

A Study on Fall Prevention in Inpatients in the Rehabilitation Medicine Department Based on a Multidimensional Intervention Strategy

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Abstract

Objective: To analyze the effect of the multidimensional intervention strategy nursing model in a clinical nursing program for inpatients in a rehabilitation medicine department on fall prevention. **Methods:** A total of 4000 patients who were hospitalized in the Department of Rehabilitation Medicine of our hospital between January 2023 and December 2024 were included in the pilot study. Multidimensional intervention strategies were implemented to prevent falls, and the patients before and after the intervention were compared. The incidence rate and severity of fall injuries were evaluated. Nursing effects such as the MFLS fall efficacy scale, the ESCA self-care ability, and the SF-36 quality of life of the patients were compared before and after the intervention. The NSNS nursing satisfaction score was used to compare nursing satisfaction before and after the intervention. **Results:** After the intervention, the incidence of falls and the severity of fall injury in this group of patients were greater than those before the intervention, and the comparison of the indicators revealed statistical significance ($P < 0.05$). Moreover, the scores of the MFLS fall efficacy scale, the ESCA self-care ability, and the SF-36 quality of life after the intervention were also better than those before the intervention, and the comparison of the indicators was statistically significant ($P < 0.05$). In terms of nursing satisfaction, the postintervention level was significantly better than the preintervention level was, and the indicator comparison was statistically significant ($P < 0.05$). **Conclusion:** Multidimensional intervention strategies can reduce the probability of falls and the degree of injury caused by falls, reduce secondary injuries in patients during hospitalization, increase their health awareness, improve their self-care ability,

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and improve their quality of life. Patients had good hospitalization experience and accepted the nursing service.

Keywords

Multidimensional Intervention Strategy, Rehabilitation Medicine Department, Inpatients, Fall Prevention

1. Introduction

The Department of Rehabilitation Medicine is an important clinical department. Its medical function is to use rehabilitation medicine methods to eliminate and reduce the dysfunction of patients, to reconstruct and restore the lack of function of the body, and to improve various functions of patients through the prevention and diagnosis of dysfunction [1]. During rehabilitation and hospitalization, patients often fall. According to study statistics, falls are common unintentional injuries in hospitalized patients, with the probability of occurrence accounting for 20% of all unintentional injuries, and in elderly patients over 65 years of age, the fall rate is greater than 30% [2]. The hazards of falls include trauma, cerebral hemorrhage, fractures and soft tissue contusion, which increase the risk of death and the risk of poor patient prognosis and may also induce conflicts between doctors and patients. Therefore, it is particularly important to pay attention to fall prevention among inpatients in rehabilitation medicine departments [3]. With respect to fall prevention, numerous scholars have conducted studies on various factors and proposed that the factors influencing falls are complex and changeable and that intervention measures should be multifaceted and multidimensional. Fall prevention based on multidimensional intervention involves environmental modification, nursing management, family care, patient self-care, etc. The quality of the intervention not only is related to the body safety of the patient but also affects the quality of nursing rehabilitation and trust in the doctor-patient relationship [4]. This study aims to analyze the value of a multidimensional intervention strategy for fall prevention among inpatients in the rehabilitation medicine department.

2. Objects and Methods

2.1. Objects

A total of 4,000 patients admitted to the Department of Rehabilitation Medicine of our hospital from January 2023 to December 2024 were included in the trial study. The inclusion criteria were: patients aged ≥ 60 years; normal cognitive function capable of effective verbal communication; accompanied by family members participating in care; stable vital signs without requiring emergency resuscitation; ability to walk independently or with assistive devices. The exclusion criteria were: primary psychiatric disorders; severe osteoporosis; patients with conditions such as aphasia or deaf-mutism; poor compliance with nursing care. There were 2162

male patients and 1838 female patients in this group. The oldest patient was 78 years old; the youngest patient was 60 years old, and the mean age was 65.25 ± 2.62 years. There were 1621 patients with musculoskeletal diseases, 1237 patients after fracture surgery, and 1142 patients with sequelae of stroke. This study was approved by the Ethics Committee of our hospital and was performed according to normal procedures.

2.2. Methods

This group of patients underwent multidimensional nursing interventions to prevent falls.

2.2.1. The Development of Individualized Intervention Plans

① Customization based on risk assessment: The emphasis is on in-depth analysis of the fall risk assessment results for each patient, which include age, sex, previous fall history, use of walking equipment, cognitive ability, and medication use, health status and living environment. On the basis of the results of risk assessment, patient-specific fall risk factors are identified, and individualized intervention measures are customized accordingly. ② Consideration of personal preferences and living habits: When the intervention plan was developed, the personal preferences and living habits of the patients, such as daily activity time, preferred exercise methods, and eating habits, were fully considered. Through communication with patients and their families, understanding patients' daily needs and expectations ensures that interventions are aligned with patients' actual lifestyles. ③ Integration of family support elements: The patient's family support status, including the availability of family members and the adaptability of the living environment, was evaluated. On the basis of family support status, interventions, such as family members assisting the patient in performing daily activities and supervising the patient in taking medication, were developed. Family education and training should be provided to enhance the role and sense of responsibility in patient fall prevention. ④ Improving patient compliance: The development of intervention plans with patients ensures that patients understand and agree with each step and goal in the plan. Patients are encouraged to put forward their opinions and suggestions to make the intervention plan more in line with the expectations and needs of patients. Patient adherence and intervention effects were regularly evaluated, and timely adjustments were made on the basis of the feedback to maintain high patient adherence.

2.2.2. Technical Assistance and Monitoring

① The use of wearable devices: Patients are equipped with wearable devices such as smart wristbands and fall detection sensors, which can continuously monitor the patient's activity level, heart rate, blood pressure and other physiological indicators, as well as movement performance such as gait and balance ability. When the device detects that the patient's activities are abnormal or that there is a risk of falling, it immediately sends out an alarm to remind the patient, his family, or med-

ical personnel to take corresponding measures to effectively prevent falls. ② Application of the electronic medical records system: The electronic medical records system was used to comprehensively track the results of the fall risk assessment, the implementation of intervention measures, and the evaluation of the effects of fall prevention on patients. Through the data analysis function of the system, the change trend of the patient's fall risk and the effectiveness of the intervention measures can be discovered in a timely manner so that the intervention plan can be adjusted in a timely manner according to the actual situation and ensure the continued effectiveness of fall prevention.

2.2.3. Interdisciplinary Teamwork

① Interdepartmental cooperation: Close cooperative relationships with departments of neurology, orthopedics, and geriatric medicine were established to jointly evaluate the fall risk of patients and develop targeted intervention measures. Through regular interdepartmental exchanges and case discussions, we can share experience and update knowledge in a timely manner to ensure the scientific validity and effectiveness of fall prevention. ② Multiprofessional collaboration: The development and implementation of a fall prevention plan involves the collaboration of multiple professionals, such as physical therapists, occupational therapists, social workers, and dietitians. Physical therapists and occupational therapists are responsible for evaluating patients' exercise ability and activities of daily living and developing individualized rehabilitation training and activity plans. Social workers are responsible for providing psychological support and links to social resources to help patients and their families cope with the psychological and social problems caused by the fall. A dietician will develop a personalized diet plan based on the nutritional status and needs of the patient to ensure that the patient receives adequate nutritional support.

2.2.4. Diversification of Education Materials for Patients and Relatives

① Development of video tutorials: A series of video tutorials on fall prevention were produced, covering fall risk assessment, environmental improvement skills, safety education knowledge, etc. The video tutorial revealed the importance and specific methods of fall prevention in a vivid way so that patients and relatives can understand and master relevant knowledge more intuitively. ② Offering of online courses: An online course on fall prevention was offered via the online platform. The course content included the hazards of falls, prevention strategies, and rehabilitation training. Patients and family members can participate in the courses anytime, anywhere through computers or mobile phones, and they can flexibly arrange the study time to improve the convenience and efficiency of learning. ③ Setting of interactive questions and answers: An interactive question and answer session was set up on the hospital app or social media platform, and patients and family members could ask questions about fall prevention at any time. Professional medical personnel will answer in a timely manner and provide personalized suggestions and guidance to increase their sense of participation and gain from

patients and their relatives. ④ Utilization of social media and hospital apps: The company made full use of platforms such as social media and hospital apps to release relevant knowledge regularly and share successful cases on fall prevention. Through these platforms, patients and family members can obtain the latest fall prevention information at any time, exchange experiences with other patients, and form a community atmosphere of mutual support and learning.

2.2.5. Effect Evaluation and Continuous Improvement

① A regular effect evaluation mechanism should be established: a detailed effect evaluation plan should be developed, including the time node for evaluation, evaluation indicators, and evaluation methods. The assessment indicators included the incidence of patient falls, the degree of fall-related injuries, and the degree of patient satisfaction. These indicators can comprehensively reflect the actual effects of fall prevention. ② In-depth analysis of the assessment results: An in-depth analysis of the results of each assessment was performed, including the causes of falls, the time and location of the fall, and the condition of the patient, to identify weak links in fall prevention. Moreover, attention was given to the results of the patient satisfaction survey to understand the evaluation and suggestions of patients regarding fall prevention work to better meet the needs of patients. ③ Continuously optimize the fall risk assessment model and intervention strategies: Based on the feedback of the assessment results, the fall risk assessment model is continuously optimized to improve the accuracy and pertinence of risk assessment. Moreover, the intervention strategy should be adjusted and improved to ensure the scientific nature and effectiveness of the intervention measures. We pay attention to interdisciplinary teamwork and fully listen to the opinions and suggestions of all professionals in the optimization process to ensure the comprehensiveness and feasibility of improvement measures. ④ Achieving continuous improvement: Effect evaluation and continuous improvement are the core links of fall prevention work, and continuous improvement in fall prevention work is realized through continuous evaluation, analysis, and optimization. Emphasis should be placed on the sharing and promotion of improved results so that more patients and medical institutions can benefit.

2.2.6. Policy and Institutional Support for Fall Prevention

① Funding guarantee: The hospital has established a special fund for fall prevention to support the implementation of fall prevention-related projects, including environmental improvement, equipment purchase, publicity and education, and personnel training. It is helpful to ensure that there is sufficient financial support for fall prevention to be implemented smoothly and achieve the expected effects. ② Fund supervision: To ensure the effective use of the special fund, a strict fund supervision mechanism has been established to regularly audit and evaluate the use of funds to ensure that every penny fund is used wisely. ③ Clarification of responsibilities: Rules and regulations related to fall prevention should be formulated to clarify the responsibilities and tasks of medical personnel and manage-

ment personnel at all levels of fall prevention work to ensure that the work is accountable and implemented. ④ Process specification: The rules and regulations should include detailed processes and specifications for each link of fall risk assessment, the development of intervention measures, and effect evaluation to ensure that there are rules and evidence to follow in the work of fall prevention. ⑤ Assessment and incentives: Fall prevention work is included in the performance assessment system, and departments and individuals with outstanding performance are encouraged and rewarded to stimulate the enthusiasm and creativity of medical personnel. ⑥ Cultural construction: Fall prevention has been included in one of the important contents of the department's cultural construction, and the fall prevention awareness of all medical personnel has been improved by creating a strong atmosphere of fall prevention.

2.3. Observation Indicators

The incidence of falls and the severity of fall injury before and after the intervention were compared.

Nursing effects such as MFS fall risk, ESCA self-care ability, and SF-36 quality of life were compared before and after the intervention. MFS fall risk was evaluated via the MFS Fall Risk Scale. The Morse Fall Scale (MFS), developed by the University of Pennsylvania in 1989, demonstrates high sensitivity (83%) and specificity (83%). This 6-item assessment tool evaluates: (1) history of falls within the past 90 days (25 points if present, 0 if absent); (2) presence of ≥ 2 medical diagnoses (15 points if present, 0 if absent); (3) ambulatory aid use (15 points for cane, 30 points for walker/wall support, 0 points for none); (4) intravenous therapy (20 points if present, 0 if absent); (5) gait abnormalities (10 points for lower extremity weakness, 20 points for disability/lower extremity impairment, 0 points for normal); and (6) cognitive status (15 points for overestimation of ability, 0 points for normal). The total possible score is 125 points, with risk stratification as follows: ≤ 25 indicates no risk, 25 - 44 suggests moderate risk, and ≥ 45 represents high fall risk. ESCA self-care ability is scored from 0 - 172, and the score is proportional to self-care ability. The SF-36 quality of life percentile scale, which includes physiological and psychological dimensions, is a percentage scale, and the score is positively proportional to quality of life.

The nursing satisfaction scores before and after the intervention were compared. The NSNS nursing satisfaction score included the timeliness of nursing, nursing attitude, concern for the patient and emotional support (0–95 points), and the score was positively proportional to the satisfaction score.

2.4. Statistical Analysis

The study data were immediately included in SPSS 24.0 software for analysis, and the measurement data were compared via a *t* test and expressed as $(\bar{x} \pm s)$, whereas the count data of cases and rates were analyzed via the χ^2 test and expressed as rates (%), and the difference was considered statistically significant ($P < 0.05$).

3. Results

3.1. The Fall Rate and Degree of Fall Injury in this Group of Patients

In this study, the differences in the fall rate and degree of fall injury after the intervention were statistically significant ($P < 0.05$), as shown in **Table 1**.

Table 1. Analysis of the fall rate of patients in this group (n, (%)).

Groups	Number of cases	Soft tissue injury	Severe fracture	Intracranial hemorrhage	Total fall rate
Before intervention	4000	95 (2.375%)	65 (1.625%)	26 (0.65%)	186 (4.65%)
After intervention	4000	34 (0.85%)	22 (0.55%)	8 (0.2%)	64 (1.6%)
χ^2	-	4.162	3.024	2.685	3.257
P	-	0.001	0.025	0.046	0.001

3.2. Comparison of the Effects on this Group of Patients

In this study, the fall risk associated with MFS, self-care ability associated with ESCA, and quality of life associated with the SF-36 score after the intervention were significantly better than those before the intervention ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of the effects of this group of patients ($\bar{x} \pm s$, score).

Groups	Number of cases	MFS fall risk score	ESCA self-care ability	SF-36 living quality
Before intervention	4000	38.65 \pm 0.76	135.65 \pm 2.06	75.15 \pm 3.06
After intervention	4000	26.14 \pm 0.52	155.18 \pm 4.12	85.14 \pm 0.41
t	-	8.325	5.005	4.001
P	-	0.001	0.025	0.046

3.3. Comparison of the Evaluation of Nursing Effects in this Group of Patients

In this study, the nursing satisfaction score after the intervention was significantly better than that before the intervention, and the difference was statistically significant ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of the evaluation of the nursing effect in this group of patients ($\bar{x} \pm s$, score).

Groups	Number of cases	Timely care	Patient concern	Emotional support	Nursing attitude
Before intervention	4000	21.18 \pm 2.38	23.21 \pm 0.41	22.18 \pm 1.47	22.41 \pm 0.32
After intervention	4000	19.15 \pm 2.32	20.15 \pm 0.33	20.32 \pm 2.75	19.54 \pm 0.31
t	-	6.285	8.245	8.063	5.326
P	-	0.001	0.001	0.011	0.001

4. Discussions

With the acceleration of the aging population worldwide, the physical and mental management and safety management of elderly individuals during hospitalization

have become the focus of clinical care. Therefore, in the safety goal of clinical nursing, the prevention of unintentional injury that may occur to patients during hospitalization has been regarded as the key direction of nursing [5]. Comprehensive and interdisciplinary fall prevention nursing measures have become a new trend in current development. Multidimensional nursing intervention refers to the implementation of targeted intervention on the basis of multiple factors that may cause a patient's fall. For example, nursing is performed from a medical point of view, such as through nursing management, environmental management, and psychological management [6]. Therefore, fall prevention with multidimensional nursing intervention involves multiple disciplines, such as medical rehabilitation, psychological nursing, nursing safety management, and ambient environment management, which can be considered effective implementations of the human-biological-social care model and can ensure the safety of patients. Moreover, it can also improve the level of hospital management and promote the development of rehabilitation medicine [7].

In this study, we compared before and after implementation in 4000 patients and analyzed the value of multidimensional nursing interventions for fall prevention. The results demonstrated that both the incidence and severity of falls were significantly lower post-intervention compared to pre-intervention levels. This improvement may be attributed to the multidimensional nursing approach, which systematically addressed fall prevention by comprehensively identifying environmental risk factors and establishing a safer rehabilitation and care environment for patients. Adequate lighting for patients, risk identification, and assistive tools to disperse gravitational instability during walking can significantly reduce the probability of falls. The reasons for the improvement in the degree of fall injury and the multidimensional preventive intervention measures included ensuring the safety of the environment, improving the prevention awareness of patients and their families, meeting the reasonable needs of patients in a timely manner, ensuring the safety of their medication, and adding necessary safety monitoring and inspections. Multifaceted interventions reduce the probability of a patient's fall injury and the degree of injury. In terms of observation quality indicator 2, after intervention in this group of patients, the MFS fall risk significantly decreased from intermediate risk to low risk, and patients' self-care ability and quality of life improved. The reason may be that before multidimensional intervention, we carefully evaluated the patient comprehensively and identified the fall risk. The nursing staff should pay attention to the patient's fall hazard and provide targeted interventions on the basis of the characteristics of falls, such as instructing the patient to rely on his family members and not to get up alone at night to go to the toilet, meanwhile, active care should be emphasized. To pay attention to the benefits of patient dynamics at any time for patient fall prevention, family members should be involved in fall prevention, and the value of combined nursing of the three lines of defense, *i.e.*, nurses, family members, and patients themselves, should be considered so that there is no dead angle in fall prevention [8] [9]. While

the risk of falls spreads, patients' own health awareness also increases, and thus, their self-care ability improves. Patients have a low risk of falls and a low possibility of physical injury, and each rehabilitation exercise can be performed smoothly. As time progresses, the rehabilitation effect improves, which can increase patients' confidence in rehabilitation and improve their quality of life. For observation indicator 3, the satisfaction score of patients after the intervention was significantly higher than that before the intervention, possibly because patients and their families experienced medical professionalism and attentive care and had better health experiences.

5. Conclusion

In summary, multidimensional intervention strategies can reduce the probability of falls and the degree of injury caused by falls, reduce secondary injuries in patients during hospitalization, increase their health awareness, improve their self-care ability and improve their living standards. The quality improved, patients had a better hospitalization experience, and they recognized the nursing service. However, there are some limitations to this study, the single-center study design may limit the generalizability of the results, and more details about the implementation of the intervention need to be optimized.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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