Variations In Good Patient Reported Outcomes After Total Knee Arthroplasty

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ABSTRACT

This study identifies optimal OKS values that discriminate post-operative (TKA) patient satisfaction and determines the variation in threshold values by patient characteristics and expectations. It is the first to identify patient improvement using measures (PoPC) that account for patient's pre-operative symptom severity. Of 365 primary TKA patients from a London district general hospital 84% were satisfied at 12 and 24 months. Whilst the overall OKS thresholds (follow-up, change, PoPC) were stable at 12 months (31, 11, 39.7%) and 24 months (35, 12, 38.9%), patients who were older (≥75 years), were underweight/normal (BMI < 25), had pre-operative symptom severity (OKS ≤ 15) and expected no pain post-surgery, required a greater (potential) improvement to be classed as satisfied. When reporting good patient outcomes, cohorts should be stratified accordingly.

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Knee osteoarthritis is a common condition. In England, Wales and Northern Ireland, 82,267 primary knee arthroplasties were recorded in 2013 by the National Joint Registry [1]. This number is expected to rise over the coming years due to demographic changes, specifically the ageing population and increasing body mass index (BMI) [2].

Historically, the outcome of total knee arthroplasty (TKA) has been reported by implant survival (revision rate), but such survival data can be misleading. Patients can have an unsatisfactory result from TKA without requiring or undergoing revision surgery. This shortcoming has been described previously [3] and is being rapidly redressed by the recent drive toward assessing and reporting patient reported pain and function. In 2008 the UK Government selected the Oxford Knee Score (OKS) as the patient reported outcome measure (PROM) to assess all TKA patients. Since April 2009 all patients are required to complete an OKS [4,5]. The OKS was introduced in 1998 [6] and comprises twelve questions assessing knee pain and function.

Whilst the OKS has been in widespread clinical use for over a decade, it is not clear what score optimally identifies patient satisfaction. Several authors have attempted to categorise the Oxford scoring system using cumulative frequency cut points and defined the groups as poor, fair, good, excellent, as described by Kalairajah et al [7]. However, these bands do not take into account the self-perceived outcome (or criterion outcome); an important outcome after arthroplasty is patient satisfaction. A second issue is the known dependence of final outcome scores on baseline or pre-intervention data. As the baseline position affects the potential for improvement, there is a need to account for this when considering the change in OKS after surgery.

This study addresses these issues by identifying post-operative OKS thresholds that discriminate patient satisfaction with the operation, and

Table 1
Descriptive Statistics of the Cohort by Baseline Characteristics.

Baseline Characteristics	Full Cohort n = 608	Patients Not Used in This Analysis n = 243	Patients Used in This Analysis n = 365[a]	P Value[b]	Imputed Data[c] n = 365
Age (years), median (IQR)	72 (66, 77)	71 (63, 77)	72 (67, 78)	0.025[d]	72 (−)
Age (years) categories, % (n)					
65 or under	23.5% (143)	29.6% (72)	19.5% (71)		19.5% (−)
Between 66 and 74	38.5% (234)	35.0% (85)	40.8% (149)	0.015[d]	40.8% (−)
75 and over	38.0% (231)	35.4% (86)	39.7% (145)		39.7% (−)
Gender, % (n)					
Female	61.4% (373)	60.9% (148)	61.6% (225)	0.855	61.6% (−)
Male	38.7% (235)	39.1% (95)	38.4% (140)		38.4% (−)
BMI (kg/m^2), mean (sd)	28.8 (5.2)	29.1 (5.4)	28.6 (5.0)	0.341	28.3 (0.4)
BMI (kg/m2) categories, % (n)					
Less than 25	20.4% (68)	18.7% (26)	21.7% (42)		25.4% (2.8)
25 to less than 30	38.7% (129)	37.4% (52)	39.7% (77)	0.608	37.5% (2.7)
30 or more	40.8% (136)	43.9% (61)	38.7% (75)		37.2% (3.1)
Pre-operative expectations − pain, % (n)					
Not at all painful	50.3% (154)	52.2% (24)	50.0% (130)		49.6% (2.9)
Some pain	49.7% (152)	47.8% (22)	50.0% (130)	0.786	50.4% (2.9)
Pre-operative expectations − function, % (n)					
Not limited at all	33.6% (101)	38.6% (17)	32.7% (84)		33.2% (2.7)
Some limitation	66.5% (200)	61.4% (27)	67.3% (173)	0.440	66.8% (2.7)
Baseline OKS (0–48), mean (sd)	19.7 (7.6)	19.3 (7.6)	20.0 (7.6)	0.248	20.0 (−)
Baseline OKS (0–48) tertiles, % (n)					
Tertile 1: 15 or under	30.8% (187)	32.1% (78)	29.9% (109)		29.9% (−)
Tertile 2: more than 15 and less than 23	33.9% (206)	34.2% (83)	33.7% (123)	0.761	33.7% (−)
Tertile 3: 23 and over	35.4% (215)	33.7% (82)	36.4% (133)		36.4% (−)

[a] Missing baseline data for 'Patients used in this analysis': BMI 46.9% (171), Pre-operative expectations − pain 28.8% (105), Pre-operative expectations − function 29.6% (108).
[b] P value comparing patients not used in this analysis with patients used in this analysis; t test used for normal continuous data, rank sum test used for non-normal continuous data, chi square test used for categorical data.
[c] Imputed data show estimate (standard error for imputed factors).
[d] P < 0.05.

importantly, identify the improvement in OKS accounting for patient's pre-operative symptom state. The stability of patient improvement between 12 months and 24 months post-surgery is described and the cohort is further analysed by stratifying on patient characteristics and expectations at baseline to identify the variation in threshold values.

Methods

Study Population

The ***BLINDED*** Hospital, UK is a busy district general hospital serving a local population of about 320,000 in the London boroughs of Sutton and Merton [8]. A structured outcome programme was established in 2003 to review the progress of patients following TKA. Only patients receiving an elective primary TKA were recruited into the study. If a patient had undergone the procedure on both sides, the earliest operation was included. Subjects with previous distal femoral or proximal tibial fractures were excluded. Surgeries were performed by several consultant orthopaedic surgeons and their supervised trainees. Data for this study were collected independent of the operating surgeon.

Data Collection

Patients admitted for a TKA between 2003 and 2007 (baseline) completed a pre-operative OKS questionnaire comprising 12 questions on their knee pain and function during the past four weeks. The responses for each question were on a Likert scale (0–4). The total score ranged from 0 to 48, where 0 is the worst possible score indicating severe knee symptoms (this is much worse than many patients pre-TKA) and 48 is the best score suggesting excellent joint function (which is usually much better than many satisfactory TKA). Pre-operative patient characteristics were also recorded and included age, gender, height and weight (from which BMI was calculated).

In addition to the baseline OKS, the following expectation questions were included pre-operatively:

1) "How limited do you expect to be in your usual activities, when you are fully recovered from this surgery?"(Not limited at all, slightly limited, moderately limited, greatly limited)
2) "How painful do you expect your knee to be when you are fully recovered from this surgery?" (Not at all painful, slightly painful, very painful)

At 12 months and 24 months follow-up, a self-reported OKS questionnaire was administered by post and the following questions were asked,

1) "Has your knee replacement increased your overall function?" (No, Yes)
2) "Has your knee replacement operation decreased your knee pain?" (No, Yes)
3) "Has your knee replacement decreased your need for pain medication?" (No, Yes)
4) "Are you satisfied with the result of your knee replacement?" (No, Yes)

Satisfaction was used as the principal anchoring question for the analysis in this study. Patients who completed the follow-up questionnaire and anchoring question for patient satisfaction at 24 months, along with their responses at 12 months, were the focus of this study.

For examining patient improvement, two additional variables were derived. The first was the actual change in OKS and was calculated by subtracting the baseline score from the follow-up score. The second was the 'percentage of potential change' (PoPC) which takes into account patients' pre-operative symptom state by expressing actual change relative to the amount they could have potentially changed [8,9]. For patients who improved, this was 'actual change' divided by '48 minus baseline score' multiplied by 100. For patients who worsened, this was 'actual change' divided by 'baseline score' multiplied by 100. Patients who had the same score at baseline and follow-up had zero for actual change and PoPC. The range of possible values for actual change was −48 to 48 and for PoPC was −100% to 100%. For both measures, negative values indicated a worsening of symptom state following TKA and positive values indicated an improvement.