Wound closure in flexion versus extension following total knee arthroplasty: a systematic review
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CRD summary
This review considered whether total knee arthroplasty wounds should be closed in flexion or extension. The authors concluded that the specific degree of knee flexion used when closing total knee replacement wounds may be an important variable to clinical outcome, but evidence was limited. The conclusions and recommendations for further study appear appropriate.

Authors' objectives
To determine whether total knee arthroplasty wounds should be closed in flexion or extension.

Searching
MEDLINE, EMBASE, CINAHL, AMED, Scopus and The Cochrane Library were searched for relevant published studies. Search dates were inception to January 2010. The authors searched SIGLE, NTIS, NRR and Current Controlled Trials databases for relevant unpublished studies. Search terms were reported. Reference lists of included studies were searched for further relevant studies. Corresponding authors of included studies were contacted to identify any additional studies.

Study selection
Eligible studies were randomised and non-randomised clinical trials that compared total knee arthroplasty wound closure in flexion and extension. Primary and revision total knee arthroplasty patients were assessed separately. Eligible studies had to report knee range of motion and other clinical or economic outcomes.

Mean patient age in the included studies was more than 67 years. Follow-up ranged from three to 12 months. Similar proportions of patients were treated with wounds closed in flexion and extension.

Two reviewers independently assessed papers for inclusion. Disagreements were resolved through discussion and consensus.

Assessment of study quality
Two reviewers independently assessed study quality using an 11-item PEDro scoring system that included items for study design and conduct, population, use of intention-to-treat analysis and clarity of reporting. Disagreements were resolved through discussion and consensus.

Data extraction
Two reviewers independently extracted data from included studies using a standardised form. Disagreements were resolved through discussion and consensus.

Methods of synthesis
A narrative synthesis was conducted, due to the clinical heterogeneity of the outcome measures.

Results of the review
Two studies (n= 237) were included in the review. Methodological quality scores were 7 and 9 out of 17. One study was a randomised controlled trial (RCT) and the other was an observational study. The observational study subdivided patients into those who underwent primary and those who underwent revision surgery; the RCT was of primary surgery patients only.

Both studies reported a higher flexion range of motion at final follow-up following flexion rather than extension closure; the difference was statistically significant (p<0.03) only in the lower-quality observational study. Only the
observational study reported average extension range of motion and degree of extension lag at one year follow-up. Differences between flexion and extension were not statistically significant.

One study reported no wound complications or extensor mechanism complications. The other study reported no statistically significant difference in rates of major complication between flexion and extension closure groups. Two patients in extension closure and three in flexion closure developed deep vein thrombosis. One wound haematoma was reported in a patient in the flexion closure group. One study reported pain scores and reported no significant differences between groups.

**Authors' conclusions**
The specific degree of knee flexion used when closing total knee replacement wounds may be an important variable to clinical outcome. The evidence base was limited in size and quality.

**CRD commentary**
This review addressed a clear review question. The search was thorough. Language bias could not be ruled out as it was unclear whether papers published in languages other than English were included. Study selection criteria were clear and seemed appropriate. A standard tool was used to assess study quality and results were appropriately reported. Many stages of the review process, such as study selection, quality assessment and data extraction, were conducted in duplicate and this reduced risks of reviewer error and bias. The choice of a narrative synthesis appeared appropriate given the clinical heterogeneity. The results were clearly reported.

The conclusions and recommendations for further study appear appropriate given the limited evidence available.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that further methodologically robust studies were required to determine requirements for home help and carer costs and how these differed between wound closure methods. Such trials should assess whether there were differences in ability to kneel following different forms of knee closure method. Further study was recommended to determine whether knee position during total knee replacement affected outcomes and assess incidences of wound complications, cosmetic results and patient perception and satisfaction following operation.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.