

Sagittal Total Knee Replacement (TKR) Alignment aNd Clinical OutcomEs: A Systematic Review and Meta-Analysis (STANCE)

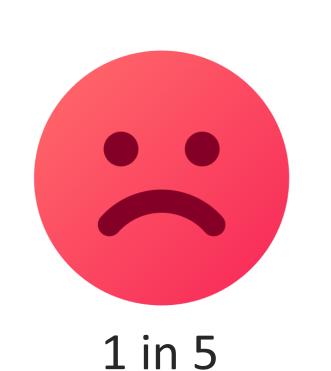
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BACKGROUND

 Over 116,000 TKRs are performed each year in the UK, costing the NHS £750 million annually



dissatisfied





55% ongoing pain

£750M/year NHS

- **Post-operative knee alignment** is a key modifiable factor influencing Patient Reported Outcome Measures (PROMs)
- But most research focuses only on coronal (front-view) alignment in 2D.
- We need to assess how **3D sagittal alignment** impacts what matters most: **patient outcomes**.

OBJECTIVE

To explore the relationship between post-operative alignment from side (sagittal) and PROMs.

METHODS

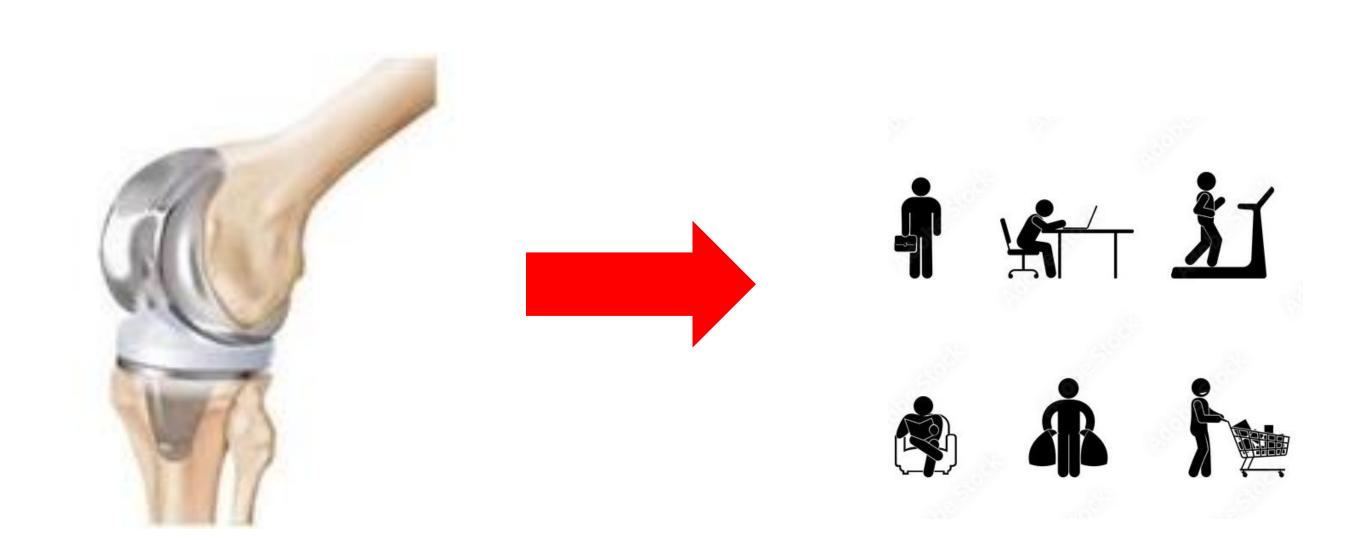
- We conducted PROSPERO-registered meta-analysis [CRD42024584335]
- Five electronic databases until 2025 for studies reporting post-TKR sagittal alignment and PROMs.
- Case-weighted meta-regression models assessed sagittal alignment—PROM relationships
 - across individual timepoints post-TKR,
 - across all timepoints (pooled effects)
- Results are reported as regression coefficient (RC) and 95% confidence intervals (95%CI).

Identification of new studies via databases and registers Records identified from Databases (n = 4): Pubmed (n = 234) Records removed before screening: Embase (n = 281) Duplicate records (n = 572) Records marked as ineligible by automation Scopus (n = 263) Web of Science (n = 159) Records removed for other reasons (n = 0)Registers (n = 1): Cochrane Central Register of Controlled Trials (n = 257) Records excluded (n = 463)Reports sought for retrieval Reports not retrieved Reports excluded: Not meet population inclusion criteria (n = 32) Reports assessed for eligibility No PROMs (n = 9) No Sagittal Parameters (n = 9)No Extractable Data (n = 21) Systematic Review (n = 17)New studies included in review New Studies identified through other Reports of new included studies methods (n = 1)(n = 50)

RESULTS

Of 622 studies, 51 were included(N=10,769 TKRs).

- Higher Femoral-Flexion(FF) was associated with improved
- Knee-Society-Score (KSS) (FF:RC=0.83,95%CI=0.53-1.14,n=510) across all timepoints.
 - Knee-Injury-and-Osteoarthritis-Outcome-Score (KOOS) (FF:RC=1.42,95%CI=0.62 2.21,n=400) across all timepoints.
- Lower Femoral-Sagittal-Angle(FSA, range:0.90-3.80) was associated with improved
 - KSS(RC=-6.09,95%CI=-7.63- -4.54,n=280) at all timepoints
 - KSS (RC=-6.29,95%CI=8.68- -3.903,n=160) at 12 months
- **Higher Posterior-Condylar-Offset(PCO**, range:24.00-33.60) was associated with improved
 - KSS(RC=31.6,95%CI=23.52-39.76,n=338) across all timepoints
 - KSS at 12 months(RC=31.9,95%CI=19.8-43.9,n=613).
- Higher Posterior-Tibia-Slope(PTS, range:-5.00-8.86) was associated with
 - Visual-Analogue-Scale-Pain scores (RC=1.00,p<0.001,n=90) at 1 month
 - Oxford-Knee-Score (RC=3.28,p=0.009,n=117) at 6 months
 - KSS-Knee (RC=3.29,p=0.002,n=150) at 24 months
 - BUT pooled analysis across all timepoints didn't show significant relationship with PROMs.



Sagittal Alignment

Patient Outcomes

Need For This Research & Future Direction

- This review shows that sagittal alignment influences PROMs, with higher Femoral Flexion, lower Femoral Sagittal Angle, and greater Posterior Condylar Offset associated with improved patient outcomes.
- We urge a shift from outdated 2D thinking to a true 3D understanding of knee alignment.
- A clear consensus on what core sagittal parameters must be reported is now essential to standardise and strengthen future research.

REFERENCES

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Gardner J, Roman ER, Bhimani R, Mashni SJ, Whitaker JE, Smith LS, et al. Aetiology of patient dissatisfaction following primary total knee arthroplasty in the era of robotic-assisted technology: a review of 674 cases. Bone Jt Open [Internet]. 2024 Sep 12 [cited 2024 Oct 28];5(9):758–65.