ACHE
- The Arthroplasty Candidacy Help Engine -
Using PROMs data to identify thresholds for hip and knee replacement surgery

Andrew Price, Helen Dakin, Jonathan Cook, James Smith, Sujin Kang, Alastair Gray, Peter Eibich, David Beard & the ACHE study team
Rationing arthroplasty by OHS/OKS

- In 2004, 31% (16/52) of Clinical Commissioning Groups (CCGs) limited hip/knee replacement referrals based on Oxford hip and knee scores (OHS/OKS)
- CCG thresholds include OHS/OKS scores of 19, 24 and 30
- No good evidence to support use of OHS/OKS or the current thresholds
- NICE recommend against using scoring tools in referral decisions
- Threshold of 24 would exclude 21% of current arthroplasty operations

Number of Patients

Oxford Knee Score
Research Questions

Can clinical tools for assessment of a patient’s suitability for knee or hip replacement be used to set thresholds for operation?

How does the choice of threshold affect the cost effectiveness of the procedure and subsequent improvements in patient quality of life?
Estimation of clinical thresholds: Methods

- Conducted systematic review to identify potential tools
- Assessed psychometric properties of 32 PROMs
  - Patient Related Outcome Measures 2016:7 101–108
- Thresholds estimated for 5 shortlisted scores
  - Several methods for threshold calculation considered
- OHS/OKS chosen due to measurement properties and available data
- Calculated probability of a "good outcome" at different pre-operative OHS/OKS
  - "Good outcome" defined as a minimally important change according to patients' perception of improvement
    - 8 point improvement in OHS or 7 point improvement in OKS
  - Used logistic and quantile regression and estimated proportions for observed data on NHS PROMS data 2009-2015
  - For men and women in 3 age bands
Estimation of clinical thresholds: Results for hips

At a score of 35
72% of patients have a “good outcome”

Absolute threshold = 41
Zero chance of a “good outcome”
Estimation of clinical thresholds:
Results for knees

At a score of 30
72% of patients have a “good outcome”

Absolute threshold = 42
Zero chance of a “good outcome”
Estimation of clinical thresholds: Discussion

- Preoperative OHS/OKS predicts the change in OHS/OKS and the proportion of patients improving
- Threshold OHS/OKS for referral can be estimated
- Other covariates beyond pre-operative score add little to the prediction
- Limitations
  - Covariates reflect those collected in the PROMS questionnaire
  - Substantial between-individual variability is not explained by OHS/OKS or observed covariates
  - Not a full picture of benefits: Ignores mortality, revisions, etc
  - Influenced by score properties
Estimation of economic thresholds: Methods

- Disease model of treatment pathway
  - Starting after the decision to operate
- Individuals with different age, sex, joint and Oxford score run through model
- Used data from NHS PROMs linked to HES, the Knee Arthroplasty Trial (KAT) and COASSt cohort
Estimation of economic thresholds: Results for Oxford Hip Score

- Total hip replacement is cost-effective for patients with OHS ≤42
  - Overall, hip replacement costs <£5,000 per QALY gained for 99% of patients

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Threshold: 42, 43, 43, 41, 38, 42

- Saves money
- Hip replacement is cost-effective at these ages and scores: costs less than £20,000 per QALY gained vs. no surgery
- Hip replacement improves quality of life, but costs more than £30,000 per QALY gained vs. no surgery
- Hip replacement is dominated at these ages and scores: increases cost & generates fewer QALYs than no surgery
**Estimation of economic thresholds: Results for Oxford Knee Score**

- **Total knee replacement is cost-effective for patients with OKS ≤40**
  - Overall, knee replacement costs <$5,000 per QALY gained for 97% of patients

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Conclusions

• OHS and OKS can be used to set thresholds for referral for hip and knee replacement
• Joint replacement is highly cost-effective for all patients with capacity to benefit
• Joint replacement is cost-effective and has a high chance of a good outcome for nearly all patients who currently undergo surgery
• Current thresholds suggested by CCGs would restrict care to many patients who would benefit
• Results were used to develop the online ACHE tool
  – To help GPs/hubs identify candidates for referral to secondary care
  – To support the more complex 'shared decision’ in secondary care
A working ACHE tool

Arthroplasty Candidacy Help Engine

OHS Score: 17 out of 48
You could benefit from Joint Replacement. ACHE suggests you have a 94% of a good outcome.

Understand more about this recommendation
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University of Bristol: Ashley Blom, Rachel Gooberman-Hill

Peninsular Medical School: Paul Dieppe

Statisticians: Sujin Kang, Laura Miller, Adrian Sayers, Jonathan Cook

Health Economists: Peter Eibich, Helen Dakin

Coordinators: James Smith, Elena Benedetto, Kristina Harris. Admin support: Mrs Jiyang Li

ACHE is funded by the National Institute for Health Research (NIHR) under its Health Technology Assessment (HTA) programme (No. 11/63/01).

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We would like to thank the COAST and KAT study groups for providing access to their data. COAST was also funded by the NIHR as a PGfAR (No. RP-PG-0407-10064); KAT was funded by the NIHR as an HTA (No. 95/10/01).

The views and opinions expressed therein are those of the authors and do not necessarily reflect those of the HTA programme, NIHR, NHS Digital or the Department of Health.