University of St.Gallen

School of Medicine

What matters when interpreting patient-reported outcomes? - Adjusted minimal clinically important differences for hip and knee replacement patients

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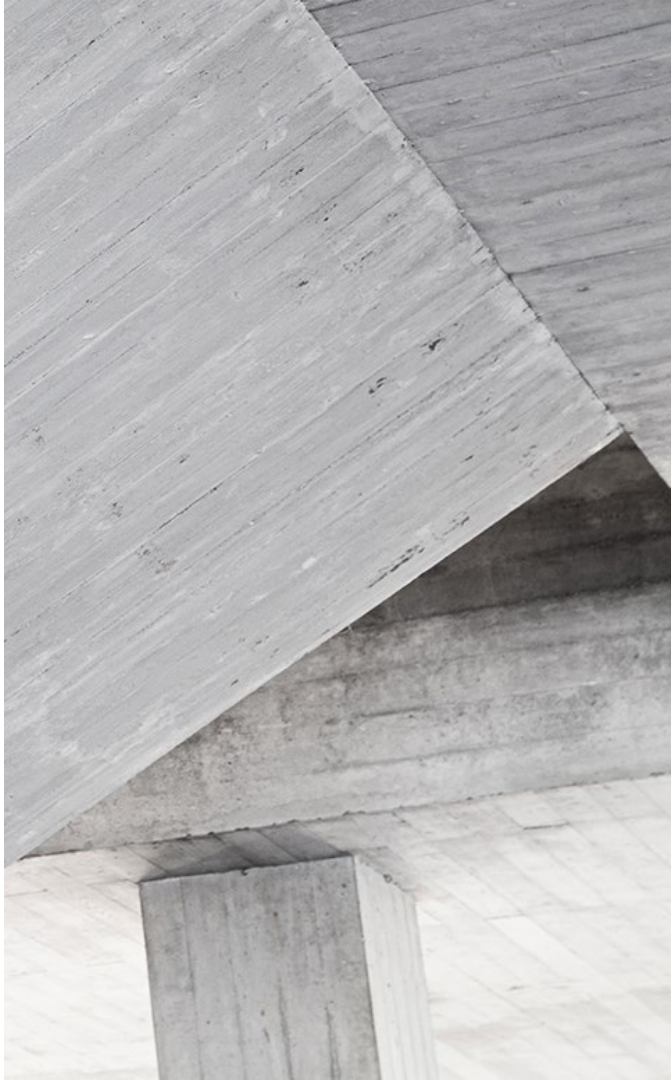

Intro | Hip and knee replacement outcomes should be measured through PROMs

- Hip and knee replacements: two of the most frequently performed and effective orthopedic surgeries worldwide
  - Main aim: improving patients' health-related quality of life (HRQoL)

- Patients are "the best judges of their own HRQoL"
  - Patient-reported outcome measures (PROMs)
  - In April 2009 the English National Health Service (NHS) started to collect PROMs

- However: statistical significance ≠ clinical relevance → meaningful thresholds

Intro | Adjusted MCIDs are necessary to meaningfully interpret PROMs

- MCIDs are *"the smallest difference in score in the domain of interest which patients perceive as beneficial and which would mandate, in the absence of troublesome side effects and excessive cost, a change in the patient's management" (Jaeschke et al., 1989)*

- However: MCIDs for the average patient may lead to biased treatment evaluations

→ MCIDs adjusted for patient characteristics provide a more realistic estimation of the percentage of success

- However: limitations from existing literature

Research question:

- *What are the minimal clinically important differences between pre- and post-surgery EQ-5D-3L indicating a successful hip or knee replacement for different subgroups of patients?*

Methods | Three-step approach with data from the NHS PROMs dataset

Dataset

- Variables: patient demographics, pre-operative health history, comorbidities, pre- and 6-month post-operative PROMs and other post-operative information
- Time span: from 2013 to 2020
- Sample size:
  - Hip: 297'806 → 232'808
  - Knee: 324'946 → 261'093

Three-step approach

1. Run multivariate OLS regression models with the EQ-5D index score improvement as dependent variable
2. Cluster patients according to the previously identified predicting factors
3. Estimate the MCIDs for the unstratified and stratified samples

Methods | The anchor-based approach

- An anchor-based approach using receiver operator curves (ROC) was implemented
  - How does it work:
    - The change in the EQ-5D is linked to a meaningful external anchor that accounts for the patient's perspective
    - The EQ-5D index score changes are plotted on an ROC curve
    - The ROC curve is used to determine thresholds that maximize sensitivity and specificity:

$$threshold = \min\{(1 - sensitivity)^2 + (1 - specificity)^2\}$$

- Selected anchor: "Success" ("Overall, how are your problems now, compared to before your operation?") transformed into a binary variable

Results | Regression results

- Pre-operative factors best explaining the post-operative EQ-5D index score improvement:

  1. Patients' pre-operative EQ-5D index score ← Highest prediction weight
  2. Previously diagnosed depression

Discussion | Summary and contribution

Findings

- Sample stratification leads to increased MCIDs accuracy
- Patients with worse pre-operative scores need a larger EQ-5D score improvement for the surgery to be considered successful
- Adjustment for patients' characteristics provides a more realistic evaluation of surgery successes

→ Consistent with literature findings

Contributions

- Additional contributions
  - Large sample size from nationally-representative dataset
  - Reliable anchor set and possibility for robustness checks
  - Reliable clustering algorithm
  - Stratification by pre-op EQ-5D, depression status and gender

Discussion | Limitations

- PROMs:
  - Responder bias for patients with extremely poor recoveries
  - Recall bias

- Anchor-based methods:
  - MCIDs varied depending on the anchor used
  - Inability to include measurement precision
  - Surgery success depends on the expectations of the patients

Discussion | Policy relevance and outlook

- Physicians: monitoring their patients' recovery paths
- Health policy makers: using PROMs for quality monitoring and policy design
- Health insurers and health systems: developing pay for performance contracts
- Patients: benefitting from increased transparency on hospitals' performance

Future research: MCIDs adjusted for patients' characteristics and as precise as possible

Thank you!

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