Does preoperative rehabilitation improve patient-based outcomes in persons who have undergone total knee arthroplasty? A systematic review
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CRD summary
The authors evaluated effects of preoperative rehabilitation on patient outcomes after total knee arthroplasty and concluded that none of the measured outcomes improved consistently following preoperative rehabilitation except for reduced length of stay. Methodological concerns about the review process and synthesis make the reliability of the review uncertain. The recommendations for research and practice seem sensible.

Authors' objectives
To evaluate the effects of preoperative rehabilitation on patient outcomes after total knee arthroplasty.

Searching
PubMed, AgeLine, CINAHL and SPORTDiscus were searched from 1950 to 2011 for studies written in English contained within peer-reviewed journals. Search terms were reported. Reference lists of retrieved studies were scanned to identify further articles.

Study selection
Eligible studies were randomised controlled trials (RCTs) that compared preoperative rehabilitation using exercise for the lower extremity with a control or alternative treatment in patients scheduled to undergo total knee arthroplasty. Trials had to report means and standard deviations at two to three months post surgery on any of the outcomes: Western Ontario and McMaster Osteoarthritis Index (WOMAC) or the Knee Injury and Osteoarthritis Outcome Scores (KOOS); knee flexion range of movement; knee extension strength; and hospital length of stay (further details in the paper).

The included trials were of men and women with a mean age of 68 years and body mass index (BMI) in the range 38.6 to 44.8 kg/m² across the intervention and control groups. Interventions included lower extremity strengthening, stretching and functional exercises. In more than half of the studies the frequency was three sessions per week and in most studies exercise were performed with a therapist. Control groups received patient education about surgery expectations, exercise advice, no treatment or usual care. None of the trials used KOOS scores.

The authors did not state how many reviewers selected studies for inclusion in the review.

Assessment of study quality
The quality of included trials was assessed using the PEDro scale.

Two reviewers independently assessed study quality. Any disagreements were resolved by consensus.

Data extraction
Data were extracted to enable calculation of Hedges' g effect sizes and 95% confidence intervals (CI). Effect sizes of less than 0.4 were considered to be weak, 0.41 to 0.7 were moderate and greater than 0.7 were strong.

The authors did not state how many reviewers extracted these data.

Methods of synthesis
Studies were combined in separate meta-analyses for the outcomes of interest. No details were supplied on the type of model used or efforts to evaluate statistical heterogeneity. Sensitivity analysis was carried out to explore the effect of removing one study at a time to test the stability of the cumulative effect. Publication bias was assessed using a funnel plot and by the Orwin fail safe BN text.

Results of the review
Seven RCTs (624 patients) were included in the review. Overall study quality was moderate. PEDro scores ranged from
2 to 8 out of 10 (average 5.6). Follow-up (where reported) varied up to 12 months postoperatively.

There were no statistically significant differences for the effect of preoperative rehabilitation on self-reported outcomes measured by WOMAC (pain, three RCTs; function, three RCTs; and stiffness, two RCTs) or for knee range of movement (two RCTs) and strength (two RCTs) compared to control. There was a trend towards lower length of stay in the intervention groups (four RCTs) but this was possibly due to variations in hospital discharge criteria.

Sensitivity analysis did not show any substantial influence of a single study on the overall cumulative effect. There was no evidence of publication bias.

**Authors' conclusions**
None of the outcomes were consistently improved following preoperative rehabilitation compared with alternative for patients undergoing total knee arthroplasty; reduced length of stay was the exception.

**CRD commentary**
The review question was clear and inclusion criteria were sufficiently detailed to enable replication. Several relevant data sources were searched. The restriction to studies in English suggested potential for language bias and missed studies. Only published studies were sought. Publication bias was explored and found unlikely to be a threat to the findings. The review process was not reported for study selection and data extraction so error and bias in these areas could not be ruled out. There was quality assessment of the included studies but these results were presented as scores, which did not allow full interpretation of possible bias in the individual trials. The results for individual trials and pooled results were presented graphically without accompanying numbers. Some detail was given on clinical homogeneity. There was no assessment of statistical heterogeneity and the study details showed some material variations in intervention content, comparator content and follow-up. The decision to undertake statistical pooling was not justified by the authors and the method of meta-analysis was not reported.

Potential methodological concerns arose from the review process and synthesis so there is some uncertainty about the reliability of this review. The authors acknowledged the limited evidence base and their recommendations for research and practice seem sensible.

**Implications of the review for practice and research**
**Practice:** The authors stated that it was unclear whether to recommend preoperative rehabilitation for people undergoing total knee arthroplasty.

**Research:** The authors stated a need for large scale RCTs to carefully report and monitor the exercise programme. Future research should address compliance and other outcomes such as self-efficacy and consider the influence of lifestyle factors. Attention to the quality of RCTs was recommended, including blinding of clinicians and patients, good follow-up and reduced drop-out rates.

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