

Osteoarthritis and Cartilage



Review

Early commencement of physical therapy in the acute phase following elective lower limb arthroplasty produces favorable outcomes: a systematic review and meta-analysis examining allied health service models



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SUMMARY

Background: Temporal and dose–response relationships between allied health (AH) and recovery in the acute phase following lower limb (LL) arthroplasty are unclear. This systematic review investigates whether early commencement, additional therapy and/or weekend AH affects length of stay (LOS) and patient outcomes in the acute phase following LL arthroplasty.

Methods: Electronic databases were searched in February 2015. Studies were included if they evaluated any of the following aspects of AH for adults following LL arthroplasty in the acute phase: Early compared to later therapy commencement; Additional therapy; or a 6- or 7-day service compared to a lesser service.

Results: Twenty-four studies met the inclusion criteria, of which 19 investigated effects of physical therapy (PT) alone. Earlier PT reduced LOS (WMD = −1.23 days; 95% CI, −2.16 to −0.30) and resulted in higher probability of discharge directly home (relative risk = 1.45; 95% CI, 1.26–1.67). Addition of weekend PT reduced LOS (WMD = −1.04 days; 95% CI, −1.66 to −0.41) and improved function (SMD = 0.37; 95% CI, 0.02–0.73). Increasing PT from once to twice daily did not affect LOS (WMD = −0.35 days; 95% CI, −0.96–0.26) or function (SMD = 0.31; 95% CI, −0.06–0.71).

Discussion: Early PT commencement and a weekend service may produce favorable outcomes following LL arthroplasty when baseline LOS is 4 days or more. Redistributing PT resources to commence as early as day of surgery regardless of weekday may accelerate postoperative recovery. Current, high quality research is needed to confirm these findings.

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Introduction

Clinical guidelines recommend arthroplasty as a cost-effective intervention for people with severe osteoarthritis who are unresponsive to medication and exercise¹. Rates of knee and hip arthroplasty have risen drastically over the last two decades^{2,3} and are expected to continue to rise. Between 2005 and 2030, primary

total hip and knee arthroplasties are projected to grow by 174% and 673% respectively in the United States⁴. Increasing demand for such surgery is placing pressure on scarce healthcare resources. Maximizing postoperative recovery has potential to improve quality of life, save money and increase capacity to perform additional surgeries by increasing patient flow.

Allied health (AH) professionals facilitate independent mobility and self-care in preparation for discharge following arthroplasty^{5,6}. Postoperative AH therapy may improve range of motion, quality of life, gait and balance and reduce hospital length of stay (LOS)^{7–10}. However, the temporal (how soon post-surgery should therapy commence?) and dose–response relationships (by how much does the outcome improve if the therapy amount is increased?) are unclear. Clinical guidelines prescribing exact timing and dose of

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therapy following lower limb arthroplasty are absent despite general recommendations specifying early commencement of both physical therapy (PT)⁵ and occupational therapy (OT)⁶ where practicable.

Evidence from other populations suggests AH should commence early enough and be of sufficient quantity to accelerate and maximize postoperative recovery but not too early or of too high a quantity so as to utilize resources inefficiently or have detrimental effects on recovery^{11–13}. Timing of therapy commencement has the potential to affect the total therapy quantity assuming a constant LOS. Likewise, availability of weekend AH can potentially affect both quantity and time of therapy commencement following lower limb arthroplasty, especially when surgery occurs later in the working week or on the weekend. A recent review found weak evidence to suggest a benefit to weekend PT in reducing LOS following total knee arthroplasty (TKA)¹⁴. However, it concluded early therapy initiation and total sum of visits might be more influential than actual day of week during which treatment is received. This finding is logical given potential inter-relationships between availability of weekend AH, timing of therapy commencement post-surgery and therapy quantity, and deserves further investigation.

This study has been conducted from a service model perspective to inform decision-making by healthcare policy-makers and managers. The aim was to systematically evaluate the available evidence relating to the timing of commencement, total dose, and effect of weekend AH services, in the acute phase following elective lower limb arthroplasty. Key outcomes were LOS, rate of adverse events, discharge destination, cost and physical function.

This review required several aims to be addressed concurrently due to the multidimensional nature of AH service models. The research questions were:

1. Does earlier commencement of AH result in reduced LOS and improved outcomes compared to later commencement?
2. Is a greater quantity of AH in the acute postoperative phase more beneficial in terms of patient and hospital outcomes compared to a lesser quantity?
3. What is the effectiveness of acute weekend AH services in patients following lower limb arthroplasty?
4. Are there differences in the evidence relating to timing of commencement, total dose and effectiveness of weekend AH provision for patients undergoing TKA compared to total hip arthroplasty (THA)?

Methods

Study identification and selection

This review was performed and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines¹⁵. Full holdings of the Cochrane Central Register of Controlled Trials (CENTRAL), AMED, CINAHL plus, Embase, OVID Medline, Scopus and ProQuest (Health & Medical Complete, Nursing and Allied Health Source, Social Science Journals) were searched electronically by the lead investigator (RH) on 16th February 2015. Publications were limited to English and no publication date limit was imposed. Boolean operators “AND” and “OR” were used to combine search terms relating to each domain in a PICO (Population, Intervention, Comparison and Outcomes) model¹⁶ and to provide additional terms with similar meaning respectively. Keywords included terms relevant to lower limb arthroplasty AND AH services AND weekend AH therapy OR early therapy OR increased dose AND arthroplasty outcomes ([Appendix](#)

I). Search terms relating to a comparison intervention were not identified. Truncation (*) was used where variations of search terms existed. The search strategy was first piloted and then refined for each database ([Appendix II](#) for AMED search).

Titles and abstracts were independently screened for relevance and cross-checked¹⁷ by two investigators (RH, MS). First, a random sample of 66 titles and abstracts were screened. Both reviewers were blinded to author and journal title, and reached strong agreement (Cohen's $\kappa = 0.84$)¹⁸. The two investigators then independently screened all titles and abstracts, and removed those that did not meet the inclusion criteria ([Box 1](#)). The full text of all remaining articles were obtained for review. Two investigators independently reviewed these to ascertain eligibility for inclusion. Studies were excluded if the full text was unavailable or appropriate data was not collected as per the published methodology. Disagreements were resolved by discussion and where agreement could not be met, a third investigator (KAB) was consulted. Reference lists of included studies were searched using SCOPUS database (Elsevier, New York, USA) to identify additional relevant studies. This method has been shown to be as valid and more efficient than the traditional manual search approach¹⁹. The reference list of each systematic review deemed eligible for full text review was scanned for relevant papers. Potentially relevant papers were then cross-checked against findings of the original search strategy to identify any further studies.

Box 1

Inclusion criteria for systematic literature review

Inclusion Criteria

Design

- Experimental, quasi-experimental and observational study designs as long as a comparison intervention was evaluated in terms of a relevant outcome measure.
- Published in English

Participants

- Adults undergoing elective lower limb arthroplasty in a surgical facility and requiring admission to an acute health service.

Intervention

- The effect of additional allied health therapy in terms of time, frequency or number of sessions provided compared to a lesser amount of therapy
- The effect of early commencement of allied health therapy determined by time since surgery compared to a delayed commencement
- Allied health therapy provided on the weekend with a 6- or 7-day service compared to that provided during the week with a lesser service
- Allied health included physiotherapy, occupational therapy, speech therapy, dietetics, social work, orthotics or prosthetics
- Allied health intervention to focus on service models rather than individual treatment modalities

Outcome measures

- Length of stay, adverse events, unplanned readmission, discharge destination, function, mobility, joint range of motion, quality of life, pain, cost.

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