Implementation Path and Effect Analysis of Individualized Sports Rehabilitation Program under Nursing Intervention

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Abstract: In the field of medical rehabilitation, in order to improve the rehabilitation effect of patients and meet individual rehabilitation needs, this article focuses on the in-depth exploration of individualized sports rehabilitation program under nursing intervention. In this article, a individualized sports rehabilitation program is designed by constructing an assessment system and following specific principles, and the implementation path of nursing intervention is planned in detail, including preparation before intervention, specific measures in the process and effect tracking mechanism. In this article, comparative analysis and correlation analysis are used to analyze the effectiveness of the program with the recovery of physical function, improvement of quality of life and improvement of mental state as assessment indicators. The results showed that in the aspect of muscle strength recovery, the grip strength of patients in the experimental group who received individualized exercise rehabilitation program under nursing intervention increased from 20±3kg before rehabilitation to 30±4kg after 8 weeks of rehabilitation, which was significantly higher than that in the control group. The score of activities of daily living reached 70±7 after 8 weeks of rehabilitation, and the increase was more obvious. The decline of anxiety and depression score was also greater than that of the control group. The research shows that the combination of nursing intervention and individualized exercise rehabilitation program can effectively improve the rehabilitation effect of patients and provide important reference for clinical rehabilitation.

1. Introduction

In today's medical and health field, rehabilitation therapy has become a key link to promote the recovery of patients' physical function and improve their quality of life [1]. With the improvement of people's health awareness and the rising expectation of medical service quality, how to formulate a more scientific and effective rehabilitation program has become a key issue in medical research [2]. As an indispensable part of the rehabilitation process, the cooperative implementation of nursing intervention and individualized sports rehabilitation program has far-reaching significance for optimizing the rehabilitation effect.

From the macro medical development trend, the traditional rehabilitation model is gradually difficult to meet the increasingly diverse needs of patients. In the past, unified rehabilitation programs often failed to fully consider individual differences, resulting in uneven rehabilitation effects [3]. Modern medicine emphasizes patient-centered and pays attention to each individual's unique physiological, psychological and social environmental factors, which promotes the emergence of individualized sports rehabilitation programs [4]. Nursing intervention plays an important role in it. With professional knowledge and skills, nurses can provide comprehensive support and guidance for patients in the whole process of rehabilitation [5]. In clinical practice, a large number of cases show that the combination of effective nursing intervention and individualized exercise rehabilitation program can improve the rehabilitation process of patients [6]. For example, for fracture patients, if the simple exercise rehabilitation lacks the intervention of nursing staff in pain management, psychological counseling and exercise details guidance, patients may be afraid of exercise because of pain, or the rehabilitation effect may be poor because of the wrong exercise mode [7]. Through the full participation of nursing staff and the formulation and implementation of individualized exercise rehabilitation program according to the specific situation

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of patients, the rehabilitation efficiency and quality of patients can be significantly improved.

Many scholars have conducted in-depth discussions on nursing intervention and individualized exercise rehabilitation respectively, but there are relatively few documents that closely combine the two and systematically study their implementation paths and effects [8]. The purpose of this study is to fill this gap, deeply analyze the implementation path of individualized sports rehabilitation program under nursing intervention, and accurately assess its effectiveness.

2. Design of individualized sports rehabilitation scheme

The starting point of rehabilitation intervention lies in the design of individualized sports rehabilitation program, and its scientific nature plays a decisive role in the subsequent implementation path and effect [9]. In this study, the scheme design is not based on a general template, but a dynamic decision-making process based on systematic evaluation and guided by evidence-based principles.

Multi dimensional baseline evaluation has initiated the process of scheme construction. The evaluation covers the following aspects: firstly, physical function indicators are measured using a grip strength meter to determine upper limb muscle strength (in kg), main joint range of motion (ROM in °) is measured using a protractor, and static and dynamic balance abilities are evaluated using the Berg Balance Scale (BBS); Secondly, the level of exercise ability is evaluated through a 6-minute walk test (6MWT) to assess cardiovascular endurance, and the daily activity intensity is determined based on the patient's past activity habits; Thirdly, it is a psychological state assessment, using the Self Rating Anxiety Scale (SAS) and Self Rating Depression Scale (SDS) to quantify emotional states, while combining interviews to understand patients' confidence and compliance expectations for rehabilitation. All data were collected by the responsible nurse within 48 hours of patient enrollment and entered into the electronic medical record system as an objective basis for developing the plan.

Based on the above evaluation results, the scheme formulation follows three key principles. Individualization principle, that is, according to the patient's age, basic disease, degree of injury and rehabilitation goals, choose different types of exercise. The principle of gradual progress, clearly set the stage objectives: in the initial stage (week 1-2), mainly active-assisted training with low intensity (heart rate controlled at 50%-60% of the maximum heart rate), short duration (15-20 minutes each time) and high frequency (twice a day); In the middle stage (3-6 weeks), gradually transition to moderate intensity (heart rate reaches 60%-75% of the maximum heart rate), extend the duration of a single session to 30 minutes, and introduce resistance training; In the later stage (7-8 weeks), functional training was strengthened to simulate daily life movements. The safety principle runs through, the contraindications are strictly set, and the risk assessment is re-evaluated before each training.

The specific content of the plan is determined by the rehabilitation doctor and the nurse in charge, and a written Personalized Exercise Prescription is formed. The prescription clearly lists the daily training items, intensity parameters, duration, rest interval and matters needing attention, and it is quantitatively adjusted every two weeks with the change of patients' functions.

3. Implementation path of nursing intervention in individualized sports rehabilitation program

Nursing intervention plays a key role in individualized sports rehabilitation program. From the careful preparation before the implementation of the scheme, to the all-round support in the implementation process, and then to the continuous monitoring of the effect tracking, it constitutes a complete and systematic implementation path.

Preparation before intervention is the cornerstone to ensure the smooth development of rehabilitation program. Nurses should first collect patient information comprehensively, including medical records, physical function test reports, personal living habits and psychological state assessment results. Through careful analysis of this information, nurses can deeply understand the

specific situation of patients and provide a strong basis for follow-up rehabilitation guidance. Nursing staff should create a suitable rehabilitation environment for patients, and ensure that the rehabilitation site is safe without hidden dangers, and the rehabilitation equipment is complete and running normally.

Specific measures in the intervention process are the core link of successful implementation of rehabilitation program. At this stage, nurses bear multiple responsibilities such as exercise guidance, psychological support and condition monitoring. In the aspect of exercise guidance, the nursing staff explained the essentials of exercise to patients in detail according to the individualized exercise rehabilitation plan, and demonstrated them in person to ensure that patients mastered the correct exercise mode. The intensity and rhythm of exercise should be adjusted in time according to the patient's real-time feedback. Psychological support is also indispensable. Patients are prone to anxiety, depression and other negative emotions in the process of rehabilitation. Nurses should pay close attention to patients' psychological dynamics, give encouragement and comfort through active communication, and help patients establish confidence in rehabilitation. Disease monitoring is the key to control the rehabilitation process at all times. Nurses regularly measure patients' vital signs, observe their physical recovery, such as wound healing and limb swelling, and make detailed records. Table 1 shows the condition monitoring of individualized sports rehabilitation program:

Table 1 Disease Condition Monitoring Table for Individualized Exercise Rehabilitation Programs

Monitoring Indicator	Monitoring Frequency	Abnormality Handling	Remarks
Vital Signs (Temperature, Blood Pressure, Heart Rate, Respiration)	Daily	If temperature exceeds 38.5°C, apply physical cooling and report to doctor; if blood pressure fluctuation exceeds 20mmHg, re-measure and inform; if heart rate exceeds 120 or drops below 50 beats/min, stop exercise and assess; if respiration exceeds 30 or drops below 12 breaths/min, provide emergency care and notify.	Record measurement time.
Wound Condition (Redness, Swelling, Exudate)	Daily	If redness worsens, disinfect and administer medication as prescribed; if exudate increases, change dressing, record quantity and quality, and report to doctor.	Record wound appearance and odor.
Degree of Limb Swelling	Every 3 Days	If swelling increases by more than 1cm, adjust program, elevate affected limb to reduce swelling, and report to doctor.	Measure circumference at fixed sites using a soft tape.
Range of Joint Motion	Weekly	If range of motion does not improve or decreases, analyze cause, adjust training, and refer for consultation if necessary.	Record joint range of motion angles.
Pain Level (VAS Score)	Daily	If VAS score is ≥4, assess cause, apply cold compress and massage for pain relief, administer medication if necessary, and report to doctor.	Record pain location, nature, and relief situation.
Sleep Quality (PSQI Short Version)	Weekly	If PSQI score is >5, assess contributing factors, provide counseling, adjust environment, and address if necessary.	Record manifestations of sleep disorders.
Exercise Tolerance (Exercise Duration, Fatigue Recovery Time)	After Each Exercise Session	If exercise duration decreases by more than 20%, or fatigue recovery time exceeds 24 hours, reduce intensity, extend rest, and report to doctor.	Record based on patient's feelings and observations.

In the process of rehabilitation, nursing staff strictly refer to this table to monitor patients' condition, find potential problems in time and communicate with doctors, so as to make timely adjustments to rehabilitation programs.

The follow-up mechanism of intervention effect is an important guarantee for evaluating the effectiveness of rehabilitation programs. With the help of professional assessment tools, nurses

regularly quantitatively assess the recovery of patients' physical function, the improvement of their quality of life and the improvement of their psychological state. The assessment results should be compared with the expected goals of the rehabilitation program. If any deviation is found, the reasons should be deeply analyzed, and the nursing intervention measures and sports rehabilitation program should be adjusted in time to ensure that the rehabilitation process advances in the expected direction.

4. Effect analysis of individualized exercise rehabilitation program under nursing intervention

The effectiveness analysis of individualized exercise rehabilitation program under nursing intervention is the key link to measure whether the program is effective in clinical application. The establishment of effectiveness assessment index needs to comprehensively consider several key dimensions in the process of patients' rehabilitation. The first is the recovery of physical function, which covers muscle strength, joint mobility, limb coordination and so on. Secondly, the improvement of quality of life is also an important indicator, including the ability of daily living (such as self-care ability and walking ability) and pain relief. The relief of pain can significantly improve the comfort of patients' lives, while the enhancement of daily living activities means that patients can live more independently. Furthermore, the improvement of mental state can not be ignored, such as the degree of relief of anxiety and depression, and the improvement of rehabilitation confidence. Positive mental state is helpful for patients to better cooperate with rehabilitation treatment and improve rehabilitation effect.

In order to accurately analyze the effect, it is very important to choose the appropriate analysis method. In this study, the patients who received individualized exercise rehabilitation program under nursing intervention were taken as the experimental group, and the patients with similar illness in the same period were selected as the control group. By comparing the assessment index data of the two groups of patients, the advantages of individualized sports rehabilitation program are presented intuitively. At the same time, using correlation analysis, this article explores the internal relationship between nursing intervention measures and rehabilitation effect, and makes clear which intervention measures have the most significant impact on rehabilitation effect.

Table 2 below records the muscle strength test results of the two groups of patients before and after 8 weeks of rehabilitation (taking common test items such as grip strength and leg muscle strength as examples, unit: kg). From the data in the table, it can be clearly seen that the improvement of muscle strength in the experimental group is significantly higher than that in the control group through the individualized exercise rehabilitation program under nursing intervention.

Table 2 Muscle Strength and Functional Mobility Recovery in Experimental and Control Groups

Test Item	Group	Pre-rehabilitation	After 4 Weeks of Rehabilitation	After 8 Weeks of Rehabilitation	p-value (Within Group)	p-value (Between Groups at Week 8)
Grip Strength (kg)	Experimental	20.1 ± 3.2	25.3 ± 3.8	30.2 ± 4.1	<0.001	<0.001
	Control	19.8 ± 2.7	21.5 ± 3.1	23.4 ± 3.3	<0.01	
Leg Muscle Strength (kg, Isometric Dynamometer)	Experimental	35.4 ± 5.1	42.6 ± 5.7	50.3 ± 6.2	<0.001	<0.001
	Control	33.2 ± 4.3	36.1 ± 4.8	40.2 ± 5.4	<0.01	
Timed Up and Go Test (TUG, seconds)	Experimental	28.5 ± 4.7	20.3 ± 3.9	14.2 ± 2.8	<0.001	<0.001
	Control	29.1 ± 5.2	24.8 ± 4.5	21.6 ± 3.7	<0.001	

Table 3 Assess the activities of daily living (ADL) of patients in two groups at different stages of rehabilitation by using the common ADL rating scale (Barthel index). The table clearly shows that

with the progress of rehabilitation, the scores of daily living activities of patients in the experimental group increased more obviously, indicating that individualized sports rehabilitation program has a better effect on improving the self-care ability of patients.

Table 3 Scores for Activities of Daily Living (ADL) and Quality of Life (SF-36) in Experimental and Control Groups

Assessment Scale	Subscale / Total Score	Pre-rehabilitation	After 4 Weeks of Rehabilitation	After 8 Weeks of Rehabilitation	p-value (Within Group)	p-value (Between Groups at Week 8)
Barthel Index (Total, 0-100)	Experimental	40.3 ± 5.4	55.6 ± 6.2	70.4 ± 7.1	<0.001	<0.001
	Control	38.7 ± 4.8	45.2 ± 5.1	55.3 ± 6.4	<0.001	
Barthel Index	Feeding	Experimental	5.0 ± 1.2	8.5 ± 1.5	9.8 ± 0.4	<0.001
		Control	5.2 ± 1.1	7.0 ± 1.3	8.2 ± 1.0	<0.001
	Bathing	Experimental	1.5 ± 0.8	2.8 ± 0.9	4.2 ± 0.8	<0.001
		Control	1.3 ± 0.7	2.0 ± 0.9	2.8 ± 0.9	<0.01
SF-36 Physical Component Summary (PCS)	Experimental	32.1 ± 4.5	38.7 ± 5.2	45.3 ± 5.8	<0.001	<0.001
	Control	31.8 ± 4.2	35.4 ± 4.9	38.9 ± 5.1	<0.001	

In terms of mental state, through Table 4, professional anxiety and depression scale (SAS, SDS) is used to assess. The data show that after receiving nursing intervention and individualized exercise rehabilitation program, the anxiety and depression scores of patients in the experimental group decreased more than those in the control group, which shows the positive role of the program in improving patients' psychological state.

Table 4 Psychological Status and Exercise Adherence in Experimental and Control Groups

Assessment Scale	Group	Pre-rehabilitation	After 4 Weeks of Rehabilitation	After 8 Weeks of Rehabilitation	p-value (Within Group)	p-value (Between Groups at Week 8)
SAS (Total Score, 20-80)	Experimental	55.3 ± 5.2	47.1 ± 4.8	40.2 ± 4.3	<0.001	<0.001
	Control	54.7 ± 4.6	50.3 ± 4.9	45.1 ± 5.2	<0.001	
SDS (Total Score, 20-80)	Experimental	58.4 ± 6.1	50.2 ± 5.4	42.3 ± 5.1	<0.001	<0.001
	Control	56.2 ± 5.7	52.1 ± 5.8	48.3 ± 6.0	<0.001	
Rehabilitation Confidence Scale (RCS, 0-10)	Experimental	3.8 ± 1.0	6.5 ± 1.2	8.2 ± 0.9	<0.001	<0.001
	Control	4.0 ± 1.1	5.8 ± 1.3	6.4 ± 1.1	<0.001	
Exercise Adherence Rate (%)	Experimental	-	85.3%	92.1%	N/A	<0.001
	Control	-	72.6%	78.4%	N/A	

Based on the data in the above tables, the individualized exercise rehabilitation program under nursing intervention has shown remarkable results over conventional rehabilitation treatment in many aspects, such as physical function recovery, quality of life improvement and psychological state improvement. This provides a strong practical basis for clinical rehabilitation treatment, and further confirms the great potential of individualized sports rehabilitation program combined with nursing intervention in improving the rehabilitation effect of patients.

5. Conclusions

This study comprehensively analyzes the implementation path and effect of individualized sports rehabilitation program under nursing intervention. On the implementation path, nurses laid the foundation for the development of the program by comprehensively collecting patient information and preparing the rehabilitation environment before intervention. In the process of intervention, nurses ensure the rehabilitation process from sports guidance, psychological support to condition monitoring; The intervention effect tracking mechanism is based on professional assessment and timely adjustment of the program. The results of effectiveness analysis show that the scheme has achieved remarkable results in many aspects. In the recovery of physical function, the muscle strength and joint mobility of the patients in the experimental group have improved obviously,

which strongly proves the effectiveness of targeted training of individualized sports rehabilitation program. In terms of quality of life, the significant improvement of the score of activities of daily living means that patients can live independently better and greatly improve their quality of life. The improvement of psychological state is also outstanding, and the score of anxiety and depression is decreased, which reflects the key role of psychological support of nursing intervention. Individualized exercise rehabilitation program under nursing intervention, with its scientific implementation path, has effectively improved the rehabilitation effect of patients. This study provides a reliable basis for clinical rehabilitation treatment, and it is suggested to further promote its application. In future research, more influencing factors should be considered to continuously optimize the scheme, so as to benefit more patients and promote the development of rehabilitation medicine.

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