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Information-Motivation-Behavioral Skills model-based rehabilitation in patients after total knee replacement

Submission date
28/09/2025

Recruitment status
No longer recruiting

Registration date
21/10/2025

Overall study status
Completed

Last Edited
24/11/2026

Condition category
Musculoskeletal Diseases

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[X] Results
[ ] Individual participant data

Plain English summary of protocol

Background and study aims
This study was designed to evaluate the effectiveness of rehabilitation training measures under the Information-Motivation-Behavioral Skills (IMB) model on rehabilitation training compliance and knee function of patients after total knee arthroplasty (TKA).

Who can participate?
Adult patients treated with TKA

What does the study involve?
Participants were randomly assigned to one of two groups:
1. Control Group – Standard Care
These patients received routine post-surgery nursing care after knee replacement, including:
- Health education for patients and families about recovery.
- Monitoring vital signs after surgery.
- Early mobility training using a walker once stable.

Functional exercises like:
- Ankle pumps
- Straight leg raises
- Quadriceps contractions
- Passive knee movement (CPM)

Discharge planning with home rehab guidance and monthly follow-ups.

Exercise schedule:
Days 0–3: Ankle pumps, leg raises, quadriceps exercises, CPM (from Day 2).
Days 4–7: Sitting up, walking with a walker, and knee bending.
Days 7–10: Discharge if knee bends ≥60°, walking independently, and no infection.
After discharge: Daily 30-minute home exercises and monthly check-ins.

2. Observation Group – IMB Model-Based Rehab
These patients received all the standard care above, plus a structured rehab program based on the IMB model, delivered by a multidisciplinary team.

Extra support included:
Information: Personalized education, multimedia tools, regular updates, and community support.
Motivation: Trust-building, open conversations, and focus on personal goals.
Skills training: Tailored rehab plans, clear instructions, and step-by-step goals.

Exercise schedule:
Days 0–3: Frequent ankle pumps, leg raises, quadriceps exercises, and CPM (starting Day 1).
Days 4–14: Gradual walking with a walker, sitting up, and knee bending.
Weeks 2–6 (at home): Step training, balance exercises, and weight shifting.

What are the possible benefits and risks of participating?
Benefits: Rehabilitation training interventions based on the IMB model can significantly enhance patients' compliance with postoperative rehabilitation exercises and effectively improve knee joint function, reduce pain intensity, and enhance exercise tolerance, demonstrating the practical utility and value of the IMB model in promoting functional recovery after TKA.
Risks: Participants may experience chest pain, difficulty breathing, or other discomfort.

Where is the study run from?
The People's Hospital of SND

When is the study starting and how long is it expected to run for?
April 2022 to December 2023

Who is funding the study?

Who is the main contact?
Li Zhang and Xiaohong He, hexhong259@163.com

Contact information

Type(s)
Public, Scientific, Principal investigator

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Additional identifiers

Protocol serial number

GSWS2022136, SZHL-C-202408

Study information

Scientific Title
Effects of IMB model-based rehabilitation on exercise compliance and knee function after total knee arthroplasty: a randomized controlled trial

Study objectives
To evaluate the effectiveness of rehabilitation training measures under the Information-Motivation-Behavioral Skills (IMB) model on rehabilitation training compliance and knee function of patients after total knee arthroplasty (TKA).

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 07/09/2025, Ethical Review Commitee of the Suzhou High-tech Zone People's Hospital (The People’s Hospital of SND, No. 95, Huashan Road, Huqiu District , Suzhou, Jiangsu, 215129, China; +86 18662182101; szgxqrmyy@163.com), ref: 2025-133

Primary study design
Interventional

Study design
Randomized controlled trial

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Patients after total knee arthroplasty (TKA)

Interventions
A total of 90 patients treated with total knee arthroplasty were randomly divided into a control group (n=45, intervention with conventional nursing measures) and an observation group (n=45, rehabilitation training intervention based on the IMB model). Participants were randomly assigned to either the observation group or the control group in a 1:1 ratio using a computer-generated random number sequence. The randomization sequence was generated by an independent statistician using SPSS version 26.0 (IBM Corp., Armonk, NY, USA) and was concealed in sequentially numbered, opaque, sealed envelopes. Upon enrollment, each participant was assigned the next envelope in order, ensuring allocation concealment. Although blinding of participants and intervention providers was not feasible due to the nature of the intervention, outcome assessors and data analysts were blinded to group assignments to minimize assessment and analytical bias.

Control group: The patients in the control group were treated with routine nursing measures after being admitted to the hospital. Health education was carried out by the primary nurse in accordance with the requirements of rehabilitation training and intervention after knee arthroplasty, and the patient's family was informed to actively participate in the learning of

relevant knowledge. After the surgery, the patient's vital signs need to be strictly tested, and after the patient regains consciousness and maintains a stable condition, the patient is instructed on how to correctly use the walker to carry out training, and the patient is guided to get out of bed as soon as possible. After the surgery, it is also necessary to pay attention to functional exercise interventions such as continuous passive exercise, straight leg raise exercise, ankle pump exercise, and home rehabilitation guidance. Discharge health education intervention should be carried out when the patient is discharged from the hospital.

Specific exercise methods: Postoperative Days 0-3: Ankle pumps (10-15 cycles per session, 3 sessions daily); Quadriceps isometric contractions (10 reps/set with 5-second holds, 3 sets daily); Straight leg raises (5-8 reps/set, 2 sets daily); Continuous passive motion (CPM) initiated on postoperative day 2 (0-30°, 30 minutes once daily). Days 4-7: Bedside sitting (5 minutes/session, 3 sessions daily); Walker-assisted ambulation (5-10 meters/session, twice daily); Active knee flexion (target 60°, 3 sets daily). Discharge Criteria (Days 7-10): Active knee flexion ≥60°, independent walker use, no signs of wound infection. Post-Discharge: Standard rehabilitation manual distribution, monthly outpatient follow-ups, and recommended 30-minute daily training.

Observation group: The observation group of patients was treated with IMB model rehabilitation training measures on the basis of conventional nursing measures.
1. Intervention team: The IBM model rehabilitation training management team was composed of 1 primary nurse, 1 psychologist, 1 rehabilitation therapist, 1 orthopedic surgeon, and 1 orthopedic specialist nurse. A specialist nurse was responsible for the implementation, and the specific implementation of the rehabilitation guidance program was summarized and analyzed through weekly meetings.

2. Information support:
2.1. Information transfer and education
2.2. Personalized information support
2.3. Use multimedia resource
2.4. Regular communication
2.5. Establish a community support system

3. Motivational interview:
3.1. Building a relationship of trust
3.2. Open-ended questions and listening
3.3. Emphasizing personal values

4. Behavioral skills training
4.1. Design a personalized rehabilitation exercise plan
4.2. Provide specific and clear guidance
4.3. Phased goal setting

Specific exercise methods: Early postoperative rehabilitation (days 0–3) requires patients to perform ankle pumps (10–15 repetitions/hour of dorsiflexion-plantarflexion cycles) for venous return enhancement, concurrently with quadriceps isometric contractions in supine position: 5–10-second holds with full knee extension, repeated 10–15 times per set for 3–5 daily sets, while straight leg raises demand elevating the affected limb to 30°–45° while maintaining knee extension, holding for 5 seconds before controlled lowering at 10 repetitions/set across 3 daily sets; additionally, continuous passive motion (CPM) initiation on postoperative day 1 starts at 0°–30°range, administered twice daily for 30-minute sessions with progressive flexion increases exceeding 90°.

Intermediate rehabilitation (4-14 days after surgery): Beginning on the 3rd to 4th day after surgery, patients are instructed to use a walker to stand beside the bed and walk short distances (5-10 meters), gradually increasing to twice daily, with each session lasting 10-15 minutes. Starting from the 5th day after surgery, patients are guided to transition from a lying position to a seated position beside the bed, with both legs naturally hanging down, to promote knee flexion.

Home rehabilitation after discharge (2-6 weeks post-surgery): With the assistance of handrails or crutches, start by stepping up with the healthy leg, then the affected leg, gradually increasing the height and frequency of steps. Starting from 4 weeks post-surgery, perform balance training, single-leg standing (holding onto the back of a chair), and center of gravity transfer training, with 2 sets per day and 10 repetitions per set.

Intervention Type
Behavioural

Primary outcome(s)
1. Knee function measured using the Hypertension Scale (HSS) at discharge, one month, and three months after surgery
2. Pain severity measured using the Visual Analog Scale (VAS) at discharge, one month, and three months after surgery

Key secondary outcome(s)
3. Mobility was assessed using the 6-minute walk distance (6MWD) test at discharge, one month, and three months after surgery

Completion date
31/12/2023

Eligibility

Key inclusion criteria
1. Patients who met the diagnostic criteria for patients with knee osteoarthritis according to the American Academy of Orthopaedic Surgeons
2. Patients who had the surgical indications of unilateral total knee arthroplasty
3. Patients who were able to understand, express and read correctly
4. Patients and their families gave informed consent to the study and signed the informed consent form

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
44 Years

Upper age limit
53 Years

Sex
All

Total final enrolment
90

Key exclusion criteria
1. Patients who withdrew during the experiment
2. Patients with mental disorders or cognitive impairment
3. Patients with severe systemic diseases
4. Patients with severe organ diseases.

Date of first enrolment
01/06/2022

Date of final enrolment
30/06/2023

Locations

Countries of recruitment
China

Study participating centre
The People's Hospital of SND
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Sponsor information

Organisation
The People's Hospital of SND

Funder(s)

Funder type
Government

Funder Name
Talent Research Project of Suzhou Gusu Health Talent Program

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		15/12/2025	24/11/2026	Yes	No