Biomedical Data Science
2026, VOL. 6, NO. 1, 83-86
DOI: 10.47297/wspbdsWSP2752-630518.20260601

Standardized Process Construction and Quality Improvement of First Ambulation After Hip and Knee Arthroplasty

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ABSTRACT

Objective: To construct the standardized process of first ambulation after hip and knee arthroplasty, and verify whether the clinical effect has been effectively improved. Methods: Through literature review, semi-structured interviews and Delphi method, the standardized process of first ambulation after hip and knee arthroplasty was constructed. 60 patients with hip and knee arthroplasty in the Department of orthopedics of Yichang Central People's Hospital were selected as the research objects by convenient sampling method, and were divided into control group (n=30, receiving routine nursing) and experimental group (n=30, receiving standardized nursing process) according to different nursing schemes. The hip joint function and knee joint function were compared between the two groups after nursing. Results: After nursing, the hip function score and knee function score of the experimental group were significantly higher than those of the control group ($P<0.05$). Conclusion: The standardized process of first ambulation after hip and knee arthroplasty can significantly improve the hip and knee function of patients.

KEYWORDS

Hip and knee arthroplasty; Delphi method; Get out of bed for the first time; Standardized process

1 Introduction

Hip and knee arthroplasty is the final treatment of end-stage hip and knee diseases. It has become a conventional and mature surgical method in orthopedics by reconstructing the joint structure and restoring the joint mechanical function, significantly improving the pain symptoms and limb activity ability of patients, and improving the quality of life [1]. With the aging of the population, the popularization of surgical technology and the improvement of patients' demand for rehabilitation prognosis, the number of hip and knee arthroplasty surgeries in China has increased year by year. According to statistics [2], the annual number of surgical cases has exceeded one million, and is still growing at an average annual rate of more than 10%. However, the rehabilitation after hip and knee arthroplasty is the key link connecting the surgical efficacy and the long-term functional recovery of patients. As the starting point of the rehabilitation process, the first ambulation directly affects the recovery speed of postoperative joint function, the risk of complications and the hospitalization period. The standardization and scientificity of its implementation have become one of the core indicators to measure the quality of diagnosis and treatment of hip and knee arthroplasty [3]. Therefore, this study aims to construct the standardized process of first ambulation after hip and knee arthroplasty, and verify whether the clinical effect has been effectively improved.

2 Construction of standardized process

2.1 Establishment of Research Group

The research group was composed of 8 members, including 3 nursing professors, 4 orthopedic specialist nurses and 1 professor of rehabilitation medicine. After the establishment of the group, a kick-off meeting was held to unify the members' understanding of the key links of the first ambulation after hip and knee arthroplasty, and formulate a detailed research implementation plan to lay the organizational foundation for the standardization of the follow-up work.

2.2 Literature Review

The system retrieves the Cochrane Library. PubMed、Embase、Web of Science、The retrieval time of relevant literatures in CNKI, Wanfang database and VIP database is from the establishment of each database to all relevant literatures published before December 2025, so as to ensure that the included literatures have sufficient follow-up data and clinical application feedback. The Chinese key words include "hip and knee replacement", "first ambulation", "standardized process" and "rehabilitation nursing", and the English key words are the English corresponding to the Chinese key words. The literature screening strictly followed the inclusion and exclusion criteria, and the screened literatures were classified and evaluated for quality. The first draft of the standardized process for the first ambulation after hip and knee arthroplasty was initially established.

2.3 Semi Structured Interview

Objective sampling method was used to select the inpatients in the Department of orthopedics of Yichang Central People's Hospital as the interviewees. The interview outline includes: what are your psychological concerns when you get out of bed for the first time, how much do you know about the activity process, how do you feel about the use of assistive devices, what are your rehabilitation needs, and what are your opinions on process optimization. The interview was conducted in the form of one-on-one face-to-face interview. The duration of each round of interview was controlled at 20-30 minutes. The whole process was recorded and recorded synchronously. The recording and transcription were completed within 24 hours after the end of the interview to form the interview text. According to the results of the interview, the research team further clarified the focus and direction of the standardized process scheme: increasing preoperative psychological assessment, clarifying the details of getting out of bed posture, and standardizing the fitting process of assistive devices.

2.4 Delphi Method

From September to October 2024, a total of 14 experts from 5 provinces including Beijing, Hebei, Shandong, Hubei and Hunan and 6 tertiary hospitals were selected for two rounds of expert consultation. The experts work in 5 clinical nursing, 6 nursing management, 1 clinical medicine and 2 rehabilitation medicine. The questionnaire includes the consultation description, the full text of the first draft of the process, the expert evaluation scale and the column of opinions and suggestions. Two rounds of expert consultation were conducted by e-mail. The first round of consultation mainly invited experts to evaluate the overall framework, contents of each link, details and specifications of the first draft of the process, and put forward suggestions for modification and supplement. After the consultation, the research group summarized and analyzed the experts' opinions, and modified and improved the first draft of the process according to the experts' opinions, forming the revised draft of the process. The second round of consultation sent the revised draft of the process and the summary results of the first round of experts' opinions to the experts again, and asked the experts to review and evaluate the revised process, confirm the rationality of the revised content, and put forward suggestions for further optimization. After the two rounds of consultation, the positive coefficient of experts in the first round was 100%, the positive coefficient of experts in the second round was 100%, and the coordination coefficient of experts' opinions was 0.48, indicating that the coordination of experts' opinions was good and the recognition degree was high. The research team modified and improved the scheme according to the suggestions of two rounds of experts. See Table 1 for the final scheme.

Table 1 Standardized process scheme for first ambulation after hip and knee arthroplasty

Primary index	Secondary index
Preoperative preparation	1. Rehabilitation therapists evaluate limb muscle strength, joint range of motion and balance function 2. Specialist nurses assess the nutritional status, psychological emotion and the risk of complications such as deep vein thrombosis and falls 3. Explain the core purpose, implementation process, clinical value and cooperation points of the first ambulation activity to the patient 4. Practical demonstration of getting out of bed posture, use of walking aids and emergency help process 5. Relieve patients' anxiety and fear, and strengthen rehabilitation compliance
Postoperative assessment	1. Continuous monitoring of blood pressure, heart rate and blood oxygen saturation 24-48 hours after operation, and the ambulation process can be started only after the vital signs are stable 2. Assess incision bleeding, pain and joint swelling 3. Assess the sensory and motor abilities of lower limbs, and investigate abnormal signs such as nerve injury and prosthesis dislocation 4. Accurately determine the time to get out of bed and activity intensity based on the preoperative evaluation results
Out of bed implementation	1. Assist the patient to change from the supine position to the semi recumbent position, raise the head of the bed by 30 ° -45 °, and stay for 5-10min. Observe whether there is dizziness, palpitation and other discomfort. If there is no abnormality, turn to the end sitting position, with both feet on the ground and legs drooping naturally, and then stay for 5-10min to adapt to the change of body position. 2. Instruct the patient to support the edge of the bed with both hands, stand with the healthy lower limb first, then slowly move the affected lower limb to the ground, and stabilize the body with the aid of walking aids. Stay for 3-5min after standing, keep your body upright and eyes level, and avoid bending and twisting joints. 3. Assist the patient to move slowly to the bedside with the aid of a walker, support the bedside with both hands, and move the affected lower limb slowly after the healthy lower limb goes to bed.
Safety assessment	1. Monitor the patient's vital signs, complexion and subjective feelings throughout the activity, and ask whether there are symptoms such as pain, dizziness and joint discomfort in real time. 2. After the activity, evaluate the skin temperature and skin color of lower limbs, guide patients to carry out ankle pump exercise, and prevent deep vein thrombosis. 3. Wear elastic socks in a standardized way to avoid limb compression affecting blood circulation.

3 Preliminary Application of the Scheme

3.1 Research Object

Using the convenient sampling method, 60 patients with hip and knee arthroplasty in the Department of orthopedics of Yichang Central People's Hospital were selected as the research objects. Inclusion criteria: (1) meet the surgical indications of hip and knee arthroplasty; (2) The subjects or their families agreed and voluntarily signed the written informed consent. Exclusion criteria: (1) complicated with severe organic lesions; (2) Complicated with serious mental illness, unable to understand and cooperate with the relevant research instructions.

3.2 Research Methods

3.2.1 Nursing Methods of Control Group

Preoperative health education was carried out to explain the operation process and postoperative nursing priorities to patients and their families. At the same time, a comprehensive physical examination was completed to assess the health status of patients to ensure the suitability of surgery. After the operation, the vital signs such as blood pressure and heart rate were continuously monitored, drugs or analgesic pump were used for analgesia, wound cleaning and drying care and dressing were regularly changed, and patients were verbally encouraged to get out of bed as soon as possible.

3.2.2 Nursing Methods of the Experimental Group

It includes four parts: preoperative preparation, postoperative assessment, getting out of bed implementation and safety assessment. See Table 1 for details.

3.3 Evaluation Index

3.3.1 Hip Function

The Harris hip scoring system (HHS) [4] was used to evaluate. The scale covers four core dimensions, and the total score ranges from 0 to 100. The higher the score, the better the structural integrity, mobility and functional practicability of the hip joint, and the better the postoperative rehabilitation effect.

3.3.2 Knee Joint Function

The Knee Society score (KSS) [5] was used to evaluate. The total score of the scale was 100 points. The score results were positively correlated with the knee function. The higher the score, the better the knee function of patients.

3.4 Statistical Methods

Spss26.0 statistical software was used for processing and analysis. Chi square test was used for statistical analysis when analyzing the correlation of count data between different groups. T test was used to evaluate the significance of differences when comparing the differences of measurement data between groups. In the whole process of statistical analysis, when $p<0.05$, it showed that in the statistical test, the differences between groups were significant.

3.5 Results

3.5.1 Hip Function Score of the Two Groups

The results showed that after nursing, the hip function score of the experimental group was significantly higher than that of the control group ($P<0.05$).

Table 2 Hip function scores of the two groups

group	Number of cases	Before nursing	After nursing
control group	30	76.79±4.13	87.55±4.32
Test group	30	76.28±4.01	94.67±4.18
t		0.485	6.488
P		0.629	0.000

3.5.2 Knee Function Score of the Two Groups

The results showed that after nursing, the knee function score of the experimental group was significantly higher than that of the control group ($P<0.05$).

Table 3 Knee function scores of the two groups

group	Number of cases	Before nursing	After nursing
control group	30	75.49±3.78	84.71±4.50
Test group	30	74.86±3.62	93.11±3.98
t		0.659	7.659
P		0.512	0.000

4 Discussion

At present, there are still many chaos in the implementation of the first ambulation after hip and knee arthroplasty in clinical practice, and the lack of unified and standardized standardized process guidance has become a prominent bottleneck restricting the improvement of rehabilitation quality. Based on this, through literature review, semi-structured interviews and Delphi method, this study constructed the standardized process of the first ambulation after hip and knee arthroplasty, and selected 60 patients with hip and knee arthroplasty by convenient sampling method to carry out a clinical control study, to verify the feasibility of the process, as follows.

The effect of hip and knee function recovery in the experimental group was better than that in the control group. The core was that the standardized process accurately solved the prominent problems existing in the implementation of the first ambulation after conventional hip and knee arthroplasty, such as process fragmentation, nonstandard operation, and inadequate risk prevention and control. Through preoperative multi-dimensional assessment, intraoperative connection, postoperative hierarchical implementation, and whole process safety prevention and control, the standardization and accuracy of the first ambulation were achieved, laying a solid foundation for the early rehabilitation of hip and knee function. From the perspective of hip function recovery, the standardized process effectively protects the stability of hip prosthesis by accurately controlling the timing and activity intensity of getting out of bed. At the same time, through scientific posture training and activity guidance, it reduces the incidence of joint adhesion, improves joint activity and muscle strength, and then improves Harris score [6-7]. The advantage of knee function recovery stems from the precise maintenance of knee stability and step-by-step training of activity function by standardized process [8]. In the standardized process constructed in this study, specific out of bed operation specifications were formulated for patients with knee arthroplasty, and the range of motion and stress standard of knee joint during the activity process were defined. At the same time, combined with the core evaluation index of KSS score, the activity intensity and training program were dynamically adjusted, which not only avoided the soft tissue injury caused by excessive activity, but also promoted the synovial fluid circulation of knee joint through early moderate activity, reduced joint swelling and pain, and improved the range of motion and stability of joint [9].

In conclusion, the standardized process of the first ambulation after hip and knee arthroplasty can accelerate the functional recovery of patients, improve the quality of diagnosis, treatment and rehabilitation of hip and knee arthroplasty, fill the gap of standardized diagnosis and treatment of the first ambulation after hip and knee arthroplasty in China, and provide practical reference and theoretical support for the improvement of the quality of orthopedic rehabilitation.

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