Is Prescribed Postoperative Physical Therapy Necessary after Routine Primary Total Knee or Total Hip Replacement?

Claudio Diaz-Ledezma, Khalid Merghani, Ilda Molloy, Rob Nelissen, Lipalo Mokete, Julian Costantini

Response/Recommendation

Postoperative physical therapy remains an essential component of standard care following total joint arthroplasty. The specific approach (self-directed versus prescribed/supervised programs) should be individualized.

Level of evidence: Moderate

Rationale:

Definitions are crucial in clinical practice, especially in the field of total joint arthroplasty (TJA)[1]. For the purposes of this manuscript, TJA will encompass total knee arthroplasty (TKA) and total hip arthroplasty (THA). The Medical Subject Headings (MeSH) is an organized vocabulary produced by the US National Library of Medicine that is used for indexing, cataloging, and searching of health-related information.[2] According to the MeSH terms, *Exercise Therapy* is "a regimen or plan of physical activities designed and prescribed for specific therapeutic goals. Its purpose is to restore normal musculoskeletal function or to reduce pain caused by diseases or injuries."[3] It forms part of the *Physical Therapy Modalities* (Therapeutic modalities frequently used in physical therapy specialty by physical therapists or physiotherapists to promote, maintain, or restore the physical and physiological well-being of an individual)[4] which in turn is part of the *Rehabilitation* category, described as "Restoration of human functions to the maximum degree possible in a person or persons suffering from disease or injury."[5] The latter is part of the *Continuity of Patient Care* concept, described as "Health care provided on a continuing basis from the initial contact, following the patient through all phases of medical care."[6]

In clinical practice, what surgeons prescribe after TJA is principally “exercise therapy’ but other modalities that can be categorized as “physical therapy” are also included as part of the *Continuity of Patient Care* after surgery. Unfortunately, the variability with which surgeons prescribe or recommend post-TJA physical therapy, as well as the way it is executed, makes a universalization of the concepts described in this manuscript difficult. Thus, the information contained in this document should be scrutinized and adapted to every surgeon practice.

To our knowledge, there is no agreement to define what a successful result after physical therapy entails in a patient undergoing TJA. If we follow the definition of *Rehabilitation*[5], it is described as *restoration of joint function to the maximum degree possible*, which is adjustable from patient to patient. Certainly, defining *successful postoperative physical therapy* interacts with other forms of objective and subjective postoperative evaluations. We believe is worth pursuing a formal definition for TKA and for THA in the future.

For decades, exercise therapy and other modalities have been part of the postoperative management plan in TJA patients, and consultation with a physical therapist is considered one of the quality-of-care indicators in patients undergoing TJA. [7] However, more recent efforts to define “quality measures’ in TJA do not specifically mention postoperative physical therapy.[8] In the United Kingdom, the National Institute for Health and Care Excellence (NICE) through their quality standards guidelines published in 2022[9] have made clear statements regarding post operative rehabilitation. Needs for postoperative rehabilitation are evaluated through a discussion with the patient during the hospitalization. It is led by physiotherapy professionals but supported by the whole multidisciplinary team. One of the most important aspects of the NICE statement is that “the type of rehabilitation offered should be based on the outcome of this discussion and reflects adults’ clinical and personal circumstances”; All patients undergoing TJA are given advice on self-directed rehabilitation. Supervised (formal) individual or group outpatient physical therapy is offered to patients who have a) difficulties managing daily life activities, b) functional impairment leading to specific rehabilitation needs, and c) unmet rehabilitation goals with self-directed rehabilitation. For patients undergoing self-directed rehabilitation, it is paramount to understand the goals pursued and the importance of doing the exercises that were prescribed. In addition, a point of contact for advice and support is required. Importantly, the NICE guidelines clearly state that patients with physical, sensory or learning disabilities require additional support which may include individual outpatient rehabilitation.

Also, NICE guidelines recognize that the advice should be delivered in a culturally appropriate manner. The authors of this manuscript believe that the NICE guidelines approach for the tailoring of postoperative rehabilitation according to the specific and individual patients' needs and possibilities should be a model to follow in the rest of the world.

In respect of unsupervised (self-directed) exercise recommendations after surgery, Fortier et al[10] summarized a list of exercises supported by the American Academy of Orthopaedic Surgeons (AAOS) and the American Association of Hip and Knee Surgeons, both for THA and TKA patients.

This manuscript is a narrative review of relevant literature on post-operative rehabilitation strategies for total joint arthroplasty (TJA). It specifically distinguishes between two phases: 1) immediate post-procedural and inpatient therapy, and 2) physical therapy after discharge.

Total knee replacement

As early as in 1977, the specific objectives of a rehabilitation program after TKA were emphasized: "*pursue strong quadriceps setting, straight leg raising, flexion of the knee to at least 90 degrees, and extension of the knee to 0 degrees*".[11] Those aims remain similar to what is pursued as a minimum nowadays.

Immediate-post procedural and inpatient physical therapy

More than a decade ago it was proven that early initiation of exercise therapy after surgery can shorten the length of stay in TKA.[12] In 2024, as shortened lengths of stay and outpatient programs are a routine practice, the immediate start of an exercise protocol to achieve a steady gait and adequate knee range of motion, even in the postoperative acute care unit, are consuetudinary practices.

We support the formalization of physical therapy interventions in the immediate postoperative period for patients undergoing both outpatient and inpatient TKA. Every institution should establish milestones for physical therapy clearance before discharge.

Exercise therapy to achieve good range of motion for sitting and walking should be prioritized. The patient should be instructed on how to properly transfer from lying to sitting and from sitting to standing. Orthostatic intolerance, a recognized deterrent to rehabilitation in fast-recovery protocols after TKA,[13] should be carefully evaluated.

The use of assistive devices should also be individualized[14]. During the immediate post operative period, the use of a walker is the most common practice. Front-wheeled walkers may have slight advantages over regular walkers during this period, but no differences at 6 weeks.[15] Not all patients need walkers after the first two weeks. Axillary or forearm crutches can be beneficial for many, allowing them to progress to one crutch and then no assistive device. We found no studies comparing different lower extremity assistive devices after TKA. The risk of postoperative falls should be assessed, as some commonly used peripheral nerve blocks can have varying rates of quadriceps weakness.[16]

The use of other modalities, such as cryotherapy, are also part of most practices. It has a relevant role decreasing the use of opioids during the first postoperative week, according to a recent systematic review.[17] The use of continuous cryotherapy does not appear to have benefits over traditional cryotherapy, and it may not be cost-effective.[18]

Continuous passive motion machines, once a popular practice, have fallen out of regular use due to level-1 evidence.[19] They are not recommended for immediate postoperative physical therapy.

Patients who are discharged and have a long commute home (more than 90 minutes) may require special consideration. Advise them on keeping their knee mobile and maintaining calf pumps during their travels.

Physical therapy after discharge

In 2020, the American Physical Therapy Association (APTA) published a guideline for the management of TKA patients[20], with paid participation from the AAOS. The guideline is based on a systematic literature review and recommends rehabilitation strategies and tactics based on the strength of the evidence supporting them (Table 1). Interestingly, only a minority of the recommendations are based on strong evidence. Perhaps more relevant, the authors of the mentioned guideline used a voting system to categorize the strength of the recommendations, thus the objectivity of the results of these guidelines is less than ideal.

Recently, a pioneering randomized controlled trial conducted in the Netherlands with 624 knee and hip replacement patients[21] has been completed and is undergoing publication. Its results will strengthen the evidence supporting physiotherapeutic interventions after TKA in particular, and for TJA procedures in general.

The advantages observed with the use of supervised physical therapy versus self-directed rehabilitation following TKA has been investigated more recently. Fleishman *et al.* in a level-1 study demonstrated that unsupervised home therapy can be a safe alternative to regular PT among TKA patients. [22]

Self-directed therapy can be achieved following the directions of a physical document such as a booklet, or through the interaction with an electronic engagement platform or app. Klement *et al.* demonstrated that these tools may be helpful for many TKA patients, but not all may benefit from this type of interventions.[23] Virtual PT and web-based platforms can be beneficial after TKA and reduce the cost of care. [24] [25]

Total hip replacement

The objectives of formal interventions after a routine THA include to recover joint functionality and a steady gait without the use of assistive devices, as well as the prevention of complications such as postoperative falls or dislocations. These goals can be achieved at varying timeframes depending on the individual patient.

Immediate-post procedural and inpatient physical therapy

The introduction of practices that enhance surgical recovery has advanced THA to a point where outpatient surgery and one-night stays are a regular practice in many institutions. In this current scenario, immediate post-procedural physical therapy likely plays an even more important role than inpatient physical therapy, which was more crucial in past decades.

Transitions from lying in bed to sitting, sitting to standing, and the proper use of assistive devices should be a priority before discharge. The walking capacity of the patient should be objectively assessed. In our opinion, all THA patients discharged from the surgical facility should receive clearance from a physical therapist, ensuring they meet the established recovery goals at every institution.

A narrative review by the Cochrane Database evaluated the evidence supporting the provision of assistive devices, education on hip precautions, environmental modifications, and training in activities of daily living (ADL) and extended ADL (EADL) for people undergoing THA.[26] Unfortunately, the variability and limitations of the available evidence precluded a systematic review. The effectiveness of these interventions remains uncertain due to the low quality of the

underlying studies. Despite this uncertainty, their use is likely to continue as standard practice, with variations based on surgeon preference. This will likely persist until high-quality evidence emerges that definitively proves or refutes their value.

Physical therapy after discharge

A recent systematic review and meta-analysis focused on physical therapy after THA by Saueressig *et al.*[27] included 32 studies in its qualitative analysis and 26 studies in its quantitative analysis. The authors employed two categories for comparison: a) usual care or no or minimal intervention, versus 2) active control ("eg. Combined different types of intervention such as conventional rehabilitation, pool-based exercises, stretching and mobility exercises, neuromuscular stimulation, and isometric exercises with a progressive and supervised character"). The primary outcome was self-reported physical function, using different functional scores. At the follow-up that was closest to a year after surgery, the authors found no significant difference in physical function comparing the two groups, but with a low level of certainty using GRADE scale. For shorter follow-up, including timelines of 4, 12 and 26 weeks, there was also no differences, with a moderate grade of certainty using GRADE. Secondarily, the authors found no differences in hip strength for abduction or hip flexion at any point of time (4, 12, 26, or the closest to a year follow up), with a very low grade of certainty using GRADE.

While the data obtained in this study is important, it cannot be generalizable to all patients and practices. Many patients will benefit from formal interventions. Further evidence with the highest grade of certainty is needed before recommending drastic changes.

Duration of postoperative physical therapy after TJA

Yayac *et al.* described that PT can be responsible for the 8% of the cost of care in TJA, [28] thus it seems to be reasonable to study alternative methods that can reduce costs while maintaining the quality of care, including the standardization of the length of the therapy.

Groot *et al.* [29] studied the association between functional outcomes and the duration of physiotherapy. Particularly for TKA, the authors observed that patients with lower functionality at 6 months' follow-up had undergone prolonged physical therapy (more than 12 weeks) more frequently than those with better results. This suggests that the length of therapy provided aligns with patients' needs. In their study, which included 1,333 TKA patients, two-thirds received

physiotherapy twice a week for 12 or more weeks. The ideal length and frequency of physiotherapy are still under investigation. The authors of this present manuscript advocate for the rational use of resources, individualizing the prescription for the duration and frequency of sessions when necessary. More important, the surgeon should recognize when postoperative stiffness[1] will no longer improve and when manipulation under anesthesia is indicated after a TKA. In THA, after studying 1,289 patients, the authors found that 91% of the patients received physiotherapy. 56% used it for 12 weeks or more, and 49% had a frequency of two sessions per week. Interestingly, the authors observed that THA patients with prolonged physiotherapy had lower functional scores at 6 months. In this group, the existence of non-musculoskeletal comorbidities may impact the needs of prolonged therapy.

The variability with which physical therapy is recommended after TJA is worth mentioning. A study by Smith *et al*. described the use of physiotherapy after discharge in 20,260 TKA patients in the United Kingdom.[30] In the first year, 79% received at least one session. Of those who received physiotherapy, 75% received five or less sessions of treatment. The authors observed that younger patients, women, and those who live in urban areas received more sessions of physiotherapy. Patients with a higher disability based on the Oxford knee score at baseline and 12 months follow up received more physiotherapy as well. The same study evaluated THA patients. The authors observed that only 53% of 17,338 patients completed at least one session with the physical therapist, and only 4% had 10 or more sessions.

CONCLUSION

In summary, based on the current evidence, we believe postoperative physical therapy remains an essential component of standard care following TJA. However, the specific PT approach should be individualized. The observed outcomes of self-directed exercise programs must be carefully weighed against the benefits of structured, supervised PT programs, considering both cost-effectiveness and potential advantages within each healthcare setting. Cultural and regional factors should also be contemplated for optimal patient care. Every surgeon should develop a preoperative plan that defines success for each patient prior to discharge.

References

[1] Healy WL, Della Valle CJ, Iorio R, Berend KR, Cushner FD, Dalury DF, et al. Complications of total knee arthroplasty: standardized list and definitions of the Knee Society. Clin Orthop Relat Res 2013;471:215–20. https://doi.org/10.1007/s11999-012-2489-y.

[2] Medical Subject Headings - Home Page n.d. https://www.nlm.nih.gov/mesh/meshhome.html (accessed June 14, 2024).

[3] Exercise Therapy - MeSH - NCBI n.d. https://www.ncbi.nlm.nih.gov/mesh/68005081 (accessed June 14, 2024).

[4] Physical Therapy Modalities - MeSH - NCBI n.d. https://www.ncbi.nlm.nih.gov/mesh/68026741 (accessed June 14, 2024).

[5] Rehabilitation - MeSH - NCBI n.d. https://www.ncbi.nlm.nih.gov/mesh/68012046 (accessed June 14, 2024).

[6] Continuity of Patient Care - MeSH - NCBI n.d. https://www.ncbi.nlm.nih.gov/mesh/68003266 (accessed June 14, 2024).

[7] SooHoo NF, Lieberman JR, Farng E, Park S, Jain S, Ko CY. Development of quality of care indicators for patients undergoing total hip or total knee replacement. BMJ Qual Saf 2011;20:153–7. https://doi.org/10.1136/bmjqs.2009.032524.

[8] Amanatullah DF, McQuillan T, Kamal RN. Quality Measures in Total Hip and Total Knee Arthroplasty. J Am Acad Orthop Surg 2019;27:219–26. https://doi.org/10.5435/JAAOS-D-17-00283.

[9] Statement 5: Postoperative rehabilitation | Joint replacement (primary): hip, knee and shoulder | Quality standards | NICE 2022. https://www.nice.org.uk/guidance/qs206/chapter/Statement-5-Postoperative-rehabilitation (accessed June 16, 2024).

[10] Fortier LM, Rockov ZA, Chen AF, Rajaee SS. Activity Recommendations After Total Hip and Total Knee Arthroplasty. JBJS 2021;103:446. https://doi.org/10.2106/JBJS.20.00983.

[11] Manske PR, Gleeson P. Rehabilitation program following polycentric total knee arthroplasty. Phys Ther 1977;57:915–8. https://doi.org/10.1093/ptj/57.8.915.

[12] Chen AF, Stewart MK, Heyl AE, Klatt BA. Effect of immediate postoperative physical therapy on length of stay for total joint arthroplasty patients. J Arthroplasty 2012;27:851–6. https://doi.org/10.1016/j.arth.2012.01.011.

[13] Hristovska A-M, Andersen LB, Grentoft M, Mehlsen J, Gromov K, Kehlet H, et al. Orthostatic intolerance after fast-track knee arthroplasty: Incidence and hemodynamic pathophysiology. Acta Anaesthesiol Scand 2022;66:934–43. https://doi.org/10.1111/aas.14098.

[14] Hegeman EM, Huh J. Lower Extremity Assistive Devices (LEADs): A Contemporary Literature Review. Foot Ankle Int 2024;45:192–201. https://doi.org/10.1177/10711007231207637.

[15] Pasquini SM, Peterson ML, Rattansi SM, Colclasure K, King D, Mergen A, et al. The impact of assistive device prescription on gait following total knee replacement. J Geriatr Phys Ther 2010;33:64–70.

[16] Yee EJ, Gapinski ZA, Ziemba-Davis M, Nielson M, Meneghini RM. Quadriceps Weakness After Single-Shot Adductor Canal Block: A Multivariate Analysis of 1,083 Primary Total Knee Arthroplasties. J Bone Joint Surg Am 2021;103:30–6. https://doi.org/10.2106/JBJS.19.01425.

[17] Wyatt PB, Nelson CT, Cyrus JW, Goldman AH, Patel NK. The Role of Cryotherapy After Total Knee Arthroplasty: A Systematic Review. J Arthroplasty 2023;38:950–6. https://doi.org/10.1016/j.arth.2022.12.004.

[18] Liu M-M, Tian M, Luo C, Wang S, Shao L. Continuous cryotherapy vs. traditional cryotherapy after total knee arthroplasty: A systematic review and meta-analysis of randomized controlled trials. Front Surg 2022;9:1073288. https://doi.org/10.3389/fsurg.2022.1073288.

[19] Yang X, Li G-H, Wang H-J, Wang C-Y. Continuous Passive Motion After Total Knee Arthroplasty: A Systematic Review and Meta-analysis of Associated Effects on Clinical Outcomes. Arch Phys Med Rehabil 2019;100:1763–78. https://doi.org/10.1016/j.apmr.2019.02.001.

[20] Jette DU, Hunter SJ, Burkett L, Langham B, Logerstedt DS, Piuzzi NS, et al. Physical Therapist Management of Total Knee Arthroplasty. Phys Ther 2020;100:1603–31. https://doi.org/10.1093/ptj/pzaa099.

[21] Groot L, Gademan MGJ, Peter WF, van den Hout WB, Verburg H, Vliet Vlieland TPM, et al. Rationale and design of the PaTIO study: PhysiotherApeutic Treat-to-target Intervention after Orthopaedic surgery. BMC Musculoskelet Disord 2020;21:544. https://doi.org/10.1186/s12891-020-03511-y.

[22] Fleischman AN, Crizer MP, Tarabichi M, Smith S, Rothman RH, Lonner JH, et al. 2018 John N. Insall Award: Recovery of Knee Flexion With Unsupervised Home Exercise Is Not Inferior to Outpatient Physical Therapy After TKA: A Randomized Trial. Clin Orthop Relat Res 2019;477:60–9. https://doi.org/10.1097/CORR.0000000000000561.

[23] Klement MR, Rondon AJ, McEntee RM, Greenky MR, Austin MS. Web-Based, Self-Directed Physical Therapy After Total Knee Arthroplasty Is Safe and Effective for Most, but Not All, Patients. J Arthroplasty 2019;34:S178–82. https://doi.org/10.1016/j.arth.2018.11.040.
[24] Prvu Bettger J, Green CL, Holmes DN, Chokshi A, Mather RC, Hoch BT, et al. Effects of Virtual Exercise Rehabilitation In-Home Therapy Compared with Traditional Care After Total Knee Arthroplasty: VERITAS, a Randomized Controlled Trial. J Bone Joint Surg Am 2020;102:101–9. https://doi.org/10.2106/JBJS.19.00695.
[25] Zachwieja E, Theosmy EG, Yacovelli SJ, Beatty EW, McGrath ME, Lonner JH. Web-Based Self-Directed Exercise Program Is Cost-Effective Compared to Formal Physical Therapy After Primary Total Knee Arthroplasty. J Arthroplasty 2020;35:2335–41. https://doi.org/10.1016/j.arth.2020.04.061.
[26] Smith TO, Jepson P, Beswick A, Sands G, Drummond A, Davis ET, et al. Assistive devices, hip precautions, environmental modifications and training to prevent dislocation and improve function after hip arthroplasty. Cochrane Database Syst Rev 2016;7:CD010815. https://doi.org/10.1002/14651858.CD010815.pub2.
[27] Saueressig T, Owen PJ, Zebisch J, Herbst M, Belavy DL. Evaluation of Exercise Interventions and Outcomes After Hip Arthroplasty: A Systematic Review and Meta-analysis. JAMA Netw Open 2021;4:e210254. https://doi.org/10.1001/jamanetworkopen.2021.0254.
[28] Yayac M, Moltz R, Pivec R, Lonner JH, Courtney PM, Austin MS. Formal Physical Therapy Following Total Hip and Knee Arthroplasty Incurs Additional Cost Without Improving Outcomes. J Arthroplasty 2020;35:2779–85. https://doi.org/10.1016/j.arth.2020.04.023.
[29] Groot L, Latijnhouwers D a. JM, Reijman M, Verdegaal SHM, Vliet Vlieland TPM, Gademan MGJ, et al. Recovery and the use of postoperative physical therapy after total hip or knee replacement. BMC Musculoskelet Disord 2022;23:666. https://doi.org/10.1186/s12891-022-05429-z.
[30] Smith TO, Dainty JR, Clark EM, Whitehouse MR, Price AJ, MacGregor AJ. Demographic and geographical variability in physiotherapy provision following hip and knee replacement. An analysis from the National Joint Registry for England, Wales, Northern Ireland and the Isle of Man. Physiotherapy 2020;106:1–11. https://doi.org/10.1016/j.physio.2019.11.003.

Table 1: Practices supported by moderate and strong recommendation by the American Physical Therapy Association for the management of TKA patients [20]

Interventions	Recommendation Strength	Practice Recommendations
Preoperative exercise program	♦♦♦◊	Physical therapists should design preoperative exercise programs and teach patients undergoing total knee arthroplasty (TKA) to implement strengthening and flexibility exercises.
Continuous passive motion (CPM) device use for mobilization	♦♦♦◊	Physical therapists should NOT use CPMs for patients who have undergone primary, uncomplicated TKA.
Cryotherapy	♦♦♦◊	Physical therapists should teach patients and other care givers use of cryotherapy and encourage its use for early postoperative pain management for patients who have undergone TKA.

Interventions	Recommendation Strength	Practice Recommendations
Motor function training (balance, walking, movement, symmetry)	♦♦♦♦	Physical therapists should include motor function training (eg, balance, walking, movement symmetry) for patients who have undergone TKA.
Neuromuscular electrical stimulation (NMES)	♦♦♦◊	Physical therapists should use NMES for patients who have undergone TKA to improve quadriceps muscle strength, gait performance, performance-based outcomes, and patient-reported outcomes.
Resistance and intensity of strengthening exercise	♦♦♦◊	Physical therapists should design, implement, teach, and progress patients who have undergone TKA in high-intensity strength training and exercise programs during the early postacute period (ie, within 7 days after surgery) to improve function, strength, and ROM.
Postoperative physical therapy supervision	♦♦♦◊	Supervised physical therapist management should be provided for patients who have undergone TKA. The optimal setting should be determined by patient safety, mobility, and environmental and personal factors.

Interventions	Recommendation Strength	Practice Recommendations
Physical therapy postoperative timing	♦♦♦◊	Physical therapist management should start within 24 hours of surgery and prior to discharge for patients who have undergone TKA.
Physical therapy discharge planning	♦♦♦◊	It is the consensus of the work group that physical therapists should provide guidance to the care team and to the patient on safe and objective discharge planning, patient functional status, assistance equipment, and services needed to support a safe discharge from the acute care setting.

♦♦♦◊ A high level of certainty of slight-to-moderate benefit, harm, or cost, or a moderate level of certainty for a moderate level of benefit, harm, or cost (based on a preponderance of Level 2 evidence, or a single high-quality RCT).

♦♦♦♦ A high level of certainty of moderate-to-substantial benefit, harm, or cost, or a moderate level of certainty for substantial benefit, harm, or cost (based on a preponderance of Level 1 or 2 evidence with at least 1 Level 1 study).