Rehab Practice Guidelines for:
**Unilateral Total Knee Arthroplasty (TKA)**

**Primary surgery:** Tricompartmental, TKA-any approach

**Expected # of visits:** Dependent on when patient begins physical therapy, can range from 16-28 visits

**Recommended progression of strengthening exercises**

- Strengthen at 70% of 1 Repetition Maximum or 100% of 8 Repetition Maximum (*updated: 3/2/15*)
- Once able to perform 3 sets of 8 reps with minimal fatigue increase to 3 sets of 10 reps.
- Once able to perform 3 sets of 10 reps with minimal fatigue re-assess 8RM and add resistance; accordingly, start back at 3 sets of 8 reps with added resistance.

### Considerations

<table>
<thead>
<tr>
<th>Patient Education</th>
<th>Encourage loading of surgical limb and to be active</th>
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<tbody>
<tr>
<td></td>
<td>Instruction in HEP and activity</td>
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<td></td>
<td>Prior to discharge review and practice proper kneeling techniques</td>
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<tr>
<th>Home Exercise Program</th>
<th>First month post-op exercises 2x daily, afterwards 1x daily, at discharge 3-5x/week based on recovery.</th>
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<tr>
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<td>Home activity:</td>
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<td></td>
<td>○ Phase 1: 10 minutes walking daily</td>
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<td>○ Phase 2: 30 minutes per day of walking 5+ days per week</td>
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<td></td>
<td>○ Phase 3: &gt;30 minutes per day (walking, cycling, swimming) 5+ days per week</td>
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<tr>
<td></td>
<td>○ Phase 4: &gt;30 minutes per day (walking, cycling, swimming, elliptical, stepper) 5+ days per week</td>
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<tr>
<th>Pain and swelling</th>
<th>Ice, compression, and elevation daily after exercises[^1,2,5-6]</th>
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<tr>
<th>Incision mobility</th>
<th>Soft tissue mobilizations to entire length of incision with greater emphasis on distal 1/3 of incision[^1,2,5-4] until incision moves freely over subcutaneous tissue[^3]</th>
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<tr>
<th>Vital Signs</th>
<th>Monitoring during each session[^2]</th>
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[^1]: [Clinical Guideline](www.udptclinic.com) may need to be modified to meet the needs of a specific patient. The model should not replace clinical judgment.
# Total Knee Arthroplasty Rehab Protocol

<table>
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<tr>
<th>Timeline</th>
<th>Treatment</th>
<th>Milestones</th>
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</table>
| **Phase 1**<br>0-2 Weeks Post-Operative<br>Visits 1-6 | - **ROM**<sup>2</sup>  
  - Exercise bike for ROM 5-10 minutes, forward and/or backward pedaling with no resistance until able to perform full revolution at the lowest seat height.  
  - Supine active-assistive wall slides for knee flexion ROM  
  - Passive knee extension stretches with manual pressure  
  - Seated bag hang or prone bag hang providing low load long duration stretch (weight and time may vary to achieve goal)  
  - Patellar mobilizations all directions as necessary<sup>1</sup> "No lateral mobilization secondary to surgical procedure"  
  - **NMES**<sup>1,2,5,4,6</sup>: See end note for guidelines  
  - **Volitional strength**<sup>2,10</sup>  
    - Exercise example: SAQ, standing bilateral 45° squats with UE support, clamshells, side-lying hip abduction, side-lying hip adduction, glute squeezes  
  - **Balance/Agility**<sup>9</sup>  
    - Exercise example: Multi-directional stepping, weight shifting, side-stepping (UE support as needed) | - Able to complete 3x8 reps without fatigue<sup>10</sup>  
- Pain at rest < 4/10<sup>10</sup>  
- AROM/PROM < 10-90<sup>10</sup>  
- Independence with mobility in and out of home<sup>10</sup>

| **Phase 2**<br>2-6 Weeks Post-Operative<br>Visits 7-16 | - **ROM**<sup>2</sup>  
  - Exercise bike for 5-10 minutes, forward and backward pedaling with no resistance until able to perform full revolution at lowest seat height. Once can achieve this add resistance.  
  - Supine active-assistive wall slides for knee flexion ROM  
  - Passive knee extension stretch with manual pressure  
  - Seated bag hang or prone bag hang providing low load long duration stretch (weight and time may vary to achieve goal)  
  - Patellar mobilizations all directions as necessary<sup>1</sup> "No lateral mobilization secondary to surgical procedure"  
  - **NMES**<sup>1,2,5,4,6</sup>: See end note for guidelines  
  - **Volitional strength**<sup>2,10</sup>  
    - Exercise example: LAQ, SLR, clamshells, side-lying hip abduction, step-ups/side step-ups/step-downs/step-up and overs at 5-15 cm, sit to stand, bilateral calf raises standing TKE with Theraband™ for resistance from 45-0°, standing hamstring curls  
    - Increase step height if good concentric/eccentric control  
  - **Balance/Agility**<sup>9</sup>  
    - Exercise example: Marching (decrease UE support), backward walking, forward lunges (progress depth and decrease UE support) | - AROM/PROM 0° to > 105° of flexion<sup>2</sup>  
- Minimal to no pain and swelling<sup>2</sup>  
- Voluntary quadriceps muscle control or 0° knee extension lag<sup>7</sup>  
- Heel strike/push off achieved with least restrictive device.  
- Begin focusing on TKE in stance phase of gait.  
- Obtain baseline isometric quadriceps index, and activation with a superimposed electrical stimulation burst at the end of week four.

| **Phase 3**<br>5-8 Weeks Post-Operative<br>Visits 16-21 | - **ROM**<sup>2</sup>  
  - Exercise bike for 5-10 minutes, add resistance if able to perform full revolution, lower seat height to produce stretch with each revolution  
  - Continue ROM activities as described in phase 2 treatment section with increased duration until milestones are achieved  
  - **NMES**<sup>1,2,5,4,6</sup>: See end note for guidelines  
  - **Volitional strength**<sup>2,10</sup>  
    - Exercise example: LAQ with ankle weight, standing hamstring curls with ankle weights, standing 4-way hip with UE support, | - Consistent with carryover of AROM 0° to >115°  
- Collaborate with surgeon if by 4-6 weeks post-op carryover of AROM in flexion is less than 10°-15° from initial outpatient PT evaluation measurement.  
- Steady increase in MVIC<sup>3</sup>
### Phase 4
**7-10 Weeks Post-Op**

**Visits 22-28**

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<tr>
<th>Activity</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>ROM</strong></td>
<td>Continue as previously described until milestones are achieved</td>
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<tr>
<td><strong>NMES</strong></td>
<td>See end note for guidelines</td>
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<tr>
<td><strong>Volitional Strength</strong></td>
<td>Exercise example: Machine leg extension, machine leg curls, supine stability ball hip extension progression, standing 4-way hip with reduced UE support progressing to no support, machine leg press, machine calf press, wall slides with hold.</td>
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<tr>
<td><strong>Balance/Agility</strong></td>
<td>Exercise example: Star excursion foot reach, SLS with eyes closed (re-start SLS progression), side shuffles, grapevine, figure-8 walking, backward walking (progress volume and speed).</td>
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<td><strong>Prior to discharge</strong></td>
<td>Review and practice safe kneeling with patient during one session. Provide handouts to patient on safe kneeling, local gyms, risk of weight gain following TKA, and nutrition.</td>
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</table>

- ROM: range of motion; AROM: active range of motion; PROM: passive range of motion; > greater than; reps: repetitions; SLR: straight leg raise; RM: repetition maximum; TKE: terminal knee extension; SAQ: short-arc quadriceps; MVIC: maximum volitional isometric contraction; PT: physical therapy; SLS: Single limb stance
### NMES Protocol Guidelines

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<th>At home</th>
<th>In the clinic</th>
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| ▪ To be performed twice a day for the first 6 weeks  
▪ Secure the lower limb with Velcro straps to a stable chair to allow for about 85° of hip flexion and 60° of knee flexion  
▪ Electrodes placed over proximal lateral quadriceps and distal medial quadriceps  
▪ Stimulation parameters: 250 usec, symmetrical waveform, 50 Hz, 3 second ramp, 15 seconds on, 45 seconds off, intensity to maximum tolerable and patient should be encouraged to increase the intensity throughout to tolerance | ▪ Stimulation Parameters: 250-400 usec, 50-75 Hz, 2 second ramp, 12 second on, 50 second off, intensity to maximum tolerable or at least 30% of the maximum volitional isometric contraction (MVIC), 15 contractions per session  
▪ 3 sessions per week until quadriceps strength MVIC is 70% of uninvolved.  
▪ Performed isometrically at 0-60 degrees of knee flexion—dependent on tolerance and therapeutic goal (i.e. near max extension for quad lag, etc.) |

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References


11.)Jenkins C1, Barker KL, Pandit H, Dodd CA, Murray DW. After partial knee replacement, patients can kneel, but they need to be taught to do so: a single-blind randomized controlled trial. Phys Ther. 2008 Sep;88(9):1012-21.