Dr Limoni PT Guide for Total Knee Replacement

We are in a highly dynamic era of health care pertaining to knee replacement surgery. The demand for this surgery is accelerating at a pace that may not be sustainable for the payers, and we have recently experienced a significant change in how we have traditionally rehabilitated patients and we have to prepare for more to come.
Of particular note, knee replacement was placed on the outpatient medicare procedural list, which pushes the costs on the facility if patients aren't well prepared prior to arrival and physically able to manage the early rehab and adl's independently. Many of the traditional roles that occurred while inpatient including preparing the home to be safe for mobilization, starting traditional pt assisted exercising and teaching patient performed home exercise programs have been removed from inpatient social workers and inpatient therapists to the outpatient therapists and physician caregiver teams.
The next hurdle we have experienced and will continue to face will be financial cuts to the rehab. Investment of the care episode, mostly seen by limits on formal visits for outpatient PT.

Although its clear to me that most of the drive is primarily financial driven at the detriment of the patients to meet the needs of this population will and has forced us to innovate. We have already seen a tremendous improvement in perioperitive pain management to non narcotic alternatives so patients can safely mobilize early and discharge sooner after tka. The old adage of healing at home clearly has benefits particularly with infection risks, sleep and safer mobility in a familiar environment.
First and foremost this is a Guide. Insurance companies are jumping on studies that claim patients get no benefit from formal therapy, and will continue to challenge us to save dollars. I firmly believe physical therapist will always be an important navigator for Tka patients, albeit in different ways as now.
The days of strict protocols where everyone is treated the same (patient x will start therapy on day x, goes 3 x a week for 6 weeks, does these exact exercises) are ending. We all have experienced patients reaching all their milestones without almost no help, and also patients who need the hand held several times a week or they won't move their leg. Providing care to those that need it and reducing care to those that don't is how we will meet the growing need for this surgery in a cost palatable way. The care provided is customized to the need of the patients.

Stage 1. (Preoperative role of the therapist)
Most of our patients that are first time joint replacement patients are expected to have a preoperative assessment by physical therapy!
We need to determine who is ready to go and who is at risk of inability to be safely discharged from the hospital.

**Preop**. (Prehab)

Preparation for TKA is multifactorial including physiologic (sleep, anxiety reduction, minimizing catastrophic thinking, reducing systemic inflammation and stabilizing diet and glucose levels). Patients will be screened for known modifiable risk factors including anemia, vit. D deficiency, nutritional status, glucose levels, kidney function). Some medications will be provided several days prior to the surgery procedures to help sleep, mood, inflammation.
-**Therapists** can help in reviewing sleep habits and providing suggestions like identifying tolerable aerobic activity preoperatively that may help sleep and mood.
-T**herapists** can provide some suggestions preoperatively on diet modifications that can help stabilize sugars and reduce inflammation
-**Therapist** have the important role of determining through functional capacity examination the patients post operative fall risk. (Patients balance, gait, climbing ability) will all be demented for

a period of time after joint arthroplasty, and generally worse than how they are preceding the surgery.

- If they are not able to manage their home environment safely preop they are not safe to proceed with surgery (this is a **Red Light** designation).
Factors including help at home, steps, sleeping location all are relevant individually for patients.
I a patient is deemed red-light; surgery should be delayed and formal therapy should be initiated, deficit improvement optimized and then reassessed by the MD. This patient is likely going to need frequent formal therapy after the early post op cool down phase (below)

-some patients have mild deficits, have stiffness that can be improved preoperatively or may not show capability of performing or understanding simple exercise and rules (post op early, cool down) and may need 1 or 2 additionally prehab prior to surgery. (This is a **Yellow light** designation). This patient may need frequent 2-3 x formal therapy after the early post of cool down phase. This may change based on progress through rom, strengthening, endurance rehab.

-Some patients having tka are still quite fit aerobically, have excellent balance, do not use assistive ambulatory aids. (This is a **Green Light** patient). They should be giving some simple active ROM exercises to do during the post op early cool down stage) A formal post op visit should be set around 10-14 days. If the patient already has 80% preop range of motion; home program could be continued and recheck in 2 more weeks. These are prime patients if the lifestyle or occupation requires moderate activity levels to save formal visits for later when more aggressive strengthening and endurance training can be of more benefit after 6 weeks

-**Therapists** record preoperative flexion and extension
-**Therapists** note edema in ankles Text
(If patients regularly have edema in ankles, depending on severity and if persists past night time, this needs to be resolved prior to surgery). This may include lymphedema therapy visits, education and reinforcement), they may need to start post op recovery elevation rules 3 days prior to surgery, but the goal is to not have surgery starting behind with swelling)

**Post op day 1-10** Cool down Phase

This is the most critical time to prevent the long term complications of arthrofibrosis, chronic causalgia, the knee that takes months to heal, blood clots. Dr Andrew Wickline et al recently published a paper, “A Call to Action, mitigating the post operative swelling tsunami in Total Knee Arthroplasty“. Swelling forces during the immediate post operative period are immense. Histamine release, bleeding, fluid shifts from rehydration. If this first battle is not won, everything including longevity of healing, pain, range of motion, strengthening, endurance and balance, sleep will be difficult, prolonged and potentially permanently demented.
If we can get through this early phase with little to no swelling, everything will be easy from a therapy and rehab standpoint.
Our focus has changed in this phase to nearly all the focus on swelling management with exercising to initiate ROM needing to be with the leg elevated (should include simple passive and active rom and isometrics that patients can be self taught) , CPM can be used for motion and to sustain adequate elevation at rest if patient tolerates but not required.
Patients should be avoiding prolonged time in cars (including doctor and therapy visits), long walks, and long periods of time with the leg dependent at home. To simplify this patients are team as instituted the rules of 3!
-longevity of time with leg not elevated **3**0 minutes (enough to do adl’s during day at home)

-elevate leg with at least **3** pillow or equivalent height (rarely done at hospitals and should be reinforced to hospital staff) ((cpm and 1 pillow is a stable alternative to 3 pillows) *I generally reinforce the keep leg straight theme, but most importantly keep leg elevated, if a patient can't sleep on their back (sleep apnea etc) I would rather them lay on non-op side, pillows between knees and knee bent to get some sleep. Sleep = less pain, better mood and better outcome

-pump ankles a minimum of **3** x an hour

-during daytime patients should get up and walk at a minimum of once every **3** hours (more ok as long as the 30 minutes dependent isn't exceeded every 3 hours

-passive and active rom with leg elevated ( cpm not required), isometrics minimum **3** x a day

-remote monitoring beneficial for at risk patients (former yellow and red light) and may include home pt stop if noncompliant with check in or 3 x a day exercise.

-I don't have a magic number for ice. I do believe it has a role for pain management and is beneficial to the level of patient tolerance. Graduated compression is important (foot more, knee less) particularly during the dependent time (leg not elevated)

## Early **Formal PT** visit day 10-12

Patients screened on first visit. Measurements should include edema measurements performed pre-op, range of motion compared to pre-op, fall risk assessment, muscle activity, and compliance to the rule of 3's.
The plan for formal PT (frequency and longevity) should be roadmapped at this visit and may alter considerably based on the current state and their timeline to recovery.

1. Patients with considerable swelling shouldn't return that week as formal therapy sessions including travel, registration and sessions can't be accomplished in less than a 30 m window. The next stages of strengthening, endurance will only aggravate the swelling. Review their swelling reduction, remote monitoring acceptable. Patient should be seen around this time by the Doctor's office to determine medical causations as a possibility. Home pt is an option.
2. Some patients may have limited swelling. If they have reached near preop range of motion, are regular exercisers and do not have a time line (return to work); these patients likely will progress independently quite well. A follow up monitoring visit in 2-3 weeks may be appropriate with an hep
3. If patients swelling is reasonable but Rom is a struggle, these patients are the most likely to benefit from frequent formal assisted rom exercising at this stage. Too much endurance and strengthening can induce swelling and focus should be maintained on rom and swelling management if this is noted.
4. If patients don't fall into the above categories, use your judgement and adjust frequency and intensity based on their response to your treatments. Keep in mind, all patients are different, all patients heal differently and all have various demand and expectations of their results. In general, if preop range of motion can be obtained or exceeded, strengthening and endurance and balance will recover with time through ADL's. Formal therapy will recover patients quicker (so it needs to be determined if this is necessary) and will open the opportunity to exceed preop values. (This may be a desire of high demand patients and a necessity of yellow and red light patients)

**Late PT past 6 weeks**

**-**There is 3 categories here as well
1. Patient one is the self motivated, retired, that has restored adequate ROM is unlikely to benefit much from ongoing formal PT.

Category 2 and 3 are distinctly different people

Hunting Dog trainers categorize dogs into 2 categories ; the ones we need to slow down and the ones we need to speed up. Likewise we have 2 patient catagories; one set that needs to be slowed down and one set that needs to be sped up.

2. Patient has a timeline; needs to return to work; may need work simulation; endurance exercising and formal strengthening. The overachievers fall in this category. 6 weeks is still relatively soon after a major surgery to push knees to preoperative function, and inducing a ripe tomato repetitively can lead to chronic dysfunction. The obsessive exerciser or manual worker would benefit from therapy visits to slow them down and reinforce modifications if inflammation continues.

3. Red light and yellow light patients would benefit from intermittent long term (1-2 months) of ongoing gait, balance, endurance formal therapy.

How do you get there? Range of motion, strength, endurance. This is what you have an expertise in. It is not my role or expertise as a surgeon to tell you what to do at therapy sessions!! You need to assess how your interventions effect the patients swelling, and modify as needed. Remember that patients that suffer a swelling tsunami are far more likely to have chronic dissatisfaction with their knee due to various complications regardless of what they do to rehab their knee; and inappropriate or overly aggressive rehab can contribute to a swelling tsunami.
In order to execute a knee replacement we compromise the extensor mechanism; and it is held together by only stitch material in the early recovery. I have had patients return to the Or for extensor mechanism injuries after surgery due to inappropriate rehab (early squats etc).

Lastly, you may have noticed over the past 5 years; patients are achieving their flexion somewhat easier or sooner than historically and may struggle more with terminal extension. This is the result of design changes that are occurring. The shapes of the posterior components have become more conducive to deep flexion; we have begun adapting tools to include soft tissue tensioning in the flexion tension and we are trending away from posterior lateral lips on the poly inserts that restrict the femurs native external rotation and tibias internal rotation deep flexion to orientate the patella in a mechanical advantaged position. You may have noticed that turning the knee into a hinge hindered flexion and may have led to some late flexion instability as the body motors through the restriction to natural kinematics. Better swelling management also is improving time to reach functional flexion

Likewise, you may have noticed patients struggling more recently with extension. Current designs are focused on obtaining a stable knee joint at heel strike to drive normal ext. to int torsion of tibia to impact load, normal gentle eccentric absorption of the quad and hamstring relaxation rather than a stiff legged guarded co-contraction at heel strike and early stance. This is accomplished by partial congruence of the anterior lip of the poly insert and anterior femur. Terminal extension is challenged by this congruence, however, unlike flexion can and likely will

return late. Up to 6-9 months with ongoing self exercising.  Passive weight loading (heel on edge of couch and sand bag or flour bag and relaxation 2-3 x daily and active extension and hamstring stretching should be the focus.

Let us know if you have suggestions, input; this is intended to be a philosophic guide and not strict dogma to assist therapist and patients get through this challenging surgery!

Dr Limoni