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Retrospective Study

Rehabilitation care for pain in elderly knee replacement patients

Li Liu, Qiao-Zhen Guan, Li-Fang Wang

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Abstract

BACKGROUND

Total knee arthroplasty (TKA) is recognized as the most effective surgical intervention for relieving pain and improving joint mobility and deformity in patients with knee osteoarthritis and other synovial diseases. The application of accelerated postoperative rehabilitation (enhanced recovery after surgery) has demonstrated its efficacy in improving patient outcomes, and early postoperative joint function exercise has become a key prognostic factor in knee replacement. The unexpected appearance of limb pain and swelling hindered the patient's tendency for early mobilization, leading in prolonged hospitalization, delayed functional recovery and negative psychological responses.

AIM

To investigate the impact of incorporating programmed pain nursing with collaborative nursing on elderly patients undergoing knee replacement surgery.

METHODS

A retrospective analysis was conducted on a cohort of 116 patients who underwent TKA at our hospital between July 2019 and July 2021. The patients were divided into two groups: A control group ($n = 58$) receiving programmatic nursing, and an observed group ($n = 58$) receiving programmed nursing combined with a collaborative nursing model. A pain management team consisting of attending physicians, head nurses, and responsible nurses was established. Outcome measures included visual analogue scale (VAS) scores, activities of daily living (ADL) scale scores, and functional scores.

RESULTS

The ADL scores of patients in both groups exhibited a continuous increase. However, there was no statistically significant difference in the ADL scores between the two groups at 48 h and the 7th d post-surgery ($P > 0.05$). Upon reexamination at the 3rd mo, the observation group demonstrated higher ADL scores compared to the control group (67.48 ± 14.69 vs 59.40 ± 16.06 , $P < 0.05$). The

VAS scores of both groups significantly decreased, with no significant difference observed between the groups at each time point ($P > 0.05$). The functional status of patients in both groups exhibited a gradual increase prior to intervention and at the 1st, 2nd, and 3rd month following discharge ($P < 0.05$). There was no statistically significant difference in knee joint function scores between the two groups at the 1st month after discharge (47.52 *vs* 45.81, $P > 0.05$). However, the knee joint function scores of patients in the observation group were significantly higher than those in the control group at the 2nd (59.38 *vs* 53.19, $P < 0.05$) and 3rd month (71.92 *vs* 64.34, $P < 0.05$) following discharge.

CONCLUSION

The utilization of programmed pain nursing in conjunction with collaborative nursing for out-of-hospital care of TKA patients has demonstrated favorable outcomes, encompassing pain reduction, enhanced prognosis, and improved nursing quality for patients.

Key Words: Programmed pain nursing; Collaborative nursing; Total knee arthroplasty

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Core Tip: Total knee replacement is considered to be the most effective surgical treatment for reducing pain caused by knee osteoarthritis and other synovial diseases, and improving joint mobility limitations and deformities. A total of 116 total knee arthroplasty patients treated in our hospital from July 2019 to July 2021 were retrospectively analyzed. A programmed pain management team consisting of the bed doctor, the head nurse and the responsible nurse was established. The combination of programmed pain care and collaborative care can reduce patients' pain, improve patients' prognosis and improve nursing quality.

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INTRODUCTION

Total knee arthroplasty (TKA) is widely recognized as the most effective surgical intervention for relieving pain and improving joint movement restriction and deformity in patients with knee osteoarthritis and other synovial diseases[1,2]. The utilization of enhanced recovery after surgery has shown its efficacy in improving patient outcomes, and the early initiation of postoperative joint functional exercise has emerged as a critical factor in the prognosis of knee arthroplasty[3-5]. The unforeseen occurrence of pain and swelling in the extremities impedes patients' inclination towards early mobilization, resulting in prolonged hospitalization periods, delayed restoration of functionality, and negative psychological responses[6].

Programmatic nursing intervention encompasses a set of systematic measures aimed at assessing, diagnosing, planning, implementing, and managing the patient's condition in order to formulate a nursing plan that is both rational and scientific. This approach is characterized by its relevance, organization, and forward-thinking nature[7]. Peripheral nerve stimulation has demonstrated efficacy in alleviating pain, expediting patient recovery, and reducing hospitalization duration. Nevertheless, a prolonged period of rehabilitation is still required post-discharge[8]. Owing to limited rehabilitation resources, the majority of TKA patients opt for home-based rehabilitation, which poses challenges in effectively extending the health education and guidance received during hospitalization. Consequently, insufficient functional exercise and low compliance with rehabilitation regimens ensue, resulting in a rehabilitation effect that only reaches 60% of that achieved during inpatient care. Hence, it is imperative to enhance the training in rehabilitation nursing for both patients and their families, fostering their capacity to engage in healthcare practices, and promoting their active involvement in patient care.

The collaborative nursing model, which is rooted in the responsibility nursing framework, prioritizes the involvement of patients in family rehabilitation nursing and strives to facilitate early recovery. This model emphasizes the integration of nursing staff, family members, and patients, commonly referred to as the "three in one" nursing approach[9]. Nevertheless, there is a dearth of clinical evidence regarding the implementation of programmed nursing in conjunction with the collaborative nursing model for patients undergoing TKA. This study aimed to examine the impact of a combined approach of programmed nursing and collaborative nursing model on the level of pain alleviation and patient recovery following TKA.

MATERIALS AND METHODS

General information

A total of 116 patients with TKA treated in our hospital from July 2019 to July 2021 were retrospectively analyzed. The patients were divided into two groups, programmatic nursing group (control group, $n = 58$) and programmed nursing combined with collaborative nursing model group (observed group, $n = 58$) according to the different care that they received. Inclusion criteria: (1) Can perform a simple written and verbal communication; (2) Patients or their family members use WeChat; (3) Initial unilateral TKA; (4) Patients with normal cognitive function and no mental illness; and (5) Patients and their families gave informed consent. Exclusion criteria: (1) Patients with nervous system and musculoskeletal diseases that limited physical activity; and (2) Patients with a history of serious cardiopulmonary disease and mental illness who could not complete the measurement and follow-up of various indicators in this study. This study was approved by the Ethics Committee of Wuhan Fourth Hospital.

Care methods

A programmed pain management team consisting of bed doctors, head nurses and responsible nurses was established. After admission, patients were evaluated for pain, targeted analgesic measures were taken and recorded, and a pain management team with a hierarchy structure of “bed doctors, head nurses and responsible nurses” was formed. Members of the pain management team were regularly trained on pain related knowledge and the training effects were evaluated. Pay attention to and inquire the pain degree of patients, timely and accurate dynamic score, double check, to ensure the objective and accurate pain assessment, good record and dynamic intervention. Implement personalized analgesia program. Multi-mode analgesia measures were adopted: Massage the aching limbs. An ice pack was applied to the patient to reduce local swelling and bleeding. Explain pain relief methods, distraction, relaxation therapy, *etc.* According to the doctor’s advice, intravenous, oral, topical and other analgesic drugs should be given. Those who use analgesic pump should take care of analgesic pump. Evaluate pain continuously and dynamically, adjust analgesic program timely and make records. Strengthening function training: Quadriceps isometric contraction exercises, ankle pump exercises, hip flexion, knee bending and walking exercises, *etc.*, promote blood circulation and joint function recovery.

The observed group received programmed nursing combined with collaborative nursing, and the specific measures were as follows: (1) Individualized pain education for patients by pain management team members. Actively encourage patients to learn how to correctly report their pain before surgery, participate in the postoperative pain assessment and actively tell the pain feelings, emphasizing the importance of patients and their families to participate in the pain assessment; (2) Inform patients and family members of the development, implementation and effect of continuous collaborative nursing plan related knowledge, establish a good interaction with patients and family members, guide family members to participate in nursing with a positive and optimistic attitude; and (3) Out-of-hospital follow-up intervention within 6 months: After discharge, establish a phone or WeChat follow-up mode or notify patients to review, to understand the status of family rehabilitation training and the emergence of new problems. The participation degree of the escorts and family members in collaborative nursing. Adjust and improve the rehabilitation training plan of the patient, and require the family members to cooperate with the patient for rehabilitation training at least 4 times a week to solve the problems encountered, and return to the doctor 6 months later to evaluate the recovery status of the patient.

Indicator observation

Visual analogue scale (VAS) was used to evaluate the pain degree of the patient. The total score on the scale was 10 points. The higher the score, the more severe the pain of the patient[10]. The activity of daily living (ADL) scale was used to assess the patient’s ability of daily living. The scale includes 10 assessment contents, including defecation, urination, grooming, toilet use, eating, transfer, activity, dressing, up and down stairs, and bathing. The full score is 100, and less than 20 is classified as extremely serious functional defect and completely dependent on life. A score of 20 to 40 requires a lot of help, 40-60 points need help in life, > 60 people can take care of themselves[11].

Two dimensions of knee joint score (KS) and functional score (FS) were evaluated using the American Knee Association Rating Scale, with each dimension scoring 100 points. Among them, KS mainly evaluated the pain, stability and range of motion of the affected limb after surgery. In order to facilitate follow-up after discharge, the FS dimension was mainly used in this study for the overall score of the knee joint of the patients. The full score was 100, the higher the score, the better the patient’s knee function after surgery[12].

Statistical analysis

The experimental data were statistically analyzed and processed by SPSS21.0 software, and GraphPad Prism 9.0 (GraphPad Software, San Diego, United States) was used to plot graphics of this data. Count data were expressed as n (%) and processed using the χ^2 test, and measurement data were represented by mean $\pm$ SD and analyzed using the t -test. When $P < 0.05$, the difference was considered statistically significant.

RESULTS

General demographic characteristics comparison

The two groups did not show a great disparity in terms of age, gender, body mass index, education level and the place of

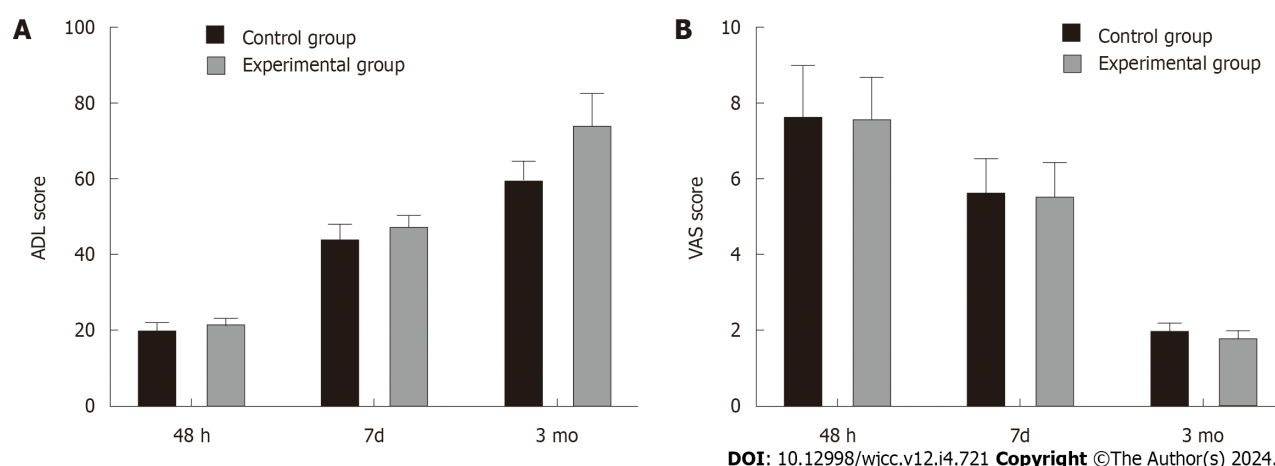


Figure 1 Comparison of the activities of daily living score and visual analogue scale score of the two groups. The abscissa is 48 h after operation, the 7th d and the 3rd month, respectively, and the ordinate is activities of daily living (ADL) and visual analogue scale (VAS) score. A: The ADL scores of patients in the two groups kept rising. There was no significant difference in the ADL scores of patients in the two groups at 48 h and 7th d after surgery. At the 3rd month of reexamination, the ADL scores in the observation group were higher than those in the control group (67.48 ± 14.69 vs 59.40 ± 16.06); B: The VAS scores of the two groups decreased significantly, and there was no significant difference between the groups at each time node. ADL: Activities of daily living; VAS: Visual analogue scale.

residence ($P > 0.05$), as shown in Table 1.

Comparison of ADL scores and VAS scores between the two groups

The ADL scores of the two groups of patients kept rising, and their self-care ability improved significantly, and at the 3rd month of reexamination, the ADL scores in the observation group were higher than those in the control group ($P < 0.05$). The VAS scores of the two groups decreased significantly, and there was no significant difference between the groups at each time node ($P > 0.05$) (Figure 1).

Comparison of knee function scores between the two groups

The knee joint function scores of patients in the two groups increased gradually before intervention and at the 1st, 2nd and 3rd month after discharge ($P < 0.05$). There was no significant difference in knee joint function scores of patients in the two groups at the 1st month after discharge ($P > 0.05$). The knee joint function scores of patients in the observation group were significantly higher than those in the control group at the 2nd and 3rd month after discharge (Table 2).

DISCUSSION

With the development of bone surgery technology, TKA has become an indispensable means to treat the elderly femoral neck fracture, knee joint dysplasia, femoral head aseptic necrosis and other diseases. However, TKA will cause short-term postoperative effects such as strong postoperative pain, temporary movement disorder, which will cause postoperative stress state for patients and transient physiological stress reaction for patients in mild cases. Serious patients will lead to anxiety and depression, delaying the speed of wound healing and the process of disease recovery[13]. As a special nursing measure for postoperative pain response of patients, programmed pain care has been widely used in various joint replacement operations. In addition to general health education, the patients were given health education on pain knowledge before and after the operation, as well as dynamic and personalized guidance in the whole process[14]. In the process of publicity and education, on the one hand, it has improved the efficiency of the pain care management team in terms of the evaluation quality, intervention and effect evaluation of pain, on the other hand, it is also conducive to the patients and their families to master pain related knowledge, understand the disease treatment process and postoperative pain response, improve the patients' treatment compliance and psychological threshold, and enhance their confidence in early recovery. Postoperative analgesia adopts continuous and multimodal methods. Let patients voluntarily accept functional exercise without pain. Effective multimodal analgesia and early postoperative activity guidance can well reduce the incidence of surgical stress and complications, accelerate patient rehabilitation, reduce hospital stay, and reduce hospital costs[15-17].

In this study, we adopted different nursing methods for patients after TKA, by analyzing the impact of programmed pain care and joint cooperative care on pain and rehabilitation of elderly patients undergoing knee replacement, this study found that programmed pain care can significantly reduce the degree of pain of patients after surgery, and improve the postoperative ADL score. The implementation of programmed pain care can make patients familiar with postoperative complications of TKA in advance, especially the most significant postoperative response to pain, so as to improve the psychological threshold of patients. Programmed comprehensive nursing, being widely used in clinical nursing, has achieved significant nursing effects. It is patient-centered, meets patients' psychological demands, provides

Table 1 Comparison of general demographic characteristics between the two groups

Variables	Experimental group (n = 58)	Control group (n = 58)	<i>t</i> / χ^2	<i>P</i> value
Age (yr)	65.8 ± 4.2	64.9 ± 4.4	1.127	0.131
Gender			0.322	0.57
Male	22 (37.93)	25 (43.10)		
Female	36 (62.07)	33 (56.90)		
BMI (kg/m ²)	25.31 ± 1.77	25.74 ± 1.84	1.283	0.101
Education level			0.787	0.853
Primary school or below	6 (10.34)	4 (6.90)		
Middle school	9 (15.52)	11 (18.97)		
High school	24 (41.38)	22 (37.93)		
Junior college and above	19 (32.76)	21 (36.21)		
Place of residence			0.568	0.753
Urban	11 (18.97)	13 (22.41)		
Town	29 (50.00)	25 (43.10)		
Rural	18 (31.03)	20 (34.48)		

BMI: Body mass index.

Table 2 Comparison of knee function scores between the two groups

Variables	Experimental group	Control group	<i>t</i>	<i>P</i> value
1 st month	47.52 ± 5.69	45.81 ± 7.09	1.433	0.0774
2 nd month	59.38 ± 7.43 ^a	53.19 ± 6.24 ^a	4.859	< 0.001 ^c
3 rd month	71.92 ± 8.14 ^b	64.34 ± 8.02 ^b	5.052	< 0.001 ^c

^a*P* < 0.05.

^b*P* < 0.01.

^c*P* < 0.001.

patients with a comfortable hospitalization environment, improves patients' nursing satisfaction and quality of care, and promotes patients' speedy recovery[18]. Programmed nursing combined with cognitive behavioral intervention can improve the clinical efficacy of patients with intracerebral hemorrhage, improve limb motor ability, and reduce neurological deficits, with high safety[7].

In order to better evaluate the rehabilitation of patients after discharge, we introduced collaborative nursing in this study to evaluate the possible impact on patients' rehabilitation. The analysis found that there was no significant difference in postoperative VAS scores between the patients receiving family collaborative care and the control group, but the ADL scores reflecting self-care ability in the combined collaborative care group were higher than the control group. In terms of FS score reflecting the overall function of the knee joint, the rehabilitation of the joint collaborative nursing group was also better. This may be related to the higher degree of cooperation and more scientific and reasonable rehabilitation training of the patient's family members during home rehabilitation after receiving relevant nursing training. Recently, a collaborative nursing study on the treatment of persistent symptoms after concussion magazine revealed that compared with conventional nursing, the adolescent patients receiving collaborative nursing relieved the symptoms of concussion at 3rd and 12th month, and improved their quality of life. The researchers intervened the participants through collaborative nursing interventions, including cognitive behavioral therapy and routine nursing management, and strengthened drug counseling when necessary. Compared with conventional nursing, the scores of the quality of life inventory of adolescents receiving collaborative nursing at 12th month increased by 4.7 points on average (95% confidence interval: 0.05-9.3 points). Although both groups improved over time, the adolescents receiving collaborative nursing intervention had fewer symptoms and improved their quality of life within one year[19].

Continuous collaborative nursing pays attention to the cooperation among nurses, patients and family members. During hospitalization, it provides knowledge guidance and rehabilitation training methods. After discharge, it extends this nursing model outside the hospital through regular follow-up. Through collaboration with family members, patients are encouraged to actively participate in the rehabilitation nursing process inside and outside the hospital, so as to

improve the self-care behavior of patients and effectively improve the quality of life[20-22].

CONCLUSION

The application of programmed pain nursing combined with collaborative nursing to the out of hospital nursing of TKA patients can achieve good results. It can reduce the patient's pain, improve the patient's prognosis and nursing quality.

ARTICLE HIGHLIGHTS

Research background

TKA is the most effective procedure to relieve pain in knee osteoarthritis and other synovial diseases and to improve joint motion and deformity. Accelerated postoperative rehabilitation can improve the prognosis of patients, and early postoperative joint function exercise is a key factor in knee arthroplasty.

Research motivation

The collaborative care model, based on the responsibility care framework, values patient participation in home rehabilitation care and strives to promote early recovery. This model emphasizes the integration of caregivers, family members, and patients, also known as the "three-in-one" care approach.

Research objectives

The aim of this study was to investigate the effects of programmed pain care and collaborative care on elderly patients undergoing knee replacement surgery.

Research methods

Of 116 patients with total knee arthroplasty (TKA) from July 2019 to July 2021. There are two groups: Routine care group ($n = 58$), programmed nursing + collaborative nursing group ($n = 58$). Establish a pain management team composed of attending physicians, head nurses and responsible nurses. Evaluation indicators: Visual analogue scale score, activities of daily living score, and functional score.

Research results

The treatment effect of the observation group was better than that of the control group.

Research conclusions

Pain nursing with collaboration has shown positive outcomes for TKA patients receiving out-of-hospital care, including reduced pain, improved prognosis, and better quality of care.

Research perspectives

The combination of programmed pain nursing and collaborative nursing in out-of-hospital care for TKA patients can achieve good results, reduce patient pain, and improve patient prognosis and nursing quality.

FOOTNOTES

Co-first authors: Li Liu and Qiao-Zhen Guan.

Author contributions: Liu L and Guan QZ contributed equally to this work as co-first authors equally to this work. Liu L and Guan QZ designed the research; Liu L, Guan QZ, and Wang LF contributed new reagents/analytic tools, and analyzed the data; Liu L and Guan QZ wrote the paper; and all authors were involved in the critical review of the results and have contributed to, read, and approved the final manuscript. Liu L and Guan QZ as co-first authors are threefold. First, Liu L and Guan QZ designed and conceptualized the study. Second, Liu L and Guan QZ participated in discussion development and provided expert guidance. Third, Liu L and Guan QZ put in the same effort throughout the study, and in summary, we believe that Guan QZ can be tagged as co-first author in our manuscript.

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