

Evidence Review



Topic: Same-day Mobilization following Total Hip and Total Knee Arthroplasty

Background

Hip and knee arthroplasty patients routinely receive postoperative physiotherapy during their inpatient hospital stay. Patient mobilization is a critical component of the physiotherapy program, which includes exercises performed while in bed. Mobilization in the hours immediately following surgery is associated with quicker return of lower limb mobility and function, and a reduced risk for adverse complications, including deep vein thrombosis (DVT), pulmonary embolism, and urinary retention. The quicker return to function with fewer postoperative complications is presumed to lead to shorter hospital stays, translating to lower costs and a reduced risk for hospital-acquired infections.

Although in-patient rehabilitation is critical towards successful recovery following total joint replacement surgery, there is uncertainty regarding the optimal time in which to initiate patient mobilization following total hip arthroplasty (THA) and total knee arthroplasty (TKA). The current Alberta Hip & Knee Replacement Care Path calls for patient mobilization to begin on the day of surgery:

- Sitting at bed side, up standing or walking as able on evening of surgery 1-2 x depending on return time to unit.
- All primaries weight bearing as tolerated. If pain prevents weight bearing, assess for control.
- PT treatment may begin 4 hours postoperatively
- For revision, activity and weight bearing at surgeon's discretion; up to 24hours may be required prior to mobilization

The purpose of this review is to summarize the best available literature from Cochrane reviews, clinical trials and practice guidelines regarding the outcomes of THA and TKA patients who received same-day mobilization following their procedure compared to those who receive standard inpatient

rehabilitation. Patient outcomes are defined here as measured improvement in impairments (joint range of motion, muscle weakness), activity levels (mobility, activities of daily living), adverse events, and length of hospital stay (LOS).

Review Design

- This review is structured on a format similar to a Cochrane systematic review;
- The relevant Cochrane systematic review, if available, will be included and summarized in this evidence review;
- Next, the search strategy and inclusion/exclusion criteria of the Cochrane review will be used or developed if a Cochrane review does not exist, prospective comparative studies (RCT, Controlled Clinical Trial, Cohort Study) and systematic reviews published after the Cochrane review will be selected for this evidence review;
- If prospective comparative studies are not available then retrospective comparative studies and case series reports will be included in this review;
- Finally, applicable clinical practice guidelines will also be included in this review;
- Selected literature and clinical practice guidelines must pass quality control (discussed below) for inclusion into this evidence review.

Search Strategy:

The objective of this evidence review was to assess the outcomes of primary THA and TKA patients who received same-day mobilization following their arthroplasty. To ensure that high-quality primary studies would be selected for this evidence review, preference was given for the selection of

prospective comparative studies. Non-comparative studies, such as case series, case studies, and expert opinions, are regarded as having the lowest level of evidence ¹ and were not included in this review.

A search of the Cochrane Database of Systemic Reviews was conducted with the following search strategy:

Search Term: (mobil\$ OR weight-bearing OR ambulation) AND (post-surg\$ OR post-opera\$) AND (hip OR knee) AND (arthroplasty OR replacement)

One Cochrane review (Khan et al. 2007. Multidisciplinary rehabilitation programmes following joint replacement at the hip and knee in chronic arthropathy) was retrieved. This Cochrane review included one comparative trial where the intervention (early mobilization) group began rehabilitation at 3 days following surgery. This was outside the intended scope of this evidence review, where the focus of early patient mobilization is on the same day as surgery. Consequently, this Cochrane review was not included in this evidence review.

Next, comparative studies were sought in PubMed and EMBASE with the following search strategy:

Search Term: (rapid OR early OR quick OR "same day") AND (exercise OR rehabilitation OR "physical therapy" OR physiotherapy OR mobilisation OR mobilization OR weight-bearing OR ambulation OR mobility) AND (hip OR knee) AND (arthroplasty OR replacement) AND English[la] and AND (Clinical Trial[pt])

Clinical Study Inclusion and Exclusion Criteria:

Inclusion criteria for published studies were as follows:

- Study intervention group received same-day mobilization following arthroplasty surgery; and
- Control group received standard patient mobilization/ rehabilitation care during inpatient care; and
- Majority of study patients received conventional primary or revision THA or TKA; and
- Study outcome measures included patient-level outcomes such as functional recovery, LOS, recovery from pain, and postoperative adverse events; and
- Studies published in English.

Exclusion criteria included:

- Joint replacements other than the hip and knee; and
- Studies based on hip replacement prostheses that are not conventional devices (e.g., hip resurfacing systems).

Clinical studies selected for inclusion:

- Peters et al. 2006. ² The effect of a new multimodal perioperative anesthetic regimen on postoperative pain, side effects, rehabilitation, and length of hospital stay after total joint arthroplasty. *J. Arthroplasty*.
- Isaac et al. 2005. ³ Accelerated rehabilitation after total knee replacement. *Knee*.
- Larsen et al. 2008. ⁴ Accelerated perioperative care and rehabilitation intervention for hip and knee replacement is effective: A randomized clinical trial involving 87 patients with 3 months of followup. *Acta Orthopaedica*.

Clinical studies excluded:

- Ragucci et al. 2003. Comprehensive deep venous thrombosis prevention strategy after total-knee arthroplasty. *Am J Phys Med Rehabil*. 82(3):164-8. [patient mobilization started on postoperative day 1]
- Gonzalez et al. 2006. Venous thromboembolism is rare with a multimodal prophylaxis protocol after total hip arthroplasty. [case series study, not comparative]
- Berend et al. 2004. Rapid recovery protocol for perioperative care of total hip and total knee arthroplasty patients. *Surg Technol Int*. 13:239-47. [a review, not comparative study]
- Tanavalee et al. 2004. Rapid ambulation and range of motion after minimally invasive total knee arthroplasty. *J Med Assoc Thai*. 87 Suppl 2:S195-201. [patient mobilization started on postoperative day 1]

Clinical studies excluded but of interest:

- Beard et al. 2002. Accelerated recovery for unicompartmental knee replacement-a feasibility study. *Knee*. 9(3):221-4. [only unicompartmental knee arthroplasty patients enrolled in study]
- Berger et al. 2004. Rapid rehabilitation and recovery with minimally invasive total hip arthroplasty. *Clin. Orthop. Related*

Res. 429: 239-47. [Same day mobilization in minimally-invasive total hip arthroplasty population]

- Lenssen et al. 2006. Efficiency of immediate postoperative inpatient physical therapy following total knee arthroplasty: an RCT. *BMC Musculoskelet Disord.* 31;7:71.[patient mobilization started on postoperative day 1]
- Froehlig et al. 2008. What is the interest of early mobilization after total hip arthroplasty? Development of French guidelines for clinical practice. *Annales de réadaptation et de médecine physique.* 51: 212–217. [article in French]
- Larsen et al. 2009. Cost-Effectiveness of Accelerated Perioperative Care and Rehabilitation After Total Hip and Knee Arthroplasty. *J Bone Joint Surg Am.* [outcome measure not in scope of this evidence review]

Lastly, a search was conducted for clinical practice guidelines with reference to accelerated patient mobilization following THA or TKA. Published guidelines by academic, professional societies and government were searched using Google. Particular attention was paid to literature available at the following organizations:

- American Academy of Orthopaedic Surgeons (AAOS)
- Canadian Orthopaedic Association (COA)
- Scottish Intercollegiate Guidelines Network (SIGN)
- National Guideline Clearinghouse (NGC)
- Agency for Healthcare Research and Quality (AHRQ)

One official guideline published by the AAOS in May, 2007 (Prevention of Pulmonary Embolism in Patients Undergoing Total Hip and Knee Arthroplasty) was selected for inclusion in this evidence review.

Quality control

The quality of the selected RCT⁴ was assessed by an independent reviewer. Study quality was measured using a validated scale⁵ developed by the Cochrane Collaboration Back Review Group. With this assessment tool, quality assessment of a prospective comparative trial is based firmly on the study design, data collection and analysis processes. The RCT included here was judged to be of high quality. Lastly, the AGREE Instrument⁶ was used to appraise the selected clinical practice guideline. This instrument gauges the quality of a guideline based on six domains: scope and purpose; stakeholder involvement; rigour of

development; clarity and presentation; applicability; and editorial independence. Based on this tool, the selected AAOS practice guideline was included in this evidence review.

Results

Three comparative studies that met the inclusion criteria of this evidence review are described below.

Peters et al. (2006)² reported a retrospective clinical trial which assessed the effect of a new multimodal perioperative protocol on recovery after THA and TKA as compared to a standard (control) care protocol. Their new multimodal management regimen, established in 2004, emphasized regional rather than general anaesthesia, the avoidance of intravenous narcotics, scheduled multimodal oral medications, and early mobilization with physical therapy beginning on the day of surgery.

That study compared the outcomes of two cohorts. Group 1 consisted of 50 consecutive THA (mean age 57 years) and 50 TKA patients (mean age 60 years) before the new multimodal perioperative management system, and Group 2 consisted of 50 consecutive THA (mean age 55 years) and 50 TKA patients (mean age 64 years) recruited after initiation of the new protocol. Baseline comparisons between the groups for each procedure (THA or TKA) found no statistical differences in the average age, weight, height and preoperative diagnoses of patients between both groups.

Group 1 patients received the standard postoperative care protocol whereas Group 2 patients received the new intervention approach, which emphasized *mobilization with physical therapy beginning on the day of surgery*. It should be noted that physical therapy was attempted on the day of surgery for all Group 2 patients. However, the authors did not report how many of those patients actually performed this task on the day of surgery.

Compared to Group 1 (control) patients, those in Group 2 had significantly shorter LOS following THA (average of 2.5 days vs. 3.7 days) and TKA (average of 2.5 to 3.1 days). The intervention group patients also had significantly better gait distance than their Group 1 counterparts. In addition, there were no significant differences between the groups in terms of the number of patients who experienced postoperative complications, including confusion, respiratory depression, renal insufficiency, oversedation, GI bleeding, reoperation and death.

It should be noted that the requirement to mobilize the Group 2 patients on the day of surgery meant that physical therapists had to stay later in the hospital in order to provide therapy to these patients on the surgery days. The authors concluded that

implementation of the new multimodal perioperative protocol, which includes same-day patient mobilization, resulted in reduced LOS, improved pain control, and achieved targets for faster functional recovery.

The weaknesses of this study includes the multiple variables that were introduced in Group 2, which made it difficult to ascertain the specific contribution of same-day patient mobilization towards the measured endpoints. Patients in Group 2 (unlike their counterparts in Group 1) were actively encouraged to expect shorter lengths of stay. In addition, this was a retrospective study by design, which presents inherent risks for study biases.

Isaac et al. (2005) ³ conducted a prospective clinical trial that examined the effect of an accelerated postoperative rehabilitation protocol for TKA on the length of hospital stay in a group of 50 patients (age 72.3 ± 9.9 years) compared to a group of 80 control patients (age 71.3 ± 8.1 years) who received standard care rehabilitation. The accelerated rehab protocol involved several changes to the routine TKA procedure, including spinal anaesthesia, infiltration of bupivacaine and adrenaline to the divided tissue layers at the time of surgery, and *mobilization on the day of surgery*. In addition, patients and hospital staff were encouraged to expect an earlier discharge from hospital for both groups of patients. The intervention group patients were mobilized using a walker frame at approximately 4 hours after surgery, while control group patients were mobilized on the day after surgery.

The intervention group had a significantly reduced mean LOS (3.6 days) compared to the control group (6.6 days). The authors also reported significant improvements in the American Knee Society and Oxford knee scores among intervention patients. No evidence of an increased complication rate was observed in the new approach compared to the routine (control) approach. These authors noted that the new protocol obviates the need for postoperative epidural anaesthesia, which allowed the intervention group patients to mobilize without pain on the day of surgery.

Weaknesses of this prospective study include the introduction of multiple variables within the intervention group, and the use of multiple surgeons who may have performed an unbalanced number of procedures amongst themselves.

A recently published Danish randomized clinical trial by Larsen et al. (2008) ⁴ also assessed the effect of an accelerated perioperative care and rehabilitation program in patients receiving primary THA, TKA and unicompartmental knee replacements. Specifically, 87 patients were randomized into two groups. The accelerated intervention group consisted of 45 patients (mean age: 64 years) while the control group (mean age: 66 years) had 42

patients. Mobilization as part of the intervention group's accelerated rehabilitation schedule started on the day of surgery. On postoperative day one, the goal was 4 hours out of bed including training with a physiotherapist and an occupational therapist. On postoperative day two and thereafter, the rehabilitation target was over 8 hours per day of mobilization for the remainder of the hospital stay. Both groups had similar preoperative characteristics, including age, mobility, pain and other co-morbidities. The primary study outcome measures were LOS and gain in quality of life (QOL) from baseline to the 3-month follow-up. In agreement with the prior studies presented here, Larsen et al. found that accelerated patient rehabilitation beginning on the day of surgery resulted in shorter average LOS (8 days for controls vs. 5 days for intervention patients) and a greater gain in QOL for the intervention patients. Unfortunately, similar to the previous studies described above, it is difficult to estimate the effect of same day mobilization alone on outcomes since this process was bundled with other aspects of accelerated perioperative care, including new pain and nausea control, nutrition and elimination protocols. Nevertheless, this RCT provides strong evidence that suggests accelerated perioperative care including same day mobilization results in shorter hospital LOS and better QOL outcomes.

Although not formally included in this evidence review, the RCT by Lenssen et al. (2006) ⁷ deserves mention. That particular study did not meet the inclusion criteria of this review due to its lack of reporting when mobilization was initiated on post-surgical TKA patients. The authors stated that physiotherapy was initiated immediately after surgery to two groups of TKA patients. One group received one 20-minute session, while the other group received two 20-minute sessions each day after surgery. Outcome measures included functional assessment (ROM, WOMAC, Knee Society Scale), LOS, pain, and treatment satisfaction. The study reported no differences in these measures between the groups. This suggests that twice daily physiotherapy sessions may not produce different results than daily physiotherapy sessions.

Another study worthy of mention is that of Berger et al. (2004) ⁸ who reported on the advantages of patient mobilization on the same day of surgery following minimally invasive THA. In that study, physiotherapy was initiated at 5 to 6 hours after surgery, patients were weightbearing as tolerated on the treated hip, and 97% of patients achieved physical therapy goals required for discharge home on the day of surgery. The use of a minimally-invasive technique in that study rather than a conventional approach THA meant that study was excluded from this evidence review.

Finally, for completeness, the current clinical practice guideline provided by the AAOS is

the following:

Postoperatively, (THA and TKA) patients should be mobilized as soon as feasible to the full extent of medical safety and comfort.

Summary

There is some evidence to suggest that mobilizing patients on the day of surgery results in shorter LOS and higher functional outcomes. The retrospective comparative study by Peters et al. found that a new multimodal perioperative protocol where same-day patient mobilization is included can shorten hospital LOS and improve pain control, and result in faster achievement of functional recovery targets. However, the specific role of same-day patient mobilization towards these outcomes cannot be determined due to the inclusion of other concurrent interventions (i.e., new multimodal pain and anaesthetic management protocol) given to the group of patients mobilized on the day of surgery that were not included in the perioperative management of patients in the control group. Isaac et al. showed in a prospective comparative study that patient mobilization initiated 4 hours after TKA may result in significant improvements in LOS, and functional outcomes while not altering complication rates, compared to routine rehabilitation patients. The RCT by Larsen et al. also yielded similar findings.

Other studies ^{10,11,12,13,14} have reported significant advantages of accelerated patient mobilization following THA and TKA. These advantages include shorter LOS, quicker functional improvements, reduced (better) or similar rates of complications, and lower total costs of health care. However, these studies were not included in this evidence review because patient mobilization in those studies was initiated on the day after surgery.

Prospective, comparative trials are required to ascertain the specific effects of patient mobilization administered on the same day as surgery with outcome measures including LOS, speed and recovery of functional outcomes, direct and indirect costs, pain improvement and patient and provider satisfaction. Further areas of uncertainty yet to be resolved include the optimal length and intensity of physiotherapy sessions, use of minimally-invasive techniques, and the use of adjunct therapies such as continuous passive motion devices that mobilize the new joint.

There are several limitations with this review. The focus here has been on comparative clinical trials where primary or revision total joint arthroplasty patients were mobilized on the same day of surgery. The inclusion of case series studies to this review could provide further evidence to support the mobilization of patients on the day of surgery. However, this would be at the expense of introducing potential biases to the conclusions here due to the

design of non-comparative studies. In addition, this review searched for studies which clearly stated that patients were mobilized (i.e., sitting, standing, walking) on the day of surgery. Hence, studies could have been missed where patients were mobilized on the day of surgery but this fact was not clearly defined in the study's physiotherapy protocol description.

Clinical Committee Comment

On October 15, 2009 the Hip and Knee Clinical Committee discussed the findings of this evidence review. Committee members agreed that the current recommendations made by the Hip and Knee Care Path are consistent with best evidence and best practice.

Care Path Recommendation

The current Alberta Hip & Knee Arthroplasty care path recommends patient mobilization to begin on the day of surgery with the following:

- Sitting at bed side, up standing or walking as able evening of surgery 1-2 x depending on return time to unit.
- All primaries weight bearing as tolerated. If pain prevents weight bearing, assess for control.
- PT treatment may begin 4 hours postoperatively
- For revision, activity and weight bearing at surgeon's discretion; up to 24hours may be required prior to mobilization

Based on the results of this evidence review, there is no contradictory information observed in the included studies to warrant amendment to the current ABJHI recommendations. The Hip and Knee Clinical Committee agreed current recommendations are to remain unchanged.

References

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- 8 Berger,R.A. *et al.* (2004) Rapid rehabilitation and recovery with minimally invasive total hip arthroplasty. *Clin. Orthop. Relat Res.*, 239-247.
- 9 American Academy of Orthopaedic Surgeons (AAOS). 2007. Clinical guideline on prevention of symptomatic pulmonary embolism in patients undergoing total hip or knee arthroplasty. Rosemont (IL): 63 p.
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- 11 Peerbhoy,D. *et al.* (1999) The systematic assessment of short-term functional recovery after major joint arthroplasty. *J. Qual. Clin. Pract.* 19, 165-171.
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