<u>original research</u>

Study on the Effect of Pain Programmed Care Based on the Concept of Prehabilitation on the Recovery of Joint Function and WHOQOL-BREF Score in Elderly Patients after Total Hip Arthroplasty

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ABSTRACT

Objective • To assess the impact of pain-programmed care, utilizing the concept of prehabilitation, on the postoperative recovery of joint function and WHOQOL-BREF score in elderly patients following total hip arthroplasty.

Methods • Ninety cases of elderly patients with total hip arthroplasty admitted to our hospital from January to December 2022 were selected as the observation sample, and the 90 elderly patients with total hip arthroplasty were divided into 45 control groups and 45 control groups by random number table method. The pain assessment, functional exercise compliance, hip joint function and quality of life of the two groups were compared after the intervention. Results • The nursing intervention led to a significant reduction in pain scores and improvement in quality of life for elderly patients undergoing total hip joint replacement. The observation group showed a greater reduction in resting pain scores (6.20 \pm 0.63 vs. 3.78 \pm 0.67, P < .05) and activity pain scores (8.78 ± 0.64 vs. 4.89 ± 0.68 , *P* < .05) compared to the control group. Additionally, the observation group demonstrated significant improvements in physiology (55.73 \pm 2.14 vs. 71.87 \pm

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Conclusion • Pain programmed care based on the concept of prehabilitation for elderly patients undergoing total hip arthroplasty has a significant positive impact on pain control, compliance with functional exercise, recovery of hip function, and improvement of quality of life. These findings highlight the benefits of implementing pain management strategies and rehabilitation programs in the field of total hip arthroplasty and elderly care. (*Altern Ther Health Med.* 2023;29(8):618-623).

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INTRODUCTION

The acceleration of population aging in China has led to a significant increase in the number of cases of hip arthritis and hip fractures.¹ The complex anatomical structure and physiological function of the hip joint, combined with the prevalence of osteoporosis and decline in physical function among the elderly population, pose concerns regarding the prognosis and quality of life for patients with these conditions.² Total hip joint replacement has become increasingly common in elderly patients with hip arthritis and hip fractures, as it directly removes the diseased joint and replaces it to restore function. 3,4

However, the presence of severe postoperative pain can cause significant stress reactions in elderly patients, leading to detrimental effects on their endocrine, respiratory, and cardiovascular systems.⁵ Moreover, it can greatly hinder patients' awareness and compliance with functional exercise, which is crucial for joint function recovery and quality of life improvement⁵. Therefore, it is essential to pay close attention to and actively intervene in the postoperative pain experienced by elderly patients undergoing total hip joint replacement.^{6.7}

The concept of pre-rehabilitation involves implementing targeted and prospective rehabilitation interventions with the goal of accelerating postoperative recovery. This approach can enhance surgical adaptation and improve patients' functional levels, subsequently reducing the likelihood of postoperative complications and promoting a favorable and rapid recovery.⁸ Meanwhile, programmed pain care refers to standardized, systematic, and comprehensive pain management plans that have positive effects on pain reduction and suppression.⁹

Notably, no previous studies have explored painprogrammed nursing based on the pre-rehabilitation concept for elderly patients undergoing total hip joint replacement. Therefore, the present study aims to investigate the effectiveness of a pain programmed nursing intervention based on the concept of pre-rehabilitation for this patient population. A significant component of this intervention is pre-recovery pain care, which focuses on addressing pain management even before the surgical procedure takes place. Through comprehensive pain awareness education, psychological counseling, and relaxation techniques, prerecovery pain care aims to enhance patients' understanding of pain, equip them with coping strategies, and promote relaxation and emotional well-being. This proactive approach has the potential to alleviate preoperative anxiety, optimize pain control during surgery, and facilitate smoother recovery.9

By including pre-recovery pain care in the intervention, this study highlights its potential advantages in enhancing overall patient outcomes and quality of life. The study aims to explore and evaluate the effectiveness of this approach, yielding promising results. Thus, the purpose of this study is to investigate the effectiveness of a pain programmed nursing intervention based on the concept of pre-rehabilitation for elderly patients undergoing total hip joint replacement.

In summary, this report provides a comprehensive examination of the impact of pain programmed nursing based on the concept of pre-rehabilitation for elderly patients undergoing total hip joint replacement. The subsequent sections will delve into the methodology, results, and discussions surrounding this study.

STUDY DESIGN AND INTERVENTION METHODS

Study Design 90 elderly patients with total hip Joint replacement admitted to our hospital from January to December 2022 were selected as observation samples. Inclusion criteria: over 65 years old, with indications for total hip Joint replacement, normal cognitive communication, and informed consent; Exclusion criteria: Malignant tumors, liver, kidney, and heart dysfunction, severe vascular lesions in the lower limbs, hip neuropathy, refusal to participate. 90 elderly patients undergoing total hip Joint replacement were divided into 45 test groups and 45 control groups by random number table method. In the control group, the average age was 70.52 \pm 4.35 years old, male: female = 26:19, and the average body mass index was $22.15 \pm 1.46 \text{ kg/m}^2$. In the test group, the average age was 70.44 \pm 4.46 years old, male: female = 27:18, and the average body mass index was $22.22 \pm$ 1.40 kg/m². The baseline data of elderly patients undergoing total hip Joint replacement in the two groups were compared. The difference was not statistically significant (P > .05) and was comparable.

Implementation methods

The control group followed the routine nursing care of total hip Joint replacement, including dynamic monitoring of the condition, implementation of doctor's orders, health cognitive intervention, diet guidance, emotional comfort, rehabilitation care, etc. On this basis, the test group carried out pain procedural nursing intervention based on the prerehabilitation concept, and the specific implementation methods. This study utilized two key approaches to enhance the outcomes of elderly patients undergoing total hip joint replacement: pre-rehabilitation and programmed pain care. Pre-reilitation, also known as prehab, involved implementing targeted exercise programs and optimizing the patients' physical and mental condition before the surgery. This approach aimed to improve postoperative outcomes, accelerate recovery, and minimize complications. Programmed pain care, on the other hand, focused on providing holistic and individualized pain management to address pain's physical, emotional, and psychological aspects. A multidisciplinary team of healthcare professionals worked together to develop personalized pain management plans, incorporating pharmacological interventions, physical therapy, psychological support, patient education, and complementary therapies. By implementing these interventions, the study aimed to improve pain levels, functional exercise compliance, hip joint function, and quality of life in elderly patients undergoing total hip joint replacement. The evaluation methods used in the study assessed these outcomes and provided insights into the effectiveness of the interventions.

Pre-operative rehabilitation pain care

(1) Strengthen pain awareness education. Before the operation, the responsible nurse took the initiative to carry out pain awareness education for the elderly patients undergoing total hip Joint replacement utilizing demonstration, manual distribution, video broadcast, etc. The causes of pain, harmfulness, analgesia strategies, wrong ideas of pain, pain assessment techniques, self-control

analgesia techniques, etc., after the operation were all included in the education. Nurses with rich experience in pain management in the department serve as special education nurses for pain, form WeChat friendship with patients, provide face-to-face consultation support for pain questions when on duty, provide pain answering support through WeChat communication when not on duty, systematically teach patients non pharmacological pain relief techniques such as ice analgesia, massage analgesia, Cognitive behavioral therapy, music therapy and emotional support, and improve position management Education on pain reduction and pain suppression strategies for functional exercise. (2) Optimize psychological counseling. Collect the medical history, family structure and function, economic status, hobbies and interests, and other basic information of the elderly patients undergoing total hip Joint replacement, and make personalized analysis and exploration on the specific causes that can induce and aggravate the patients' negative emotions. Based on this, guide the patients to fully talk about their negative emotions by relying on the policy of "question and answer". The responsible nurse listened patiently and led them to reasonably vent their negative emotions. The emotional exciter allowed Encouraged them to strengthen their venting efforts through crying while conveying empathy and support information through appropriate physical touch and using friendly and caring words to provide emotional comfort. (3) Teach relaxation techniques. Popularization of science explains the painreducing and pain-suppressing value of relaxation training, guiding patients to lie flat in bed in a comfortable state. In soothing background music, the responsible nurse guides patients into a state of meditation using the side white method, imagining themselves walking on the vast seaside, making a deep perception of the natural atmosphere around them, and adjusting their breathing simultaneously. Guide the patient to gently close their eyes and gradually scan their head and feet or feet and head to perceive the sensations of different parts of the body.

Postoperative pre-rehabilitation pain care

(1) Pay close attention to pain issues. During the postoperative analgesia pump retention stage, regular nursing rounds are conducted to observe and evaluate the analgesic effect and adverse reactions. The analgesic plan is adjusted as needed in a timely and timely manner to simplify the McGill Pain Questionnaire-2 (SF-MPQ-2) as a pain assessment tool. Reasonable pain relief is performed based on the evaluation results. When the SF-MPQ-2 score is equal to or exceeds 4 points, medication analgesia is performed, and the analgesic effect is closely monitored; when the pain relief reaches below 4 points, it is considered satisfactory for pain relief. Actively communicate with the patient about pain satisfaction, promote the necessity of pain relief, the applicability of pain relief plans, comfort goals, and other knowledge, try to avoid negative effects on functional activities caused by pain stimulation, and focus on correcting patients' erroneous and

biased pain relief concepts. (2) Diversified emotional management. Objectively explain the surgical situation and consolidate the results of pain awareness education; guide and supervise patients to implement daily relaxation training; evaluate the effectiveness of relaxation training, listen to patients' expectations and vision descriptions of their future rehabilitation results, actively and objectively explore the possible future rehabilitation conditions, display good rehabilitation case examples, and promote a sense of trust in rehabilitation and recovery; lead patients to actively examine current specific practical problems and explore practical new solutions under new experiences; encourage patients to write and express positive emotions every night before going to bed, record three positive events that they believe are related to illness and rehabilitation in their mood diary, analyze the causes and emotional feelings of the events, and share them with nurses and other patients.

Evaluation method

(1) Pain assessment. SF-MPQ-2 was used as the evaluation tool for the pain degree of two groups of elderly patients undergoing total hip Joint replacement, including rest pain and activity pain. The total score was 10 points. The higher the score, the more prominent the pain problem of the subject. (2) Functional exercise compliance. The elderly patients undergoing total hip Joint replacement were assessed for functional exercise compliance with a self-made measurement surface, which was divided into three compliance categories: complete compliance, non-compliance, and partial compliance. The total and partial compliance rates were added as the functional exercise compliance rates. (3) Hip joint function. The two groups of elderly patients undergoing total hip Joint replacement were assessed with the hip function score (Charnley) as a tool. The pain, function, and range of motion were included in three assessment dimensions, all of which were 6 points. The higher the score, the better the hip function of the subject. (4) Quality of life. Two groups of elderly patients undergoing total hip Joint replacement were evaluated with the tool of WHOQOL-BREF, which included four evaluation dimensions of social relations, physiology, environmental impact, and psychology. All were scored from 0 to 100 points. The higher the score, the better the subject's quality of life.

Statistical analysis

In order to analyze and process the data, the Statistical Package for Social Science (SPSS) 23.0 software (IBM, Armonk, NY, USA) was utilized. The measurement data was expressed as mean and standard deviation $(\overline{x} \pm s)$. To compare the pain score, hip function score, and quality of life score between the two groups of elderly patients undergoing total hip joint replacement, a *t* test was employed. The *t* test is a parametric statistical test that determines the significance of the difference between the means of two groups. In this study, it was used to assess whether there were significant differences in the mentioned variables. Additionally, the compliance rate of functional exercise was compared using

Table 1. Comparison of pain scores between two groups of elderly patients undergoing total hip Joint replacement before and after nursing $(\overline{x \pm s})$

	Resting P	ain Score	Activity pain score		
Group(n)	Before care	After care	Before care	After care	
Observation group (n = 45)	6.20 ± 0.63	3.78 ± 0.67^{a}	8.78 ± 0.64	4.89±0.68 ^a	
Control group (n = 45)	6.11 ± 0.65	5.00 ± 0.60^{a}	8.69 ± 0.60	5.89±0.75ª	
t	0.662	-59.092	0.684	-6.641	
P value	.509	<.05	.496	<.05	

 ^{a}P < .05, compared with before nursing in this group

Figure 1. Pain score of elderly patients undergoing total hip Joint replacement



 Table 2. Comparison of compliance rate of functional exercise between two groups of elderly patients undergoing total hip Joint replacement

	Non-compliance	Partial compliance	Complete compliance	Compliance rate of functional exercise	
Group(n)	(n)	(n)	(n)	[n, (%)]	
Observation group $(n = 45)$	1	17	27	44 (97.78)	
Control group (n = 45)	7	14	24	38 (84.44)	

Note: Comparison of compliance rate of functional exercise between two groups of elderly patients undergoing total hip Joint replacement, $\chi^2 = 4.939$, P = .046.

the chi-square (χ^2) test. The chi-square test is a nonparametric statistical test used to examine the association between two categorical variables. In this research, it was employed to determine if there were significant differences in the compliance rates between the two groups. The threshold for statistical significance was set at P < .05. By conducting these statistical analyses with SPSS 23.0, the study aimed to provide robust evidence on the differences in pain score, hip function score, quality of life score, and compliance rates between the two groups of elderly patients undergoing total hip joint replacement.

RESULTS

Pain score of total hip joint replacement

Table 1 presents a comparison of pain scores before and after nursing intervention in two groups of elderly patients undergoing total hip joint replacement. The observation group (n = 45) showed a significant reduction in resting pain scores (6.20 ± 0.63 vs. 3.78 ± 0.67 , P < .05) and activity pain scores (8.78 ± 0.64 vs. 4.89 ± 0.68 , P < .05) after care. In

contrast, the control group (n = 45) exhibited a less significant decrease in resting pain scores (6.11 ± 0.65 vs. 5.00 ± 0.60, P < .05) and activity pain scores (8.69 ± 0.60 vs. 5.89 ± 0.75, P < .05) after care. These findings suggest that nursing intervention contributed to a greater reduction in pain scores in the observation group compared to the control group., as shown in Table 1, Figure 1.

Compliance rate of functional exercise for total hip joint replacement

Table 2 displays the comparison of compliance rates of functional exercise between two groups of elderly patients undergoing total hip joint replacement. In the observation group (n = 45), there was only one case of non-compliance, 17 cases of partial compliance, and 27 cases of complete compliance, resulting in a high compliance rate of 97.78% (44 out of 45). In contrast, the control group (n = 45) had seven cases of non-compliance, 14 cases of partial compliance, and 24 cases of complete compliance, yielding a lower compliance rate of 84.44% (38 out of 45). Statistical analysis using chi-square test showed a significant difference in the compliance rate of functional exercise between the two groups (χ^2 = 4.939, P = .046). These findings suggest that the observation group exhibited a higher compliance rate compared to the control group in terms of functional exercise.), as shown in Table 2.

Hip function score of total hip joint replacement

Table 3 presents a comparison of hip function scores before and after nursing intervention in two groups of elderly patients undergoing total hip joint replacement. The observation group (n = 45) demonstrated significant improvements in pain (2.09 ± 0.51 vs. 4.38 ± 0.78 , P < .05), function (2.11 ± 0.49 vs. 4.67 ± 0.77 , P < .05), and activity level (2.04 ± 0.56 vs. 4.71 ± 0.73 , P < .05) after care. Conversely, the control group (n = 45) exhibited lesser improvement in pain (2.36 ± 0.83 vs. 3.31 ± 0.82 , P < .05), function (2.27 ± 0.69 vs. 3.04 ± 0.88 , P < .05) after care. Statistical analysis showed a significant difference in the improvement of hip function scores between the two groups, with the observation group showing greater improvement., as shown in Table 3, Figure 2.

Quality of life score of total hip joint replacement

Table 4 illustrates a comparison of quality of life scores before and after nursing intervention in two groups of elderly patients undergoing total hip joint replacement. The observation group (n=45) exhibited significant improvements in physiology (55.73 \pm 2.14 vs. 71.87 \pm 21.59, *P* < .05), psychology (55.71 \pm 2.13 vs. 72.60 \pm 2.20, *P* < .05), social relations (55.73 \pm 2.13 vs. 71.96 \pm 1.57, p<0.05), and environmental effect (55.60 \pm 2.15 vs. 68.62 \pm 1.51, *P* < .05) after care. On the other hand, the control group (n = 45) displayed lesser improvements in physiology (55.60 \pm 2.24 vs. 64.53 \pm 2.02, *P* < .05), psychology (55.60 \pm 2.20 vs. 66.33 \pm 1.99, *P* < .05), social relations (55.82 \pm 2.09 vs. 67.84 \pm 1.73,

Table 3. Comparison of hip function scores between two groups of elderly patients undergoing total hip Joint replacement before and after nursing $(\overline{x \pm s})$

	Pain		Fun	ction	Activity level		
Group(n)	Before care	After care	Before care	After care	Before care	After care	
Observation group $(n = 45)$	2.09 ± 0.51	4.38 ± 0.78^{a}	2.11 ± 0.49	4.67 ± 0.77^{a}	2.04 ± 0.56	$4.71 \pm 0.73^{\circ}$	
Control group $(n = 45)$	2.36 ± 0.83	3.31 ± 0.82^{a}	2.31 ± 0.70	3.47 ± 0.89^{a}	2.27 ± 0.69	3.04 ± 0.88	
t	-1.832	6.333	-1571	6.826	-1.678	9.810	
P value	.070	<.05	.120	<.05	.097	<.05	

Note: Compared with before nursing in this group, ${}^{a}P < 0.05$

Table 4. Comparison of quality of life scores between two groups of elderly patients undergoing total hip Joint replacement before and after nursing (points, $x \pm s$)

Group(n)	Physiology		Psychology		Social relations		Environmental effect	
_	Before care	After care	Before care	After care	Before care	After care	Before care	After care
Observation group $(n = 45)$	55.73 ± 2.14	71.87 ± 21.59^{a}	55.71 ± 2.13	72.60 ± 2.20^{a}	55.73 ± 2.13	71.96 ± 1.57^{a}	55.60 ± 2.15	68.62 ± 1.51^{a}
Control group $(n = 45)$	55.60 ± 2.24	64.53 ± 2.02^{a}	55.60 ± 2.22	$66.33\pm1.99^{\mathrm{a}}$	55.82 ± 2.09	67.84 ± 1.73^{a}	55.89 ± 2.18	62.09 ± 51.49^{a}
t	0.289	19.149	0.242	14.178	-0.200	11.813	-0.634	20.649
P value	.773	<.05	.809	<.05	.842	<.05	.528	<.05

 $^{\mathrm{a}}P<.05,$ compared with before nursing in this group

Figure 2. Hip function score of elderly patients undergoing total hip Joint replacement



P < .05), and environmental effect (55.89 ± 2.18 vs. 62.09 ± 51.49, P < .05) after care. Statistical analysis demonstrated significant differences in the improvement of quality of life scores between the two groups, with the observation group showing greater improvement., as shown in Table 4.

DISCUSSION

Programmed pain care based on the concept of prehabilitation has demonstrated its effectiveness in improving pain relief. The data presented in Table 1 of this study indicates that the pain score of elderly patients in the observation group who underwent total hip replacement is significantly lower than that of the control group (P < .05). This approach enables patients to establish a psychological foundation to cope with postoperative pain, learn diverse pain management strategies, acquire emotional management and relaxation techniques, and enhance compliance and self-management efficiency in managing postoperative pain. By actively monitoring the dynamic progression of patient pain after surgery and facilitating effective communication between nurses and patients,^{10,11} timely and efficient pain relief can be provided before pain escalates or becomes

severe. Moreover, patients can be guided to utilize pain selfassessment technology to adjust the pain depth of the pain pump in a reasonable and timely manner, ensuring effective pain management while minimizing the risk of adverse reactions during pain relief.¹²

Based on the concept of prehabilitation, programmed pain care has proven to be beneficial in promoting compliance with functional exercise among elderly patients. Postoperative often presents a significant challenge for patients undergoing total hip joint replacement, impeding their ability to initiate and adhere to a structured functional exercise program. By adopting prehabilitation principles, programmed pain care standardizes the pain management process, optimizes pain management strategies, diversifies management interventions, addresses preoperative pain awareness, encourages patient involvement in pain management, and educates patients on self-pain relief techniques. This facilitates active and effective participation of patients in postoperative pain intervention plans. Furthermore, the safe and effective use of analgesic pumps for continuous pain relief post-surgery encourages patients to utilize individualized non-pharmacological pain relief strategies that suit their needs.¹³ Actively managing emotions throughout the preoperative and postoperative stages can successfully disrupt the cycle between negative emotional and pain exacerbation, ultimately improving pain relief effectiveness.^{14,15} Consequently, pain-program nursing based on the concept of prehabilitation achieves better analgesic effects, thereby addressing the issue of low compliance with functional exercise among elderly patients after total hip joint replacement. As shown in Table II, the compliance rate of functional exercise among elderly patients in the observation group was significantly higher than that in the control group (P < .05).

Programmed pain care based on prehabilitation also plays a beneficial role in joint function recovery and improvement of quality of life. The data presented in Table III and Table IV of this study indicate that elderly in the observation group who underwent total hip joint replacement

achieved higher scores in hip function and quality of life compared to the control group. This is attributed to the integration of the prehabilitation concept with programmed pain care, which combines the advantages of prehabilitation and programmed care. As a result, the pain care provided by the nursing staff for elderly patients undergoing total hip joint replacement is characterized by standardization, forward-thinking approaches, systematization, and comprehensiveness. This approach helps patients preserve their pain coping abilities prior to surgery and ensures timely and efficient pain relief following the operation, reducing the impact of inadequate pain control on rehabilitation progress. It accelerates postoperative functional recovery,^{16,17} making optimal use of the benefits of compliance with functional exercise to promote joint function recovery.² By effectively managing self-pain and facilitating comprehensive hip joint function rehabilitation, it establishes a solid foundation for enhancing the quality of life.

However, this study has certain limitations. These include a small sample size, lack of detailed randomization, inadequate information on intervention content and duration, and absence of long-term follow-up. The study's single-hospital setting and the absence of a comparison group receiving standard care further restrict the generalizability of the findings. Despite these limitations, the study suggests potential benefits of pain-programmed care and highlights the need for larger, more rigorous research to confirm its effectiveness and applicability.

CONFLICT OF INTEREST

The authors have no potential conflicts of interest to report relevant to this article.

AUTHOR CONTRIBUTIONS

DD, HL and MJ contributed to the conception of the study and prepared the manuscript; YX, TZ and XX contributed significantly to literature search, data extraction, quality assessment, data analyses; JW, RT and JMW contributed improving the article for language and style and protocol preparation; YY, JX and JL helped perform the analysis with constructive discussions; All authors read and approved the final manuscript. DD and HL contributed equally to this work.

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