

# TKR Surgery

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## Post-op Rehabilitation

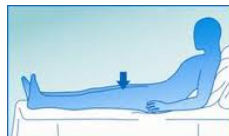
The major objectives of physiotherapy will be to:

1. Ensure maximum range of extension & flexion ROM is achieved. Extension to 0° is the ideal. Flexion needs to be at least 90° for many ADL's, provided the contralateral knee can flex to over 105° to assist with rising from low seats.
2. Promote early return of normal gait pattern. Using muscles in a normal pattern greatly assists with overall recovery.
3. Assist muscles to regain optimal strength & joint control. In the early stages, muscle function can be promoted with the use of a muscle stimulator or a EMG biofeedback device.
4. Design strategies to assist the patient to return to normal function.

The techniques used in rehabilitation will depend on the post-op timeframe, the surgical procedure, and individual patient needs. Joint mobilisation (tibio-femoral & patellofemoral joints) will assist in improving range of motion. Muscle stretching and massage are also beneficial. Scar massage can be commenced once adequate healing has occurred. Hip strengthening is also a vital component of rehab, as a compensatory Trendelenburg gait is common with chronic knee problems.

Following is a list of progressive exercises patients may undertake during their post-hospital rehabilitation period:

1. Isometric / inner range quadriceps contractions.



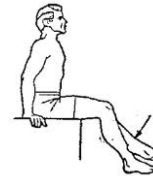
2. Passive knee extension stretches



3. Active flexion / extension range of motion exercises.



4. Heel slides, sitting.



5. Hamstring stretching



6. Straight leg raises



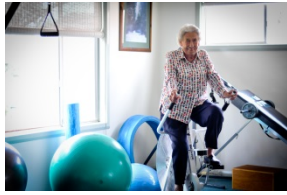
7. Quadriceps 'setting'



8. 'Clams' – hip strengthening



9. Exercise cycling



10. Step ups



11. Leg press



12. Functional exercises – sit to stand



13. Lateral step-ups



14. Knee extensions with weight



**Research:**

Approximately 687,000 total knee replacements are performed each year in the United States. In Australia in 2002, there were over 26,000 knee replacements, and at that time the incidence was growing at between 5% to 10% per year (Graves et al 2004). Although TKR reduces pain & improves self-reported function

in most patients, recovery of strength and function is unlikely to return to normal levels. Preoperative quadriceps strength is generally poor due to chronic pain and swelling. At one month post-TKR it drops by as much as 60% compared to preoperative levels. This weakness persists years after surgery, & probably never recovers to normal for age-matched controls. Functional performance is also known to be severely affected, declining by up to 88% at one month post-op. At one year, walking speed is reduced by an average of 18%, & stair-climbing speed by 51%, compared to age-matched controls. 75% of patients report difficulty negotiating stairs years after TKR, & 52% report limitation in performing functional activities, compared to 22% of age-matched controls.

Quadriceps weakness has the potential to impact function greatly, as quadriceps strength is related to stair-climbing ability, gait speed, chair-rise ability, and risk for falling. A decrease by up to 60% at one month post-operatively is profound. The mechanism at this early stage is more likely due to deficits in quadriceps voluntary activation rather than atrophy. Muscle inhibition is known to occur due to pain and swelling. However the picture is different at one year post-TKR, where atrophy plays a more dominant role in the persistent strength losses observed. It is probable that the period of decreased activation observed early, leads to the longer-term atrophy & strength deficits. It would seem that any rehabilitation intervention conducted early after surgery should target this muscle activation deficit, & may help to mitigate the long-term strength losses seen in this population by preventing muscle atrophy. Research evidence suggests that progressive resistive exercise is capable of reversing activation deficits.

There has been very little research into rehabilitation post-TKR. Some recent studies have looked at rehabilitation which is higher intensity than the traditional rehab methods. However there are concerns in the orthopaedic community that higher intensity interventions immediately on hospital discharge could lead to increased pain and swelling & reduced ROM. This article looked at a group of age & sex-matched controls who performed traditional rehab, versus a study group that underwent higher intensity & longer duration rehabilitation. The age range was 65, +/- 12 years. The main differences

between the two interventions were that (a) the high intensity group intervention went for longer (12 versus 8 weeks); (b) they performed higher intensity resistive exercises, and (c) they performed more difficult functional exercises. The resistive exercises included machine-based resistive strengthening of all major lower extremity muscle groups. The functional exercises included star excursion balance reaching, multidirectional lunging & agility exercises.

The high intervention group had significantly better strength & functional outcomes, without leading to increased pain or decreased ROM. Large differences were apparent between the two groups even at 3.5 weeks post-op, & this was maintained at 12 weeks. The high intensity group also showed clinically superior functional recovery at 3.5, 12 and 52 weeks, having recovered to normal levels compared to age-matched controls without knee OA, in 'timed up-and-go' and '6-minute walk test', and close to normal in 'stair-climb test' results. No detrimental effects were observed compared to the control group. The control group functional scores were significantly worse than the high intensity group in all categories, and were well below the results found for age-matched controls without knee OA. Further studies are required, but the implication is that high-intensity rehabilitation commenced soon after surgery may be safe & effective, helping to restore patients to optimal function.

**References:**

- *Bade, M & Stevens-Lapsley, J (2011). Early high-intensity rehabilitation following total knee arthroplasty improves outcomes. JOSPT, 41, 12, 932-941.*
- *Graves, S et al (2004). The Australian Orthopaedic Association national joint replacement registry. Medical Journal of Australia, 180, (5 Suppl), S31-34.*

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