

What determines patient satisfaction with surgery? A prospective cohort study of 4709 patients following total joint replacement

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ABSTRACT

Objectives: To investigate the factors which influence patient satisfaction with surgical services and to explore the relationship between overall satisfaction, satisfaction with specific facets of outcome and measured clinical outcomes (patient reported outcome measures (PROMs)).

Design: Prospective cohort study.

Setting: Single National Health Service (NHS) teaching hospital.

Participants: 4709 individuals undergoing primary lower limb joint replacement over a 4-year period (January 2006–December 2010).

Main outcome measures: Overall patient satisfaction, clinical outcomes as measured by PROMs (Oxford Hip or Knee Score, SF-12), satisfaction with five specific aspects of surgical outcome, attitudes towards further surgery, length of hospital stay.

Results: Overall patient satisfaction was predicted by: (1) meeting preoperative expectations (OR 2.62 (95% CI 2.24 to 3.07)), (2) satisfaction with pain relief (2.40 (2.00 to 2.87)), (3) satisfaction with the hospital experience (1.7 (1.45 to 1.91)), (4) 12 months (1.08 (1.05 to 1.10)) and (5) preoperative (0.95 (0.93 to 0.97)) Oxford scores. These five factors contributed to a model able to correctly predict 97% of the variation in overall patient satisfaction response. The factors having greatest effect were the degree to which patient expectations were met and satisfaction with pain relief; the Oxford scores carried little weight in the algorithm. Various factors previously reported to influence clinical outcomes such as age, gender, comorbidities and length of postoperative hospital stay did not help explain variation in overall patient satisfaction.

Conclusions: Three factors broadly determine the patient's overall satisfaction following lower limb joint arthroplasty; meeting preoperative expectations, achieving satisfactory pain relief, and a satisfactory hospital experience. Pain relief and expectations are managed by clinical teams; however, a fractured access to surgical services impacts on the patient's hospital experience which may reduce overall satisfaction. In the absence of complications, how we deliver healthcare may be of key importance along with the specifics of what we deliver, which has clear implications for units providing surgical services.

ARTICLE SUMMARY

Article focus

- Patient satisfaction rates have been quoted following surgical intervention; and these are used to assess the success of interventions.
- Clinical care and patient outcomes have improved over recent years, however satisfaction with surgical services has remained constant over this timeframe.
- Many factors have been suggested to influence patient's satisfaction; however there is little consensus as to which areas of care actually influences overall satisfaction response.

Key messages

- Our study identifies five factors that explain 97% of the variation in the patient's overall satisfaction following lower limb joint arthroplasty: (1) meeting preoperative expectations, (2) the achievement of satisfactory pain relief, (3) the patients subjective hospital experience, and to a lesser extent, (4) preoperative physical status (Oxford score) and (5) 12 months physical status (Oxford score).
- Factors that influence clinical outcome scores (patient-reported outcome measures, ie, PROMs) such as age, gender and comorbidities do not impact on satisfaction.
- Clinical teams currently aim to manage preoperative expectations and postoperative pain relief. Management of the patient's hospital experience may then be a key factor in optimising overall patient satisfaction, which has implications for service delivery.

Strengths and limitations of this study

- This study benefits from a large prospective patient cohort at a single National Health Service (NHS) orthopaedic centre with multiple surgeons.
- As most patients report high satisfaction with joint arthroplasty there is some doubt as to how discriminating this measure is, and caution has been advised in the use of a standardised instrument for the measurement of satisfaction.
- The wider generalisability of these results from joint arthroplasty to other surgical procedures is assumed but unconfirmed.

INTRODUCTION

Satisfaction with National Health Service (NHS) surgical services has recently declined¹ despite more rapid access to, and fewer measurable complications from surgical care. There are few procedures or treatments where the monitoring of outcomes and satisfaction has been consistent enough to investigate this apparent paradox. Joint replacement is an example of a high volume service that has been closely monitored over recent years.

Traditionally, clinical success has been measured by lack of complications or by specific clinical parameters, for example, range of motion or blood pressure control. More recently, clinical outcomes have been assessed by patient-reported outcome measures (PROMs). Patient satisfaction is perhaps the most important criterion of success. This is well recognised in the service industries, though remains something of a nebulous concept in clinical care. Despite the extensive literature on clinical outcomes following joint arthroplasty, comparatively few studies address patient satisfaction.² Where this is reported, the majority of patients are described as being satisfied with surgical outcome; though consistent reports of 10–20% dissatisfaction with joint arthroplasty persist.^{2–6} A number of authors have suggested various factors that may influence satisfaction with arthroplasty, such as postoperative pain or joint stiffness, though our current understanding as to why some patients are satisfied and others are not remains limited.^{6–8} Indeed some patients reporting a bad clinical outcome, in terms of pain and function, may report good levels of satisfaction with their surgical outcomes and vice versa.² In the wider surgical literature various factors such as meeting of expectations, staff politeness, the surgeon's communication skills and surgical waiting times have all been suggested as influencing eventual satisfaction^{9–11} though again consensus is elusive. Clearly, overall satisfaction is a broad concept that encompasses more than simply the clinical outcome.

Our aim was to explore the relationship between patient's level of overall satisfaction with their hip or knee replacement, satisfaction with specific facets of outcome and measured clinical outcomes (PROMs).

METHODS

During a 4-year period (January 2006–December 2010), all patients undergoing lower limb joint replacement at a single hospital were entered into a prospectively collected arthroplasty database, for which regional ethical approval had been obtained (11/AL/0079). The study questionnaire was completed by 4709 (95%) patients. This comprised 2462 patients receiving total hip replacement and 2247 receiving total knee replacement. All data were included in the analysis.

All patients completed preoperative PROM questionnaires, Oxford Hip or Knee Score^{12 13} and Medical Outcomes Study Short Form 12 (SF-12) health assessment,¹⁴ and were sent postal follow-up questionnaires at

6 and 12 months postoperation to assess outcomes and satisfaction. Procedures were carried out by multiple consultant orthopaedic surgeons and their supervised trainees. All data were collected independently from the clinical team by the arthroplasty outcomes research unit of the University of Edinburgh and NHS Lothian.

The Oxford scores consist of 12 questions relating to the patients perceived pain and functional ability, answered on a Likert scale with values from 0 to 4. The score ranged from 0 to 48, with the overall score calculated from the responses to the 12 questions. A score of 0 is the worst possible outcome suggesting severe symptoms and dysfunction, while 48 is the best possible outcome. The SF-12 results in two scores, the physical and mental components summary (PCS and MCS) scores. This score is calculated using norm-based methodology and population mean scores. Both PCS and MCS have a population mean score of 50 with an SD 10.

Preoperative information was collected as to the patient's age, gender and presence of comorbidities. Postoperative length of stay was recorded upon discharge. At 12 months patients were also asked to rate their overall satisfaction with their operated hip or knee on a four-point scale (very satisfied, satisfied, unsure or dissatisfied). Data on satisfaction with five specific facets of surgical outcome were obtained with the following questions, answered on a six-point scale (excellently, very well, well, fairly, poorly, don't know): (1) 'How well did the surgery relieve the pain in your affected joint?'; (2) 'How well did the surgery increase your ability to perform regular activities?'; (3) 'How well did the surgery allow you to perform heavy work or sport activities?'; (4) 'How well did the surgery meet your expectations?' We then asked our patients to indicate their satisfaction with the care they received at the hospital with the question (5) 'rate your overall hospital experience' using the response scale; excellent, very good, good, fair, poor or unknown. We also asked further two questions that enquired as to the patient's attitude towards further surgery: (1) 'Would you have this operation again if it were required on another joint?' and (2) 'Would you recommend this operation to someone else?' (Possible responses: definitely yes, possibly yes, probably not, certainly not or not sure). These were included to mimic the modelling performed in marketing research, where return visits are considered a successful outcome.

Statistical analysis

Data were assessed with SPSS V.17 (IBM). Data were not normally distributed and therefore variables have been presented as median and interquartile ranges. The satisfaction score at 1 year was simplified into a binary variable of whether or not the patient was satisfied with the surgery. Those who reported 'satisfied' or 'very satisfied' were categorised as satisfied. Those who were either 'unsure' or 'not satisfied' were categorised as 'not satisfied'. In total, 86.6% of patients were either very satisfied

or satisfied, and 13.4% were unsure or not satisfied. Bivariate analysis was undertaken to determine whether differences in outcome were associated by satisfaction status. Logistic regression analysis was then performed to determine the variables associated with satisfaction at 1 year. Multivariate modelling, using a stepwise binary building technique, was employed with predictive variables selected if their bivariate significance was $p=0.1$ to accommodate the possibility of variable achieving statistical significance once the confounding effect of another variable was controlled.

RESULTS

Demographic details are described in table 1, split dichotomously into satisfied or unsatisfied patient groups. Age and gender were not associated with differences in satisfaction, however a significantly higher proportion of the total hip arthroplasty (THA) group were satisfied than the total knee arthroplasty (TKA) group (table 1, $\chi^2=49.85$, $p<0.001$). The median number of comorbidities (2) was the same though is reported as being statistically different between groups; as the Mann-Whitney test does not

actually compare the medians but looks at the ranking of all of the data, which allows for this apparent contradiction. Median length of stay differed by a single day between those who were satisfied and those who were not, which was statistically significant. All PROM scores (including preoperative scores) were significantly better in the satisfied group. Satisfaction with the specific aspects of surgical outcome, the hospital experience and the attitude towards further surgery were all significantly greater ($p=0.001$) in those who reported overall satisfaction with outcome.

Highly significant correlations of modest-strong strength were found between overall satisfaction and the satisfaction with the specific aspects of surgical outcome (table 2). Highly significant correlations of modest-strong strength were also apparent between overall satisfaction and the attitudes towards further surgery; 'Would you have the surgery again?' ($r=0.59$, $p\leq 0.001$) and 'Would you recommend the operation to another?' ($r=0.63$, $p\leq 0.001$).

All 21 variables were entered into a stepwise binary regression model. Five of these variables were predictive of overall satisfaction with outcomes: (1) meeting pre-operative expectations, (2) satisfaction with pain relief,

Table 1 Patient demographics and outcomes (median, IQR) by overall satisfaction response

Variable	Satisfied	Not satisfied	Significance
Age	70.3 (13.8)	70.0 (14.4)	0.829
Gender			
Female, n (%)	2354 (87)	354 (13)	0.473
Male, n (%)	1725 (86)	276 (14)	
Joint			
THA, n (%)	2215 (90)	247 (10)	<0.001
TKA, n (%)	1864 (83)	383 (17)	
Number of comorbidities	2 (2)	2 (2)	<0.001
Length of stay (days)	5 (3)	6 (2)	<0.001
Satisfaction with specific facets (median scores)			
Pain relief in the affected joint	Excellent	Fair	<0.001
Ability to perform activities	Very good	Poor	<0.001
Ability to perform heavy work or sports	Good	Poor	<0.001
Meeting of expectations	Very good	Poor	<0.001
Rating of hospital experience	Very good	Good	<0.001
Attitudes towards further surgery			
Would you have the surgery again (yes, %)	3688 (92)	223 (36)	<0.001
Would you recommend the operation to another (yes, %)	3936 (97)	292 (48)	<0.001
Patient reported outcome questionnaires			
Preoperative			
SF-12 PCS, median (IQR)	28.6 (9.4)	27.2 (8.1)	0.001
SF-12 MCS, median (IQR)	50.9 (19.2)	43.8 (20.3)	<0.001
Oxford score, median (IQR)	19.0 (12.0)	16.0 (10.0)	<0.001
6 months			
SF-12 PCS, median (IQR)	41.8 (16.7)	30.4 (9.3)	<0.001
SF-12 MCS, median (IQR)	56.5 (12.6)	43.2 (19.2)	<0.001
Oxford score, median (IQR)	39.0 (12.0)	24.0 (14.0)	<0.001
12 months			
SF-12 PCS, median (IQR)	44.1 (17.9)	29.4 (8.7)	<0.001
SF-12 MCS, median (IQR)	56.2 (12.7)	41.7 (16.9)	<0.001
Oxford score, median (IQR)	41.0 (11.0)	23.0 (12.0)	<0.001

IQR, interquartile range; MCS, mental component summary; PCS, physical component summary; SF-12, Short Form 12.

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Table 2 Correlations between overall satisfaction response and satisfaction with individual facets of surgical outcome

Correlation with overall satisfaction	r	Significance
Meeting of expectations	0.74	<0.001
Pain relief in the affected joint	0.72	<0.001
Ability to perform activities	0.65	<0.001
Ability to perform heavy work or sports	0.43	<0.001
Rating of hospital experience	0.43	<0.001

(3) satisfaction with the overall hospital experience, (4) preoperative and (5) 12 months Oxford scores (table 3). There was no statistically significant difference between the observed probabilities and those predicted by the model (Hosmer-Lemeshow goodness-of-fit test, $\chi^2=5.654$, $p=0.686$). Thus the model could be considered as a good fit. Overall, the model was able to correctly predict 97% of those who were satisfied. A change of one category (on the 0–6 categories scale) of meeting expectations or satisfaction with pain relief resulted in being 2–3 times more likely to be satisfied with the outcome.

A noted ceiling effect on postoperative Oxford scores (ie, potentially problematic when performing regression modelling) led us to review our data. Ceiling effects are of concern if 15% or more of respondents report the highest value. In our data 374 patients (only 8% of the total number of respondents) reported the highest possible score.

DISCUSSION

This study demonstrates high levels of overall patient satisfaction following total joint arthroplasty and suggests that this is primarily based on three facets; meeting preoperative expectations of surgery, achieving satisfactory pain relief following surgery and the overall hospital experience. These three factors drove a model which was able to explain 97% of the variation in the patient's overall satisfaction response. It is important to highlight that various factors previously reported to influence clinical outcome (as measured by PROM scores); such as patient age, gender, comorbidities, length of postoperative stay, mental health (SF-12 MCS), general physical health (SF-12 PCS) and whether the hip or knee joint was replaced did not help explain variation in overall patient satisfaction.

Despite national efforts of categorisation, using patient-reported assessment tools, patient outcome following joint arthroplasty remains poorly understood and a highly complex construct to measure. Indeed Carr *et al*¹⁵ speculate that it is highly unlikely a single universal instrument that is valid for all aspects and domains of outcome will ever be developed. Overall patient satisfaction following joint arthroplasty is thought broadly to relate to PROM scores,^{3 16} however this relationship is not well established. Studies in general medicine have found conflicting associations between the patient's experience of intervention and the technical quality of the care delivered as measured by other means.^{17–19} Though associated, outcome and satisfaction are not of the same metric; current patient report instruments do not account for satisfaction, though this is perhaps the most important criterion of operative success.

The concept of satisfaction is most widely employed in consumer marketing and can be defined as 'an attitude like judgement following an act, based on a series of product–consumer interactions'.²⁰ It has been used as a healthcare performance indicator for surgery in the UK,¹⁷ Europe⁹ and notably for cancer services²¹ and cosmetic procedures in the USA.²² Mira *et al*⁹ report 75% satisfaction in a large sample of patients (undergoing urology, traumatology, ophthalmology and general surgery) discharged in a 2-month period from multiple Spanish hospitals. They found that in addition to successful surgical procedure other facets relating to the experience of the surgical episode such as previous explanation of the procedure, provision of information at admission and at discharge, and quickness of response on the ward all substantially influenced the patient's overall satisfaction response. Recently, Judge *et al*^{4 23} have assessed the relevant change in Oxford score that corresponds to satisfaction with joint arthroplasty using receiver-operating characteristic curve analysis. A threshold of 38 points at 12 months and 11-point change in Oxford Hip Score or 14-point change in Oxford Knee Score (from preoperative score) is suggested as being predictive of satisfaction.^{4 23} The thresholds presented however vary with the preoperative score. Judge *et al*²³ also show how the widespread attempts to use PROM data to prioritise patients for arthroplasty surgery is ineffective, demonstrating that preoperative Oxford scores in isolation have no predictive accuracy in deriving postoperative satisfaction. In the analysis presented here, both preoperative and 1 year Oxford scores contributed to the final regression model, reflecting the

Table 3 Significant predictors of being satisfied with outcome

Variable	Significance	OR	CI
Having expectations met	<0.001	2.62	2.237 to 3.073
Satisfaction with pain relief	<0.001	2.40	1.999 to 2.867
Satisfaction with the hospital experience	<0.001	1.67	1.454 to 1.908
12 month Oxford Score	<0.001	1.08	1.052 to 1.103
Preoperative Oxford Score	<0.001	0.95	0.927 to 0.973

patient's change in outcome score, though neither carried much influence, with ORs close to 1. Mental health²⁴ has been suggested to influence outcome (as measured by PROMs), and though our data highlights that dissatisfied patients generally reported worse mental health scores, it was not a predictor of overall satisfaction in multivariate modelling controlling for confounding. Neither were differences in postoperative length of hospital stay or level of satisfaction between patients undergoing THA and those undergoing TKA surgery relevant to the final model.

PROM scores are useful tools for the assessment of clinical outcome, in which they focus primarily on pain relief.^{25–26} This analysis highlights that while pain relief is very relevant to patient satisfaction; it is not the sole driver. It is quite possible for patients to report good levels of pain relief and overall dissatisfaction or vice versa. Marrying of expectations and resultant perception of outcome has been suggested as a model for understanding satisfaction response in the marketing literature.¹⁰ Baker *et al*² suggest that failure to meet optimistic expectations is associated with dissatisfaction following joint arthroplasty, and the fulfilment of expectation has been correlated to satisfaction with outcome.⁸ Mannion *et al*²⁷ however suggest that actual status (pain and function) of the individual may be more predictive of satisfaction than expectations of outcome using multivariate modelling techniques. We suggest that the meeting preoperative expectations is an equally important factor as achieving satisfactory pain relief postoperatively, with both factors demonstrating an OR of close to three points. Perhaps most interesting is the inclusion of the rating of overall hospital experience as the only other factor in the model. This aspect has not been well investigated in the arthroplasty literature and reflects the important role of the patient's experiences of their interaction with hospital services as to their final satisfaction with the services provided.

Three 'pillars of quality in healthcare' for the NHS have been recently defined; patient's safety, clinical effectiveness and the patient's experience.^{17–28} The patient experience metric is thought to help assess the strengths and weaknesses of patient's safety and clinical effectiveness and drive improvements in these components.¹⁷ Interestingly, these 'Pillars' are notably similar to previously proposed 'components of healthcare satisfaction'; structure, process and outcome.²⁹ Taken together, these suggestions emphasise that the patient's satisfaction following a surgical procedure is not limited to the outcomes of the intervention, but influenced by the experience of the event as a whole, from preoperative consultation to postoperative review. Our findings perhaps help quantify these broad concepts in the context of joint replacement.

Strengths and limitations

This study includes a large patient cohort from a single NHS orthopaedic centre with multiple surgeons. Valid and reliable instruments for assessing change in health status and outcome of joint arthroplasty have been used,

and data has been collected prospectively with a good rate of follow-up. The level of satisfaction we report is strikingly similar to that recorded in the 2005 National Joint Registry postal survey⁵ (90% satisfaction with hip replacement and 82% satisfaction with knee replacement). As we have preoperative data we were able to model how the change in pain and function related to satisfaction. This is important, as it is likely that satisfaction depends not on the postoperative status, but on the change in status.² A noted ceiling effect on postoperative Oxford scores may unduly influence regression modelling such as is reported here. Terwee *et al*³⁰ suggests that ceiling effects can be considered as present in a health status measure if 15% or more of respondents report the highest value. We are confident that our analysis has not been limited by this as less than 10% of our data was at the upper score limit.

As most patients report high satisfaction with joint arthroplasty there is some doubt as to how discriminating this measure is, and caution has been advised in the use of a standardised instrument for the measurement of satisfaction.³¹ It is recommended that satisfaction questions should be context and objective-specific rather than generic. Although the additional questions we asked were not formally validated as a measure of satisfaction, they were directed explicitly at aspects relating to joint arthroplasty allowing a more in-depth analysis of the individual factors that contribute to overall satisfaction. Though probably reflective of other interventions, the actual generalisability of these findings to other surgical procedures is not known. Satisfaction is significantly influenced by clinical outcome (pain relief and the avoidance of complications). However, it is also significantly influenced by the pathway to care and the hospital experience. The relative proportions to which these factors contribute towards overall satisfaction are likely to differ by condition or treatment depending on the success of treatment for different conditions. The most appropriate time point for assessing satisfaction has not been described; with some authors reporting satisfaction immediately postdischarge. We chose to survey our patient's satisfaction with outcomes 12 months following the index procedure as this is a time commonly agreed to represent the final outcome and is consistent with other arthroplasty studies. Waiting times for surgery are also thought to influence satisfaction, though we were not able to assess this in our study, as all patients were operated within 12 weeks of being listed for procedure, as is a requirement of planned surgical intervention in Scotland.

Recently there has been a focus on quality in the NHS (improving clinical outcomes and reducing complications) which has been highly successful. Significant reductions in hospital acquired infections, waiting times and specific procedure-related problems (such as dislocation following hip replacement) are all reported, yet patient satisfaction with outcome has remained constant over this timeframe,^{2–6} and overall satisfaction with the

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NHS as a whole has actually declined.³² In marketing it has been suggested that, focusing on service quality alone, without appreciating how it is delivered, is setting the stage for 'lower customer retention'.³³ This remains true when applied to healthcare environment, indeed Baker *et al*³⁴ noted that better performance (in delivering joint replacement outcomes) may bring the reward of more customers, as patients and commissioners seek out high performers for their elective procedures. We speculate that as surgical outcomes have been consistent, and complications reduced, the national reduction in satisfaction with the NHS may in part be due to fragmented pathways of care to surgery and a concentration on administering time targets rather than managing patient care in its wider context.

In conclusion, overall patient's satisfaction following joint arthroplasty is significantly affected by fulfilment of presurgical expectations, symptomatic pain relief achieved following surgery and the hospital experience. The Oxford scores contributed a minimal additional influence in a model which explained 97% of the variation in overall satisfaction response. Focusing on administration of waiting lists as opposed to managing the patient's experience may be influencing the observed reduction of satisfaction with healthcare delivery. This is particularly evident for joint replacement in NHS facilities, where emergency admissions often deprioritise 'elective' surgeries leading to differences in satisfaction between units focused on the patient pathway for one condition or treatment and those providing the generality of care where focus has been blurred and priority is given to emergency services.

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Data sharing statement The dataset are available via the corresponding author though is subject to approval of the data manager owing to NHS restrictions in place to protect patient confidentiality.

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