicates P <0.05

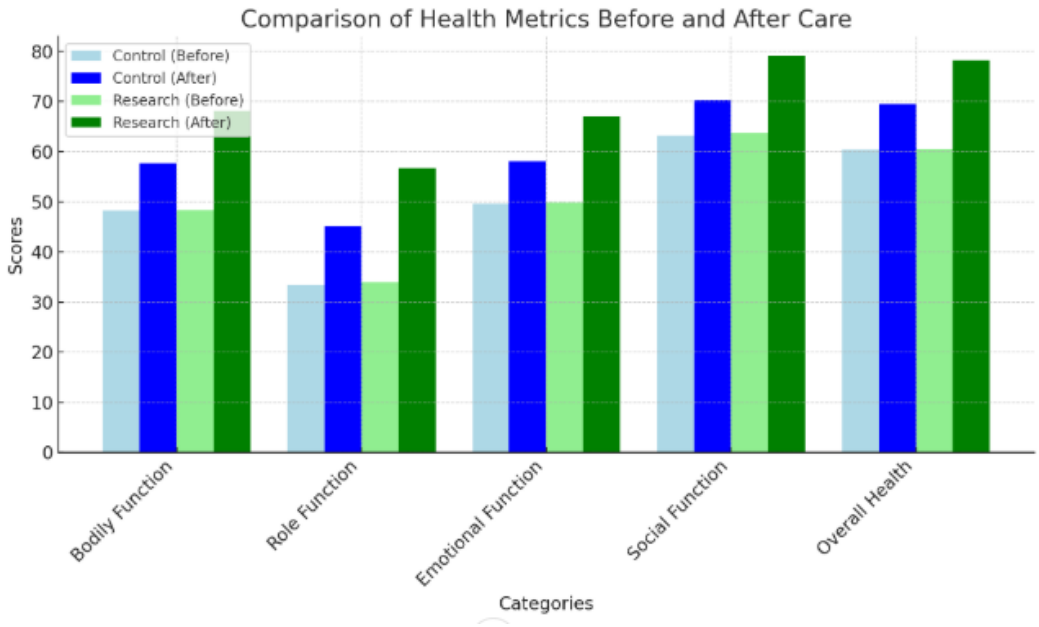

Figure 2 Contrast of life quality grades between the two teams

Note: Figure A is the comparison of the physical function score of children in the control group and the research group; Figure B shows a contrast of the children's role function scores from

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the research team and the controlling team; Children in the controlling team and the study team's emotional function scores are contrasted in Figure C; Children in the controlling team and the research team's social function scores are contrasted in Figure D; Figure E shows a contrast of the children's overall health scores from the research team and the controlling team; * indicates P ＜0.05; * indicates P ＜0.01

Analysis of life quality in the two teams

Children in both teams scored much lower after breastfeeding on measures of exhaustion, nausea, discomfort, shortness of breath, sleepiness, and appetite loss than they did before nursing (P < 0.05). After breastfeeding, the children in the study team's grades fell lower than those of the controlling team by a greater margin (P < 0.05).See Table 4, Figure 3.

Table 4 Contrast of EORTC-QLC-C30 grades between the two teams ($\bar{x} \pm s$)

group	time	fatigue	Vomit	pain	Shortness of breath	Insomnia	loss of appetite
control group (n=39)	Before Nursing	65.65±15.04	56.44±16.85	45.84±13.57	49.35±13.66	42.76±12.64	53.37±14.48
	after care	43.56±12.11*	39.78 ±11.02*	36.59 ±9.56*	38.12 ±10.59*	34.96 ±9.89*	42.12 ±12.96*
Research group (n=39)	Before Nursing	65.56±15.05	56.97±16.52	46.01±13.45	49.11±13.89	43.02±12.55	53.59±14.59
	after care	32.69±9.88*#	29.45±9.56*#	27.49±8.97*#	29.11±8.12*#	25.98±9.56*#	31.46±10.88*#

Note: Contrasted with prior to nursing, * indicates P <0.05; contrasted with the controlling team after nursing, # indicates P <0.05

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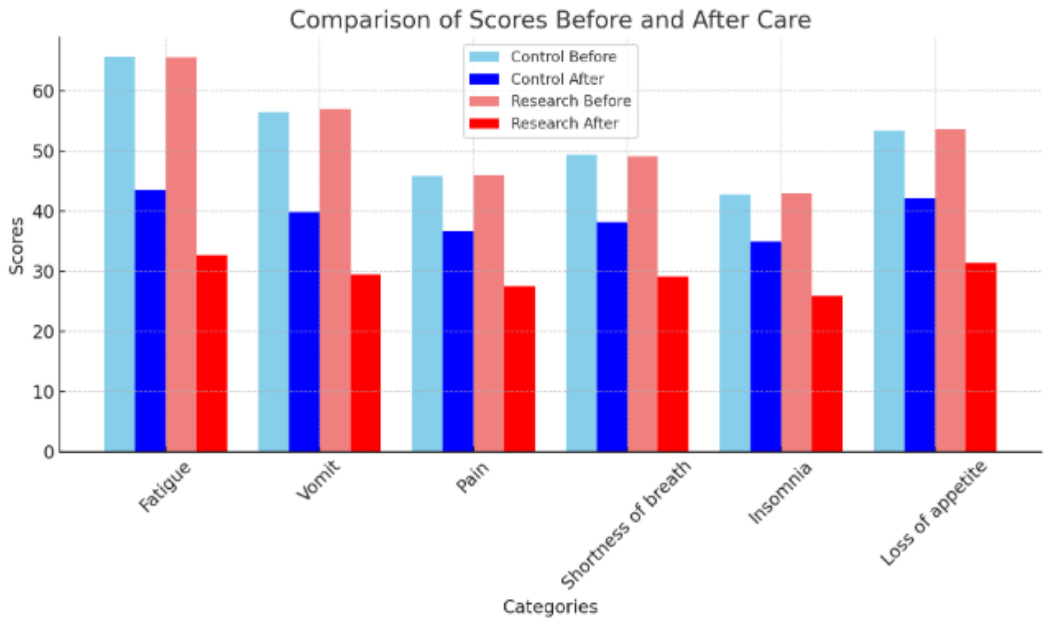

Figure 3 Contrast of EORTC-QLC grades between the two teams

Figure A shows the tiredness grade contrast between the research team and the controlling team; Figure B shows a contrast of the children's vomit scores from the research team and the controlling team; Children in the controlling team and the study team's pain scores are contrasted in Figure C; Children in the controlling team and the study team's shortness of breath scores are contrasted in Figure D; Figure E compares the scores for insomnia in the study team and the controlling team; Figure F compares the grade for appetite reduction in the study team and the controlling team; *** indicates P <0.001; **** indicates P <0.0001

Analysis of the two teams' respective risks of adverse effects

The study team's incidences of oral infections, marrow suppression, phlebitis, venous extravasation, and gastrointestinal responses were considerably higher than those of the controlling team in these conditions (P <0.05). See Table 5.

Table 5 Contrast of the two teams' rates of unfavorable responses [n (%)]

team	no	oral infection	myelosuppression	Venous extravasation and phlebitis	digestive tract reaction
control team	39	12 (30.77)	30 (76.92)	13 (33.33)	26 (66.67)

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research team	39	1 (2.56)	15 (38.46)	4 (10.26)	12 (30.77)
x^2		11.169	11.818	6.093	10.058
P		0.000	0.001	0.014	0.002

Parents in the two groups' contentment with nursing was surveyed

The total nursing satisfaction of parents in the research group was 97.44% (38/39), and that in the control group was 79.49% (31/39). Between the two teams, there was a substantial disparity in the overall nursing contentment of the parents (P <*0.05*) . See Table 6 and Figure 4.

Table 6 Contrast of the two teams' contentment with nursing [n (%)]

team	n	Very satisfied	satisfy	dissatisfied	total contentment
control team	39	15 (38.46)	16 (41.03)	8 (20.51)	31 (79.49)
research team	39	23 (58.97)	15 (38.46)	1 (2.56)	38 (97.44)
x^2					6.155
P					0.013

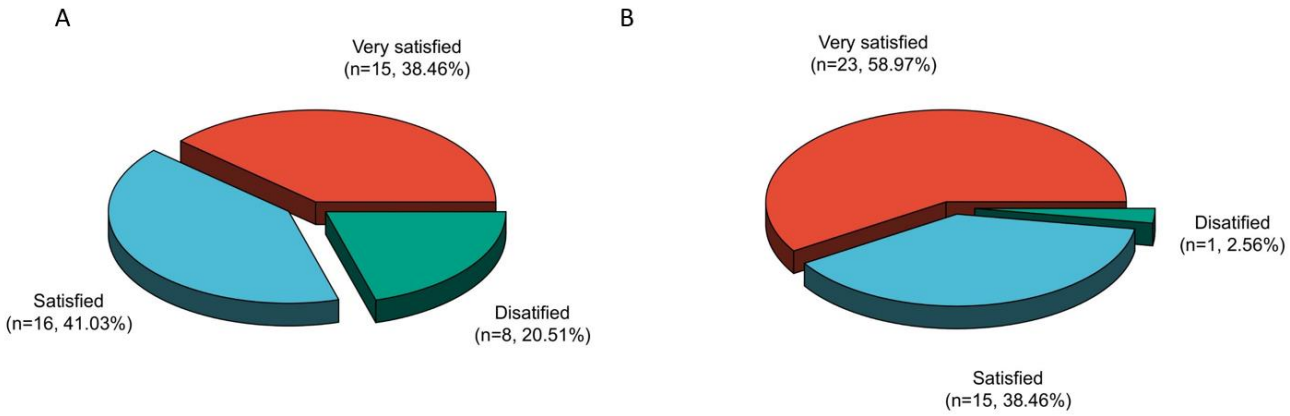

Figure 4 Distribution map of parents' nursing satisfaction in two groups

Note: Figure A is the distribution map of parents' nursing satisfaction in the control group; Figure B is the distribution map of parents' nursing satisfaction in the study group

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Discussion

Currently, neuroblastoma is a prevalent type of serious pediatric disease that puts children's health and quality of life at serious risk and burdens them mentally and emotionally [12-14] . Thus is crucial to offer children with neuroblastoma reasonable and efficient nursing interference.

The treatment and nursing of children with neuroblastoma is a relatively long process, but the traditional clinical nursing intervention can no longer meet the children's own needs, and can not intervene according to their own actual conditions, it is difficult to significantly improve the clinical curative effects of children with neuroblastoma [15-17] . The trajectory nursing model is a commonly used nursing method for chronic diseases. It has the characteristics of multi-dimensionality and evolvability. It can carry out individualized assessment of patients, adopt effective clinical guidance programs at different trajectory stages of the disease, and provide psychological support and physical support for their follow-up treatment focusing on patients' daily behaviors [18-21] .The trajectory nursing paradigm can successfully treat clients' physical and emotional issues, lessen their feeling of uncertainty,which is conducive to promoting patients to establish a positive attitude towards treatment, and promoting changes in all aspects of their behavior at the same time[22-25] . Studies have shown that the readability of most health education brochures is not good. This kind of health manual should be related to the high professional knowledge content. This leads to the lack of understanding of the disease by children and their parents, causing anxiety, depression and other bad emotions, and ultimately resulting in a decline in treatment compliance [26-27] .

The research's findings revealed that while the SF-36 grades of children in the study team were substantially greater than those of the controlling team, the fatigue degree and EORTC-QLC-C30 grades were considerably lower for the study team than for the controlling team ($P < 0.05$) . The incidences of oral infection, bone marrow suppression, venous extravasation, phlebitis, and gastrointestinal responses were substantially different between the study team and the controlling team ($P < 0.05$).It demonstrates how the trajectory nursing approach is essential for reducing levels of exhaustion and enhancing life quality for neuroblastoma patients' children following chemotherapy. The reason may be that this nursing model can provide targeted psychological support for children and parents at different stages of trajectories, which is beneficial to improve the negative emotions of anxiety and depression of children and their parents. And at the same time, it can carry out health education at different stages of trajectories, which is beneficial to enhance the disease cognition level of children and

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parents. In addition, this nursing model is to provide nursing intervention for children with neuroblastoma in three aspects: daily life behavior, disease-related behavior and self-concept behavior.Targeted nursing interference during the trajectory stage is beneficial to manage children's clinical symptoms, lower the risk of complications, and play a significant part in reducing the level of fatigue in children and enhancing their life quality[28-30] .In addition, this study conducted a survey on the satisfaction of the parents in the two groups of children. The results showed that the total satisfaction of parents in the study group was 97.44% (38/39), compared with the overall contentment of parents in the controlling team of 79.49% (31/39) was different significantly (P <0.05). It shows that the trajectory nursing model is beneficial to improve the satisfaction of parents of children with neuroblastoma.

CONCLUSION

To sum up, the trajectory nursing model can significantly alleviate the physical fatigue of children with neuroblastoma after chemotherapy, and at the same time, it can raise overall quality of life and children's life quality while lowering the chance of unpleasant responses, and help to shorten the relationship between nurses and patients, create a harmonious relationship between nurses and patients. However, the limitations of this study still need to be paid attention to. The source is a single case, and the number of cases contained is tiny. The research time is limited, and further exploration is needed in the future.

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