

Rehabilitation Protocol for

"Total Knee Arthroplasty Rehabilitation Protocol"

Kingdom of Saudi Arabia

Ministry of Health

General Directorate of Medical Rehabilitation & Long-Term Care

2025

Total Knee Arthroplasty (TKA) Rehabilitation Protocol

Overview.

Total knee arthroplasty (TKA), also recognized as a total knee replacement is an orthopedic operation that includes replacing the knee joint's articular surfaces (femoral condyles and tibial plateau) with smooth metal and extremely cross-linked polyethylene plastic.¹ TKA surgery aims to relieve pain, enhance physical function, increase mobility, and improve quality of life in patients with end-stage osteoarthritis or rheumatoid arthritis.² The number of TKA procedures in Saudi Arabia has risen because of the excellent results in improving knee joint function.³

Goals and Rationale.

This protocol aims to improve the rehab of TKA patients by using the most recent evidence. According to evidence-based practice standards, therapists must use the best available evidence in their clinical decision-making, incorporate clinical experience, and consider the patient's values. To assist physical therapists, this protocol involves a narrative review of the available literature regarding rehabilitating patients undergoing TKA in Saudi Arabia.

Recommendations for Total Knee Arthroplasty (TKA).

- Physical therapists should design preoperative TKA exercise programs and teach to perform strengthening and flexibility exercises.⁴
- Physical therapists should teach patients how to utilize cryotherapy and encourage them to do so for early postoperative pain management in TKA patients.

- Physical therapists should involve motor function training (e.g. balance, ambulation, movement symmetry) for patients who have undergone TKA.
- Physical therapists should utilize neuromuscular electrical stimulation (NMES) to improve quadriceps muscle power, gait pattern, performance, and patient-reported outcomes for patients who have undergone TKA.
- Physical therapists should design, implement, teach, and progress patients undergoing TKA in high-intensity strength exercise programs during the early post-acute period to enhance function, strength, and range of motion.
- Physical therapists should consider prognostic factors e.g. body mass index (BMI), depression, preoperative ROM, physical function, strength, age, number of comorbidities, and sex.
- Physical therapist rehabilitation should begin within 24 hours of operation and before discharge for patients who have undergone TKA.
- Obtaining a FULL range of motion is essential to a full recovery (Goal: 0 – 120 degrees AROM).
- Full functional return without restrictions should occur at approximately 12 weeks for patients who have undergone TKA.

- Ice 2-3 times daily for the first 2 weeks post-operation for patients who have undergone TKA.
- Physical therapists should collect data using outcome measures, such as Knee Injury Osteoarthritis Outcomes (KOOS), 30-second Sit-to-Stand, and Timed “Up and Go” (TUG), during rehabilitation programs.

PHASE I: Immediate post-surgical until D/C of assistive device (AD) (0-6 weeks)	
Goals	<ul style="list-style-type: none"> • Protect healing tissue • Pain and Edema Control • DVT protection • Decrease pain-free ROM • Normalize muscle activation • Ambulate independently without AD • Complete independent with all ADLs
Precautions and Red Flags	<ul style="list-style-type: none"> • Signs of DVT (Refer directly to ER) • Mechanical block or clunk (Refer to the surgeon for re-evaluation) • Lack of full knee extension by 4-6 weeks (Refer to the surgeon for re-evaluation) • AD required for ambulation after post-op week 6 (MD follow-up visit)
AD Progression	<ul style="list-style-type: none"> • Walker, then a less restrictive device (cane), and then no device as tolerated. • Crutch use: 2 crutches or 1 and then 0 as the patient tolerated • Goal: use of AD to reduce compensatory gait

Criteria for Community Ambulation without AD	<ul style="list-style-type: none"> • AROM: Full knee extension; no pain on passive overpressure. • Strength: Able to perform strong quad isometric and able to perform 2x10 SLR without quad lag. • Joint effusion: 1+ or less is preferred • No compensation or pain with 60 sec of SL stance. • Normal gait pattern without assistive device. • Able to climb/descend stairs with a handrail or AD. • Goal: DC AD by post-op week 3. 	
Return to Driving Progression	<ul style="list-style-type: none"> • MD clearance • Usually, 4-8 weeks post-op • D/C Narcotics • Driving step test 	
Edema Control	<ul style="list-style-type: none"> • Cold therapy at least 5x daily for the first week. • Cold therapy at least 3x daily for weeks 1-6 • Compression hose post-op for 30 days (optional) • If returning to work in a predominantly seated position, knee elevation is recommended for 10 min per hour (at least). 	
Range of Motion/Stretching	<ul style="list-style-type: none"> • Equalize knee ext AROM for symmetry • Knee flexion A/PROM • 60-90 degrees by 2 weeks, 100 degrees by 6 weeks, 120 degrees by 8-12 weeks. • Stationary bicycle/recumbent stepper for ROM – without resistance • Patellar mobilization. 	
Therapeutic exercise	<p>Early Exercises</p> <ul style="list-style-type: none"> • heel slides • SAQ, LAQ • SLR, SL balance 	<p>Late Exercises</p> <ul style="list-style-type: none"> • Step-ups. • Mini squats/sit-to-stand. • Prone HS curls.

	<ul style="list-style-type: none"> • Ankle pumps 	<ul style="list-style-type: none"> • Heel raises.
Aquatic Therapy	<ul style="list-style-type: none"> • With doctor clearance, begin aquatic therapy once the incision is healed after 4 weeks post-op. • Warning is needed for ambulation on the pool because of slippery surfaces. • Focus on knee ROM, normal gait, hip strength, and stability. 	
Standards to Progress to Phase II	<ul style="list-style-type: none"> • Normal gait pattern for individual's participation in social without AD. • Full knee extension, knee flexion to 110 degrees. • SLR 2x10 without pain and quad lag. • Lower to no reactive pain and swelling with ADLs and PT rehabilitation programs. • Muscle activation and isolation are normal. 	
PHASE II: Intermediate phase D/C of AD to pain-free ADLs (6-12 weeks)		
Goals	<ul style="list-style-type: none"> • Restore full PROM and AROM (0-115 degrees plus) • Progressively improve the strength of the affected lower extremity musculature. • Perform ADLs without pain or restriction. 	
Precautions	<ul style="list-style-type: none"> • Continue strengthening exercises and functional tasks as patient tolerance without pain or effusion. • Monitoring reactive edema while increasing aerobic conditioning/endurance-related tasks. 	
Range of Motion/Stretching	<p>A/PROM:</p> <ul style="list-style-type: none"> • 100 by 6 weeks • 120 by 8-12 weeks • Continuing bicycle for ROM 	
Cardiovascular Exercises	<ul style="list-style-type: none"> • May progress time on the upright bike as tolerated (ensure patient can perform 30 min with no resistance and without 	

	<p>symptoms before adding resistance. Decrease time to \leq 15 min when adding resistance)</p> <ul style="list-style-type: none"> Encourage continued progression of low-impact activities for cardiovascular fitness and community endurance 	
Therapeutic Exercise	<p>Early Exercises:</p> <ul style="list-style-type: none"> Wall squats Mini lunges Step-ups- progress to single-leg step-ups Step downs 4-way hip Leg Press with light resistance, higher reps Open Chain knee extension 	<p>Late Exercises:</p> <ul style="list-style-type: none"> Full squat to 70 degrees Side steps with the band Heel Taps Resisted walking Advanced bridges SLS and balance progressions (unstable surface, ball toss, etc)
<p>Criteria for Discharge</p> <p>(Or to Progress to Phase III once MD clearance is provided)</p>	<ul style="list-style-type: none"> Symmetrical and pain-free knee ROM to meet the demands of patients' activities Good (4/5) LE strength Symmetrical DL squat to at least 70 degrees knee flexion Good quality movement as graded on the Forward Step-Down Test Normalized gait pattern for community distances of ambulation 	
<p>PHASE III: Advanced strengthening and higher-level function to Return to Recreational Activities (12-24 weeks).</p> <ul style="list-style-type: none"> This phase is only required for patients who wish to participate in recreational sports outside of general therapeutic exercise. Patients who don't plan on sports participation can be discharged with a maintenance program following completion of Phase II. 		
Goals	<ul style="list-style-type: none"> Correct abnormal/compensatory movement patterns with higher-level multi-planer strengthening activities. 	





	<ul style="list-style-type: none"> • Optimize neuromuscular control/balance/proprioception • Increase volume/intensity of aerobic activities; begin to restore low • impact and sport-specific cardiovascular fitness • Initiate progressive plyometric activities (per clearance of physician) • Progressively return to sport or prior/the desired level of function
Precautions	<ul style="list-style-type: none"> • Avoid sacrificing quality for quantity while strengthening • Ensure patient maintains complete flexibility and pain-free ROM as strength continues to increase • Monitor/minimize reactive edema when increasing the demand of the task • Closely monitor return to sport progression
Range of Motion	<ul style="list-style-type: none"> • ROM should be checked periodically to ensure that loading the knee with new exercises does not alter the neuromuscular response and normal joint mechanics • If ROM goals are not achieved by week 12, terminal stretches should be initiated
Therapeutic Exercise	<ul style="list-style-type: none"> • Continue progressive LE and core strengthening (DL and SL for closed and open chain exercises) • LE strengthening tasks progressed to multi-planer movements emphasizing core stability and hip/knee control • Core strength tasks progressed to emphasize rotational tasks (chops/lifts, etc) • Proprioception progressed with the variability of surfaces, perturbations, UE, or trunk movements • Progression towards sport-specific tasks as indicated
Cardiovascular Exercise	<ul style="list-style-type: none"> • Dynamic Warm Up initiated

	<ul style="list-style-type: none"> • Upright Bike/Elliptical progression (per PT and patient preference) • Swimming progression (per PT and patient preference)
Plyometrics and running	<p>High-impact activities such as plyometrics and running are generally not advised following total joint replacements. The priority following these surgeries is to prevent damage to the new artificial joint. Due to a lack of evidence on how high-impact activities affect the integrity of artificial joint replacement, patients are advised to participate in low-impact exercises/activities. Patients considering plyometrics to resume running should consult their physician.</p>

References.

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2. Li J, Ma Y, Xiao L. Postoperative Pain Management in Total Knee. 2019;(June):755-761. doi:10.1111/os.12535
3. Al-Otaibi ML. Total knee replacement at Southwestern Saudi Arabia: A single-center experience. *J Fam Med Prim care*. 2021;10(6):2166-2170. doi:10.4103/jfmpc.jfmpc_2440_20
4. Jette DU, Hunter SJ, Burkett L, et al. Guidelines Total Knee Arthroplasty. *Phys Ther*. 2020;100(00):1-29.
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6. Ohio, C., Orthopaedic, S., Adult, S., Division, R., Total, O., State, O., & Medicine, S. (n.d.). TOTAL KNEE ARTHROPLASTY (TKA) POST-OP CLINICAL PRACTICE GUIDELINE Progression is time and criterion-based, dependent on soft tissue healing, patient demographics, and clinician evaluation. Contact Ohio State Orthopaedic Surgery Adult Reconstruction Di, (614).
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Approval: Total Knee Arthroplasty Rehabilitation Protocol

Prepared By	
Name	Signature
1. Hussein Ahmed Alhassany Senior MSK Physical therapist Administration of Medical Rehabilitation & LTC, Jazan Health Cluster	
2. Mohammed Abdu Zalah Senior Geriatric Physical therapist King Fahd Central hospital, Jazan	
Reviewed By	
1. Hatim Mohammed Maashi Senior Physical therapist MOH, Jazan	
2. Afnan Mohammed Shayani Senior MSK Physical therapist Jazan Specialist hospital	
Approved by	
<p>Prof. Dr. Salim Alwi Baharoon Deputy Minister Deputyship of Therapeutic Services – MOH</p>	