Research on the Application of "Internet Plus" Rehabilitation Nursing in Children with Cerebral Palsy

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Abstract: Currently, cerebral palsy has emerged as a severe disease deserving significant attention. Amidst the thriving development of internet technology, the "Internet+" platform has brought new support to the medical field. This study aims to explore the application effects of "Internet+"-based rehabilitation nursing for children with cerebral palsy. A total of 60 children with cerebral palsy were randomly divided into a control group and an experimental group. The control group received conventional rehabilitation nursing, while the experimental group underwent "Internet+"-based rehabilitation nursing intervention. Comparisons were made between the two groups in terms of overall disease recovery, fine motor function, gross motor function, activities of daily living (ADL), nursing satisfaction, and quality of life. The results showed that the experimental group surpassed the control group in motor function, ADL, disease recovery efficiency, nursing satisfaction, and quality of life assessments, with statistically significant differences (P<0.05). The application of "Internet+"-based rehabilitation nursing for children with cerebral palsy can lead to more desirable overall nursing outcomes.
Keywords: Internet+; Cerebral Palsy; Rehabilitation Nursing; Effectiveness

Introduction

Cerebral palsy (CP) is a group of syndromes resulting from non-progressive brain injuries, primarily occurring during the developmental stages of the fetus, infant, and toddler[1]. It is characterized by persistent central motor impairments, abnormal postures, and limitations in activities, often accompanied by sensory, perceptual, cognitive, communication, and behavioral disorders, as well as epilepsy and secondary muscular and skeletal issues, significantly impeding the daily living abilities of affected children[2]. Rehabilitation nursing plays an indispensable role in the recovery of CP children, yet the rehabilitation process is often hindered by factors such as time, economic constraints, and human resources, making it difficult for most children to sustain comprehensive rehabilitation in institutions. The emergence of the "Internet+Rehabilitation Nursing" model presents new opportunities for the rehabilitation nursing of CP children[3]. Especially during public health emergencies, leveraging the internet as a platform, it breaks geographical and spatial barriers, efficiently allocating medical resources, and its advantages become even more prominent[4]. This paper proposes an Internet+Rehabilitation Nursing Platform that utilizes internet technology to establish an individualized and precise home-based rehabilitation nursing model through a combination of video prescriptions and remote video assessments. This approach aims to facilitate self-management for children and their families, with the ultimate goal of accelerating their recovery.

Literature Review

Multiple studies have demonstrated that the remote family rehabilitation model based on internet technology can effectively improve motor functions and daily living abilities of children with cerebral palsy. For instance, a study selected children with cerebral palsy as participants and divided them into a remote group and a conventional group. After 12 weeks of intervention, it was found that children in the remote group scored significantly higher on the Gross Motor Function Measure (GMFM), Fine Motor Function Measure (FMFM), and WeeFIM (Functional Independence Measure for Children) compared to those in the conventional group (P<0.05). This indicates that the remote family rehabilitation model can significantly enhance the rehabilitation outcomes for these children while simultaneously alleviating the financial and time burdens on their families[5].

In addition to the remote family rehabilitation model, the integrated online and offline model has also been widely applied in the rehabilitation nursing of children with cerebral palsy. Studies that employed this combined approach for follow-up management of cerebral palsy children found that it significantly improved their language development, motor abilities, and overall quality of life. This integrated model leverages the convenience of internet technology while preserving the

benefits of face-to-face communication in traditional rehabilitation nursing, thereby enhancing the targetedness and effectiveness of rehabilitation nursing[6].

Despite the notable achievements of "Internet+Rehabilitation Nursing" in cerebral palsy rehabilitation, several issues remain to be addressed. For example, the construction of rehabilitation nursing platforms needs further improvement and optimization to meet the diverse needs of children and their families. The professional qualifications and skills of rehabilitation nurses must continue to be enhanced. Additionally, the evaluation system for rehabilitation nursing outcomes requires refinement[7].

Looking ahead, the application of "Internet+Rehabilitation Nursing" in cerebral palsy rehabilitation will place greater emphasis on personalization, intelligence, and precision[8]. By continuously optimizing rehabilitation nursing platforms, enhancing the professional qualifications of rehabilitation nurses, and improving the evaluation system for rehabilitation nursing outcomes, more comprehensive, efficient, and convenient rehabilitation nursing services will be provided to cerebral palsy children[5]. Furthermore, with the continuous development and maturation of rehabilitation robot technology, its application in cerebral palsy rehabilitation will become even more extensive and profound[9].

Description of the Study Area:
Sixty children with cerebral palsy who met the inclusion criteria and were treated in the Cerebral Palsy Rehabilitation Department of the Third Affiliated Hospital of Jiamusi University from October 2021 to October 2022 were selected and randomly divided into two groups: the control group and the experimental group, with 30 children in each group. The control group consisted of 16 males and 14 females, aged between 3 and 6 years old, with an average age of 3.8 years. The experimental group comprised 17 males and 13 females, also aged between 3 and 6 years old, with an average age of 3.9 years. There was no statistically significant difference between the two groups in terms of the selected samples (P＞0.05).

Inclusion Criteria:
All children met the diagnostic criteria outlined in the "Chinese Rehabilitation Guidelines for Cerebral Palsy" (2015 edition).
The parents of the children were fully informed and voluntarily participated in the study.
There was a fixed caregiver who was cooperative and able to adhere to the treatment and nursing plan.
The caregiver was able to use a smartphone.
Exclusion Criteria:
Children with severe cardiopulmonary diseases or severe cerebral palsy.
Children with cerebral palsy accompanied by genetic or metabolic diseases.
Children who withdrew from the study midway or were non-compliant.

Methods
The control group received routine rehabilitation nursing care, which included establishing a rehabilitation nursing record before the child's discharge. After discharge, the children were provided with skin care, oral care, dietary guidance, and instructions on the precautions for home rehabilitation nursing. Additionally, a monthly telephone follow-up was conducted.

For the experimental group, an "Internet+" rehabilitation nursing intervention was implemented:
Formation of a Rehabilitation Nursing Team: Prior to the child's discharge, a rehabilitation nursing team was established, consisting of doctors, nurses, and rehabilitation therapists. The primary tasks of the team were to communicate with the families of the children, assess their fine motor skills, gross motor skills, and activities of daily living (ADL) abilities. Based on the assessment results and the requirements of both the child and their parents, an individualized home rehabilitation nursing plan was formulated. This plan detailed the nursing items, training frequency, duration of each training session, and the expected rehabilitation nursing outcomes, setting specific goals. During the planning process, factors such as the child's home environment, personality traits, and economic conditions were fully considered to ensure the targeted and effective delivery of rehabilitation nursing guidance.

Production of Rehabilitation Nursing Instructional Videos: The entire process of the child's rehabilitation nursing guidance was filmed into videos, accompanied by detailed textual explanations. These videos and explanations clarified the rehabilitation nursing plan, key points, and precautions for the training exercises. During the home rehabilitation training, parents could refer to these videos and textual instructions to ensure that their children received correct and effective rehabilitation training and nursing guidance.

Development of a Home Rehabilitation Nursing Supervision Scale: A supervision scale was established to set standards and effectively monitor the child's rehabilitation nursing time, number of training sessions, frequency, level of cooperation, and training effectiveness. Parents were required to report the data from the rehabilitation nursing supervision scale to the rehabilitation nursing team on a weekly basis, allowing for supervision of the implementation of home rehabilitation nursing and ensuring that parents adhered to and effectively carried out the rehabilitation nursing plan. Incorporating games into the rehabilitation nursing was encouraged, using gamification to increase the child's motivation and participation in the rehabilitation process.

Real-time Video Rehabilitation Guidance: The rehabilitation nursing team conducted online video consultations and guidance once a week, adjusting the rehabilitation nursing plan and providing guidance based on the consultation results. Rehabilitation nurses provided online video guidance on activities of daily living twice a week, enabling parents to pay close attention to their child's rehabilitation progress in this area. The child was required to engage in rehabilitation for at

least 2 hours per day, 5 days a week, for a continuous period of 3 months. Additionally, attention was paid to the emotional well-being of the parents, encouraging them to establish a belief in rehabilitation, alleviate anxiety, and ensure the effective implementation of home rehabilitation nursing.

Observation Indicators

After three months of systematic rehabilitation nursing guidance, the differences between groups in terms of fine motor function scores, gross motor function scores, activities of daily living (ADL) scores, nursing satisfaction, and quality of life scores were compared. Based on the "Rehabilitation Recommendations for Motor Disorders in Children with Cerebral Palsy," the specific recovery status, symptom improvement, and mental status of children with cerebral palsy were categorized into three indicators: markedly effective, effective, and ineffective. The treatment efficacy rate was calculated as follows: (number of markedly effective cases + number of effective cases) / total number of cases × 100% [7-8].

Statistical Methods

All data from this study were analyzed using SPSS 22.0 software. Qualitative data were analyzed using appropriate tests, while quantitative data were subjected to t-tests. Statistical significance was determined at $P < 0.05$.

1. Comparison of Overall Disease Rehabilitation Outcomes in Children with Cerebral Palsy

The comparison of the overall disease rehabilitation efficacy scores between the two groups after intervention showed a statistically significant difference ($P < 0.05$). See Table 1.

Comparison of Overall Disease Recovery Status in Children with Cerebral Palsy ($\overline{x}$ ±s)

Group	Number of Cases	Markedly Effective	Effective	Ineffective	Effective Rate (%)
Control Group	30	10	13	7	76.67
Experimental Group	30	14	15	1	96.67
X² Value	-	-	-	-	5.192
P Value	-	-	-	-	0.023

Note: The table shows the comparison of overall disease recovery outcomes between the control group and the experimental group. The effective rate is calculated as the percentage of cases that were either markedly effective or effective. The X² value and P value are used to determine the statistical significance of the difference in effective rates between the two groups. A P value of 0.023 indicates a statistically significant difference ($P < 0.05$).

2. Comparison of Functional Scores in Children with Cerebral Palsy

The rehabilitation effects of the two groups were evaluated using the Activities of Daily Living (ADL) Assessment Scale, Fine Motor Function Measure (FMFM), and Gross Motor Function Measure (GMFM) from the Third Affiliated Hospital of Jiamusi University. The comparison of functional scores between the two groups after intervention showed statistically significant differences ($P < 0.05$). See Table 2 for details.

Table 2: Comparison of Fine Motor Function, Gross Motor Function, and Activities of Daily Living Scores in Children with Cerebral Palsy (±s)

Group	Fine Motor Function (FMFM)	Gross Motor Function (GMFM)	Activities of Daily Living (ADL)
	Pre-Care	Post-Care	Pre-Care
Control Group	59.14 ± 4.11	62.24 ± 5.34	103.24 ± 12.91
Experimental Group	59.17 ± 4.12	69.67 ± 5.33	104.21 ± 12.93
t-value	0.028	5.394	0.291
P-value	0.978	<0.001	0.772

Note: The table presents the mean scores and standard deviations (±s) for fine motor function (FMFM), gross motor function (GMFM), and activities of daily living (ADL) in both the control and experimental groups before and after intervention. Statistically significant differences are indicated by P-values less than 0.05.

3. Comparison of Nursing Satisfaction in Children with Cerebral Palsy

The comparison of nursing satisfaction scores between the two groups after intervention showed a statistically significant difference (P < 0.05). See Table 3 for details.

Table 3: Comparison of Nursing Satisfaction in Children with Cerebral Palsy (±s)

Group	Number of Cases	Very Satisfied	Satisfied	Dissatisfied	Satisfaction Rate (%)
Control Group	30	12	10	8	73.33
Experimental Group	30	18	10	2	93.33
X² Value	-	-	-	-	4.320
P Value	-	-	-	-	0.038

Note: The table displays the distribution of nursing satisfaction levels (very satisfied, satisfied, and dissatisfied) and the overall satisfaction rate (%) in both the control and experimental groups. The X² value and P value are used to determine the statistical significance of the difference in satisfaction rates between the two groups. A P value of 0.038 indicates a statistically significant difference (P < 0.05).

4 Comparison of Quality of Life Scores in Children with Cerebral Palsy

The comparison of quality of life scores between the two groups after intervention revealed a statistically significant difference (P < 0.05). See Table 4 for details.

Table 4: Comparison of Quality of Life Scores in Children with Cerebral Palsy (±s)

Group	Number of Cases	Pre-Care Score (Points)	Post-Care Score (Points)
Control Group	30	61.32 ± 2.38	83.74 ± 3.15
Experimental Group	30	61.61 ± 2.42	86.07 ± 3.18
t-value	-	0.468	2.851
P-value	-	0.642	<0.001

Note: The table presents the mean scores and standard deviations (±s) for quality of life before and after intervention in both the control and experimental groups. The t-value and P-value are used to assess the statistical significance of the difference in post-intervention quality of life scores between the two groups. A P value of less than 0.001 indicates a statistically significant improvement in the experimental group compared to the control group.

Results and Discussion

Cerebral palsy is one of the critical diseases in clinical practice. It is the responsibility of healthcare professionals to provide rehabilitation nursing for children with this condition, aiming to improve their motor functions and enhance their abilities in daily living activities such as self-care, feeding, and playing. The implementation of cerebral palsy rehabilitation nursing is not only essential for enhancing the children's quality of life but also crucial for their reintegration into society and realization of self-worth [9]. Children with cerebral palsy face multiple challenges, including limited physical functions and decreased daily living abilities. Professional rehabilitation nursing can alleviate the burden on families and society, helping these children gradually regain their self-care abilities [10]. Enhancing their daily activity and self-care abilities is paramount in the nursing process.

Traditional nursing models have notable deficiencies, with limited nursing measures that fail to intervene in multiple aspects, including physiological and psychological, resulting in suboptimal rehabilitation outcomes for cerebral palsy children. The "Internet+" platform-based rehabilitation nursing model effectively addresses these issues by establishing a rehabilitation team comprising doctors, nurses, and rehabilitation therapists [11]. This model utilizes assessment scales to evaluate children's functional levels and rehabilitation progress, identifying their functional impairments and health status. Based on urgent rehabilitation nursing issues faced by families, the assessment results serve as a reference to develop personalized online family rehabilitation training plans for each child. This approach not only enhances the effectiveness of rehabilitation nursing but also increases family involvement. Detailed video instructions with accompanying text materials provide parents with more intuitive and accurate guidance during rehabilitation training. Implementing strict

training supervision scales and multidimensional video rehabilitation guidance [12] ensures the systematic and holistic nature of rehabilitation nursing. Under this framework, nursing staff can promptly understand children's recent training progress, providing targeted guidance to further ensure the effective implementation of home-based rehabilitation. Incorporating games into rehabilitation nursing and family health education and support alleviates negative emotions such as anxiety, tension, and pessimism among children and their families. It significantly improves children's participation in rehabilitation, enhances parents' enthusiasm for rehabilitation treatment, and boosts the overall efficiency of rehabilitation nursing [13]. Research findings indicate that the "Internet+" platform-based rehabilitation nursing model significantly improves children's overall disease recovery rate, nursing satisfaction, quality of life, fine motor function, gross motor function, and daily living abilities. The difference in scores between the two groups is statistically significant ($P < 0.05$). In conclusion, the application of "Internet+" rehabilitation nursing in children with cerebral palsy is effective and worthy of promotion.

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