

Original Article

Role of network cloud platform-based and progressive health education in postoperative rehabilitation of patients with tibial fracture

Ding Wang¹, Xiang Lv², Shaofeng Zhang³, Taiping Zhu¹

¹Department of Enrollment and Internship Employment, Shijiazhuang Medical College, Shijiazhuang 050500, China; ²Department of Internal Medicine, Central Hospital of Baixiang County, Xingtai 055450, China; ³Principal's Office, Shijiazhuang Medical College, Shijiazhuang 050500, China

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Abstract: Objective: To explore the short-term and long-term effect of rehabilitation in patients with tibial fracture based on network cloud platform and progressive health education. Methods: A total of 100 patients with tibial fracture treated in our hospital from December 2018 to February 2020 were selected as the research subjects. According to their admission order, they were divided into a control group (n=50) and experimental group (n=50). The control group was given routine health education and nursing, while the experimental group was given progressive health education and nursing based on a network cloud platform. The fracture healing time, complication rate, knee joint function, hospitalization stay, ability of daily living, and self-efficacy of the two groups were analyzed. Results: (1) The fracture healing time and hospitalization stay of the experimental group were (72.03 ± 5.33) d and (13.15 ± 2.05) d, which were significantly lower than those of the control group [(90.89 ± 5.88) d and (18.56 ± 2.87) d] ($T=16.80, 10.85, P < 0.001$). (2) After nursing, the Lysholm score of the experimental group (43.13 ± 5.62) was significantly higher than that of the control group (31.77 ± 5.51) ($T=10.21, P < 0.001$). (3) The incidence of complications in the experimental group was significantly lower in comparison with that of the control group. (4) After nursing, the ADL score of the experimental group was significantly higher than that of the control group ($T=7.85, P < 0.001$). (5) After nursing, as compared with the control group, the GSEs score of the experimental group was significantly higher ($T=5.22, P < 0.001$). Conclusion: Implementation of network cloud platform-based and progressive health education for patients with tibial fracture after operation has a positive effect on improving the short-term and long-term rehabilitation effect.

Keywords: Network cloud platform, progressive, health education, tibial fracture, postoperative rehabilitation, short-term, long-term

Introduction

As one of the common orthopedic diseases, tibial fracture mostly develops in young adults and children [1-3]. The main causes include fractures induced by falling, crushing, car accidents, and sprains. The clinical manifestations of patients with tibial fractures are swelling, pain, and functional impairment of the affected limb. Currently, clinical treatment of tibial fractures often is surgical, which requires a prolonged bed-stay, and predisposes to bad psychological mood. Some diseases such as compartment syndrome and pressure sores can be triggered and seriously affect the operation [4-6]. For this reason, it is of critical importance

to implement effective intervention measures for patients with tibial fracture, especially health education. The network cloud platform-based and progressive health education is education for patients based on Internet technology [7]. Through the network cloud platform, nursing staff can objectively strengthen patients' understanding towards health knowledge, with a positive effect on improving prognosis [8]. The current study aimed to explore the short-term and long-term effects of postoperative rehabilitation of tibial fracture patients based on the network cloud platform and progressive health education, to provide important references for the prognosis of tibial fracture.

Materials and methods

General information

100 patients who received tibial fracture treatment in our hospital from December 2018 to February 2020 were selected as the research subjects. According to their admission order, they were divided into a control group and an experimental group, 50 cases each. Control group was 22-75 years old, fracture time 2-21 h. Experimental group was 21-76 years old, fracture time 3-22 h.

Inclusion/exclusion criteria

Inclusion criteria: (1) All patients were clinically diagnosed with tibial fractures in our hospital [9]; (2) All patients received open reduction and internal fixation implantation performed by the same chief physician in this hospital; (3) Patients aged ≥ 18 years old; (4) This study has been approved by the hospital ethics committee and the patients and their families have informed the treatment and signed a consent form.

Exclusion criteria: (1) Patients who were pregnant or lactating; (2) Patients with other fracture diseases; (3) Patients with mental or communication disorder.

Methods

The control group underwent routine health education and nursing, and the nursing staff explained the disease knowledge and precautions to the patients orally prior to the operation. After the operation, the patient was instructed to follow the doctor's prescription for medication and regular review.

Patients in the experimental group performed the network cloud platform-based and progressive health education care. The details are as follows: Develop health education multimedia materials such as admission, preoperative, postoperative, discharge, and functional training education chapters based on the patients' needs for health education and combined with relevant clinical experience. Fabricate all health content into a script, and produce multimedia materials for health education about tibial fracture diseases using vivid text, music, pictures, audio and animation. Upload the

material about tibia fracture disease to the network cloud platform, and broadcast the content to the patient and guide synchronously to correct the deficiencies in time. The patients and their families can also watch at any time according to their own needs for active learning. At the same time, patients can also accept out-of-hospital studies after they are discharged. Establish a WeChat group, with tibial fracture care experts as the main members of the group who provide patients with disease-related knowledge and the latest progress in treatment through the WeChat platform. At the same time, we set a time for answering questions when six tibial fracture chief physicians were on duty in turn. The duty is from 15:00 to 17:00 every day, and from Monday to Saturday; 8 nursing staff in the group communicate with the patients.

Evaluation index

Fracture healing time and hospital stay: The fracture healing time and hospital stay of the two groups of patients were statistically analyzed.

Knee joint function: Lysholm (knee joint function score scale) was used to assess the knee joint function of the two groups of patients before and after nursing, with a full score of 50 points. The higher the score, the better the patient's functional recovery.

Complication rate: Complications such as pain or infection in the operation area, deep vein thrombosis and pressure ulcers in the two groups of patients were analyzed, and the incidence of complications was calculated.

Activities of daily living: The Activity of Daily Living Scale (ADL) was used to assess the ability of daily living before and after nursing care, with a full score of 100 points. The higher the score, the better the ability of daily living of the patients.

Self-efficacy: The General Self-Efficacy Scale (GSES) was used to score the self-efficacy of two groups of patients before and after nursing, which were divided into 10 items, each with 1 to 4 points. The higher the score, the higher the self-efficacy of the patients.

Table 1. Baseline information

Index	Control group (n=50)	Experimental group (n=50)	X ² /t	P
Gender			1.563	0.968
male	27	28		
female	23	22		
years	45.32 ± 3.21	45.53 ± 3.15	1.245	0.536
fracture time (h)	5.61 ± 1.01	5.71 ± 1.04	2.513	0.673

compared by t test, [n (%)] was applied to represent count data, and compared by χ^2 test. $P < 0.05$ was a significant difference.

Results

General data

The two groups of patients had no significant differences in general clinical data such as age and fracture time ($P > 0.05$, **Table 1**).

Analysis of fracture healing time and hospital stay in the two groups

The fracture healing time (72.03 ± 5.33) d and hospitalization time (13.15 ± 2.05) d of the experimental group were significantly lower than the fracture healing time (90.89 ± 5.88) d and hospitalization time (18.56 ± 2.87) d of the control group ($T=16.80, 10.85, P < 0.001$), as shown in **Figures 1, 2**.

Analysis of the knee function scores of the two groups of patients

Before nursing care, the Lysholm score of the experimental group (23.13 ± 2.66) and the control group (23.42 ± 2.67) were not significantly different ($T=0.54, P=0.59$). After nursing care, the Lysholm score of the experimental group was significantly higher, by contrast, the Lysholm score of the control group was lower [(43.13 ± 5.62) vs. (31.77 ± 5.51)] ($T=10.21, P < 0.001$), as shown in **Figure 3**.

Analysis of the incidence of complications in the two groups

The incidence of complications in the experimental group was significantly lower as compared with that in the control group ($\chi^2=6.06, P=0.01$), see **Table 2**.

Analysis of the ADL of the two groups of patients

Before nursing care, the ADL score of the experimental group (52.67 ± 5.40) and the control group (52.71 ± 5.42) were not significantly different ($T=0.04, P=0.97$). After nursing care, the ADL score of the experimental group was (76.38 ± 6.35) significantly higher than the ADL score of patients in the control group ($66.51 \pm$

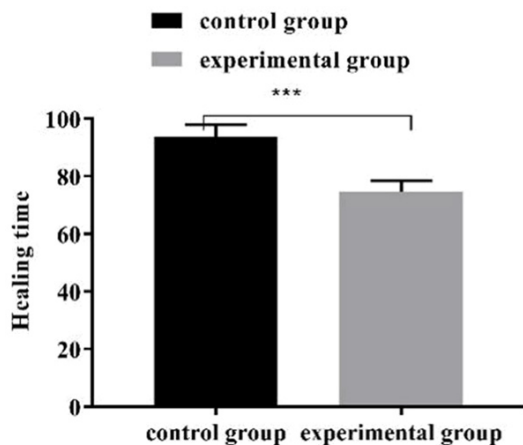


Figure 1. Analysis of fracture healing time of the two groups. Note: The difference between the two groups was *** $P < 0.001$.

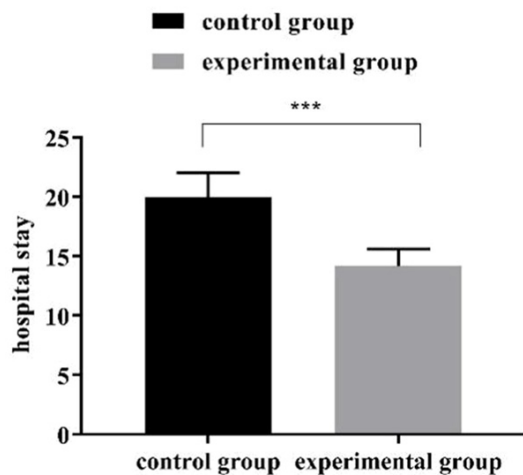


Figure 2. Analysis of hospital stay of two groups. Note: The difference between the two groups was *** $P < 0.001$.

Statistical analysis

This research used the software SPSS20.0 to process and analyze the research data. $\bar{x} \pm s$ was used to represent measurement data, and

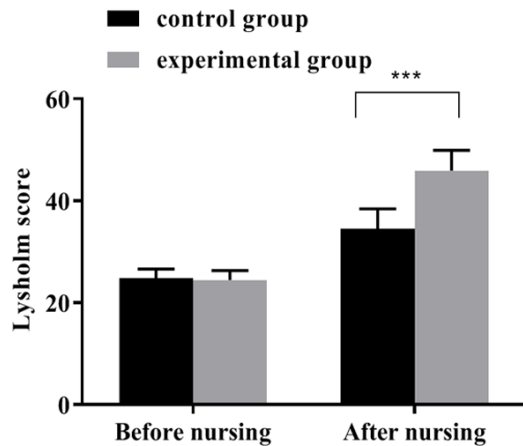


Figure 3. Knee function scores of two groups of patients. Note: The difference between the two groups was *** $P < 0.001$.

6.22) ($T=7.85$, $P < 0.001$). Details are shown in **Figure 4**.

Analysis of self-efficacy of the two groups of patients

Before nursing care, the GSES score of the experimental group (22.20 ± 4.33) and the control group (22.38 ± 4.39) were not significantly different ($T=0.15$, $P=0.88$). After nursing care, the GSES score of the experimental group was (36.25 ± 4.81) significantly higher than the GSES score of the control group (31.25 ± 4.77) ($T=5.22$, $P < 0.001$), as shown in **Figure 5**.

Discussion

Over years, people's living standards have gone up, and the incidence of tibial fractures has increased yearly. Tibial fractures are now one of the main diseases that seriously affect people's quality of life. It is reported that tibial fractures after surgical treatment will cause complications such as joint dysfunction and pressure ulcers, if the patients are not given effective nursing, which in turn will affect the clinical efficacy and prognosis [9]. Hence, the implementation of effective nursing methods for patients has a positive effect on improving clinical efficacy and prognosis. Health education can improve patients' understanding of the disease, prevent complications, and improve prognosis [10].

Due to the lack of planning and purpose of traditional health education, there will not only be

certain deviations through the use of oral health education, but the feedback of patients are usually not satisfactory, resulting in undesired results [11, 12]. The model of network cloud platform-based and progressive health education is based on the Internet and strictly requires nursing staff to implement 5 major pathways for patients from admission, pre-operation, post-operation, and discharge to functional exercise based on relevant clinical experience and actual conditions. The content carries out nursing work, which increases the planning, predictability and effectiveness of nursing work [13-15]. This not only can effectively avoid the health education knowledge deviation caused by differences in knowledge or nursing level of nursing staff, but also can make full use of the network cloud platform to provide patients with richer health knowledge and enhance the effect of health education [16].

Patients will not be affected by objective factors (time, place, etc.), but also can get access to health knowledge about diseases for free by adopting network-based cloud platform and progressive health education, which can effectively make up for deficiencies of traditional health education [17-19]. In our study, in order to explore the short-term and long-term effects of postoperative rehabilitation of tibia fracture patients based on the network cloud platform and progressive health education, the experimental group implemented network-based cloud platform and progressive health education. The results showed that the experimental group had a better fracture healing time, hospital stay, and complication rate as compared with the control group. This suggests that the network cloud platform and progressive health education has a positive effect on promoting the clinical recovery of patients and reducing the occurrence of complications.

It was claimed by Hjorth [20] that the implementation of health education for diabetic patients has a positive effect on improving the self-efficacy. The model of network cloud platform and progressive health education can enable nursing staff to use the Internet platform to introduce relevant disease knowledge to patients, and help make correct judgments on patients' behavior and ability anytime and anywhere. At the same time, nursing staff can

Table 2. Comparison of complications

Group	n	Pressure ulcers	Deep venous thrombosis	Infections and pain in operative area	Complication rate
Control group	50	2	3	5	20% (10/50)
Experimental group	50	0	0	2	4% (2/50)
χ^2					6.06
P					0.01

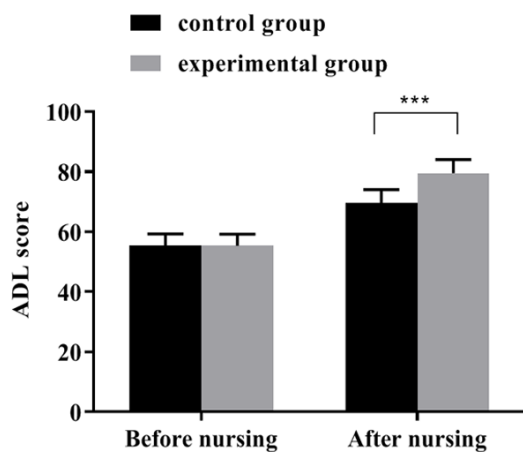


Figure 4. Activities of daily living of the two groups. Note: The difference between the two groups was *** $P < 0.001$.

communicate with patients in a timely manner to ensure the stability of the patients' living environment, thereby reducing the patients' unhealthy psychological mood and enhancing the patients' self-efficacy. The results of this study found that the ability of daily living and self-efficacy of patients in the experimental group were significantly better, suggesting that the network cloud platform and progressive health education can promote the daily living ability and self-efficacy of patients. However, there are several limitations to this study. First, the number of patients included was small. Second, the study is a retrospective trial. Hence, prospective research will be carried out in the future to provide a stronger theoretical basis for the implementation of progressive health education based on the network cloud platform for patients after tibial fracture surgery.

To conclude, the implementation of network-based cloud platforms and progressive health education for patients with tibial fractures after surgery has a positive effect on improving patients' short-term and long-term rehabilitation.

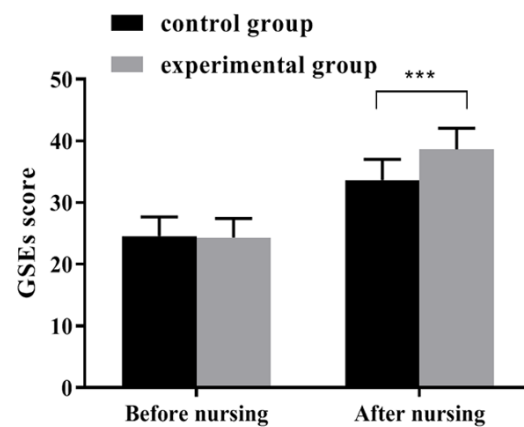


Figure 5. Self-efficacy of two groups of patients. Note: Difference between the two groups was *** $P < 0.001$.

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Disclosure of conflict of interest

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Address correspondence to: Xiang Lv, Department of Internal Medicine, Central Hospital of Baixiang County, Xingtai 055450, China. Tel: +86-0319-7722418; E-mail: lvxiang0070@163.com

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