



■ MANAGEMENT FACTORIALS IN TOTAL KNEE REPLACEMENT

I can't get no satisfaction after my total knee replacement

RHYMES AND REASONS

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Satisfaction is increasingly employed as an outcome measure for a successful total knee replacement (TKR). Satisfaction as an outcome measure encompasses many different intrinsic and extrinsic factors related to a person's experience before and after TKR. The Swedish Knee Arthroplasty Registry has previously demonstrated on a large population study that 17% of TKR recipients are not satisfied with their TKR outcome. This finding has been replicated in other countries. Similar significant factors emerged from these registry studies that are related to satisfaction. It would appear that satisfaction is better after more chronic diseases and whether the TKR results in pain relief or improved function. Importantly, unmet pre-operative expectations are a significant predictor for dissatisfaction following a TKR. It may be possible to improve rates by addressing the issues surrounding pain, function and expectation before embarking on surgery.

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Patient satisfaction after total knee replacement (TKR) is an important yet vague outcome measure that is of increasing interest, particularly to administrators and third party payers.^{1,2} It is important to have a comprehensive understanding of the psychometric aspects of satisfaction, particularly with respect to its strengths and weaknesses.

The largest reported series on satisfaction after TKR was published in 2000 as part of a validation exercise for revision status as an endpoint for the Swedish Knee Registry.³ Using the Swedish national personal number, 99.2% of all living patients having received a TKR in Sweden were contacted by mail asking them if they had their TKR revised along with a single question regarding their level of satisfaction. The question posed was - "How satisfied are you with your knee replacement". This single question permitted the following responses: a) very satisfied, b) satisfied, c) uncertain, and d) dissatisfied. The survey included 27 372 TKR patients from 1981 to 1995 (95% of the patients surveyed). The proportional distribution of satisfaction was reported as a function of multiple factors that provided some novel insights into patient satisfaction as it relates to TKR, including 17% of 25 275 unrevised patients who were either dissatisfied or uncertain regarding their outcome (Fig. 1). These same responses, perhaps not surprisingly, rose to 41% if the patient had a revision of their TKR (Fig. 1). The rates of satisfaction were remarkably consistent over the

period sampled, which suggests that the responses were sustained, and perhaps that innovation in TKR technology over the study period has had little effect (Fig. 2). Women with osteoarthritis were slightly but statistically more dissatisfied than men ($p < 0.001$; Men-Women) with rates of 18% and 16%, respectively (Fig. 3).

Another important finding in the Swedish Joint Registry study was that the proportional distribution of satisfaction was related to the chronicity of the disease state prior to TKR (Fig. 4). For example, those with a long-standing chronic disease, such as rheumatoid arthritis, were more often satisfied. Those with a pathology of more recent onset and duration leading to TKR such as avascular necrosis or post-traumatic osteoarthritis, were least satisfied.

This is best illustrated in Figure 5. Here, a patient with avascular necrosis who undergoes a TKR would be more likely to compare their post surgery health state with their concept of a pre-diseased knee state of health. A TKR to a previously recently fully healthy person is perceived as a salvage procedure, generally incapable of reproducing a 'normal knee', even a well-functioning TKR could easily lead to dissatisfaction. In contrast, a patient with a chronic and systemic condition such as rheumatoid arthritis is more likely to accept a lower quality of health for themselves as representing, to some degree, their state of normality. Therefore, when they undergo TKR, they are more likely to compare the result of surgery

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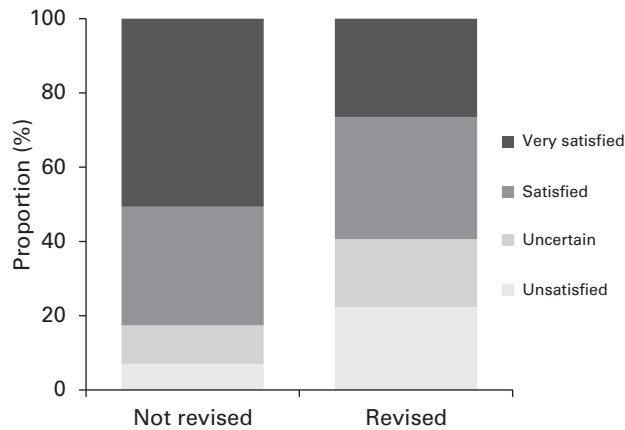


Fig. 1

In osteoarthritis (OA), 18% of the female patients (n 14 609) and 16% of male patients (n 6556) were dissatisfied or uncertain, while in patients with rheumatoid arthritis (RA) the corresponding responses were 14% (n 2,568) and 15% (n 635), respectively. The difference was significant with OA ($p < 0.001$) but not with RA ($p = 0.2$). Reproduced with permission from **Robertsson O, Dunbar M, Pehrsson T, Knutson K, Lidgren L**. Patient satisfaction after knee arthroplasty: a report on 27,372 knees operated on between 1981 and 1995 in Sweden. *Acta Orthop Scand* 2000;71-3:262-7.

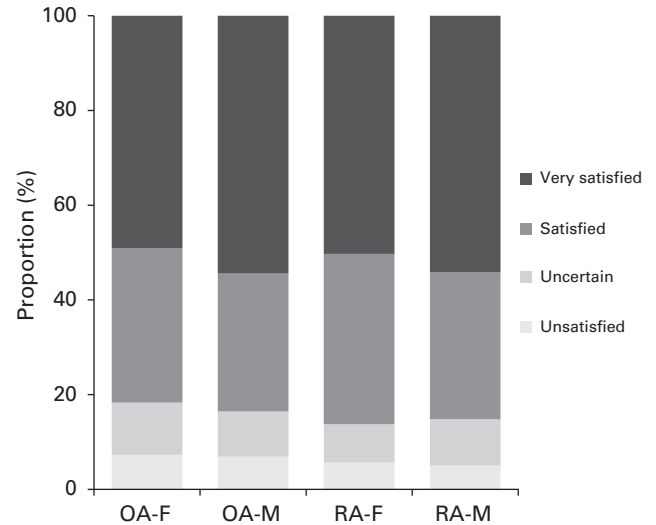


Fig. 3

Patient satisfaction graph as a function of time from 1981 to 1995 in Sweden (i.e., year of index operation) in unrevise patients (n 25 275; all diagnoses and all types of prostheses). Reproduced with permission from **Robertsson O, Dunbar M, Pehrsson T, Knutson K, Lidgren L**. Patient satisfaction after knee arthroplasty: a report on 27,372 knees operated on between 1981 and 1995 in Sweden. *Acta Orthop Scand* 2000;71-3:262-7.

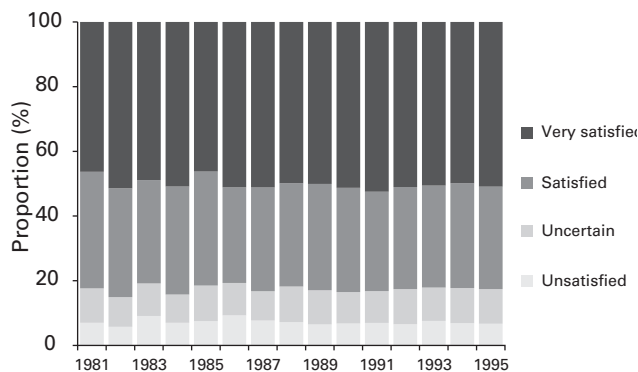


Fig. 2

Graph showing 17% of 25,275 unrevise knee arthroplasty patients in Sweden (all types and diagnoses) and 41% of 2097 revised patients were dissatisfied or uncertain with the outcome. Reproduced with permission from **Robertsson O, Dunbar M, Pehrsson T, Knutson K, Lidgren L**. Patient satisfaction after knee arthroplasty: a report on 27,372 knees operated on between 1981 and 1995 in Sweden. *Acta Orthop Scand* 2000;71-3:262-7.

with that of their pre-operative diseased state, resulting in a greater perception of satisfaction.

In a follow-up study in 2001, a subset of 3600 patients was mailed the survey on satisfaction again, but this time additional questionnaires were also sent.⁴ These included the Nottingham Health Profile (NHP),⁵ the Short Form-12 (SF-12)⁵ and Short Form-36 (SF-36),⁶ the Oxford-12 Knee Score⁷ and the Western Ontario and McMaster Universities

Osteoarthritis Index (WOMAC).⁸ It was possible to correlate patient satisfaction after TKR with the domains and summary scores of the various questionnaires. A non-parametric Spearman correlation was applied and the domains ranked with respect to the magnitude of the correlation coefficient (Table I). In each case, the strongest correlation to satisfaction was relief of pain, followed by improvement in function. These findings give some insight into the psychometrics of satisfaction post TKR. The scores for various outcome metrics were plotted as a function of the original four categories of satisfaction.⁴

Interestingly, some patients reported being very satisfied while actually reporting poor scores on well-validated health outcomes questionnaires, such as the Oxford-12 (Fig. 6). Conversely, patients would sometimes report dissatisfaction, with relatively good Oxford-12 scores. This illustrates the limited utility of health outcome questionnaires, urging caution regarding the use of standard instruments to assess satisfaction.⁹

A similar follow-up study on satisfaction after TKR has been performed and reported from the National Joint Registry of England and Wales in 2007.¹⁰ In a postal survey to 10 000 patients, 8231 usable answers were returned with an overall dissatisfaction rate of 18.2%; very similar to the number reported from Sweden. High (worse) scores in elements of the Oxford-12 Item Knee Score relating to pain and difficulty with function were related to lower levels of satisfaction using multivariable regression modeling ($p < 0.001$). Female gender and a diagnosis of primary osteoarthritis were associated with lower rates of satisfaction.

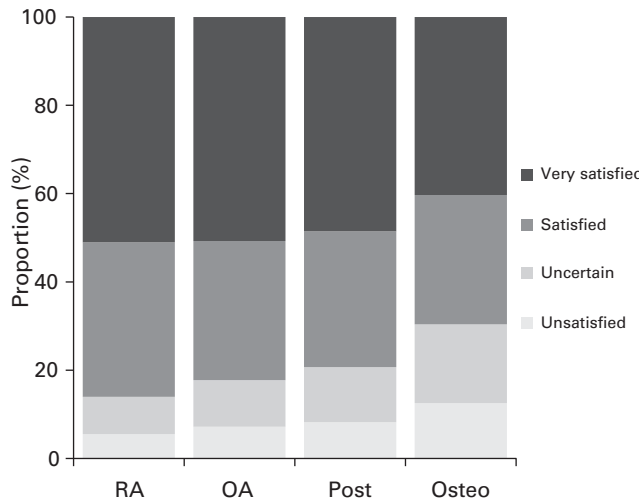


Fig. 4

Graph showing in unrevised cases, 14% of 3203 rheumatoid arthritis (RA) patients, 18% of 21 165 osteoarthritis (OA), 2% of 449 post-traumatic osteoarthritis (Post) patients and 30% of 191 patients with osteonecrosis (Osteo) were dissatisfied or uncertain. Reproduced with permission from **Robertsson O, Dunbar M, Pehrsson T, Knutson K, Lidgren L.** Patient satisfaction after knee arthroplasty: a report on 27,372 knees operated on between 1981 and 1995 in Sweden. *Acta Orthop Scand* 2000;71-3:262-7.

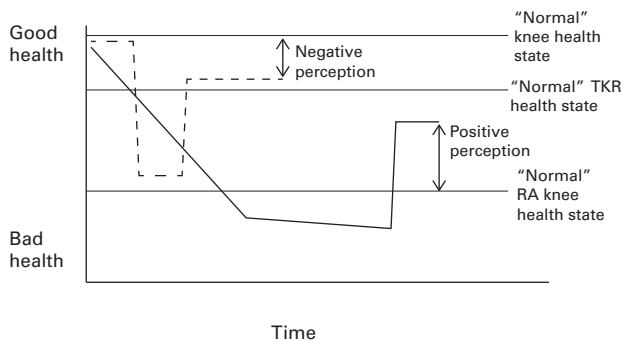


Fig. 5

Satisfaction is related to perceived level of health. The graph shows that chronic disease states, such as rheumatoid arthritis (RA) black line, reset the patient's concept of 'normal' health such that their TKR results in a perceived positive gain in health. A patient with a more recent onset of pathology, such as avascular necrosis, dashed line, compare their TKR outcome to a normal health state that results in a negative perception.

A further survey on satisfaction after TKR in 2010 reviewed prospectively collected data on 1703 eligible patients who underwent primary TKR from June 2001 to December 2005.¹¹ This study utilised data from the Ontario Joint Replacement Registry.¹² The authors reported that 19% were very dissatisfied, dissatisfied, or uncertain regarding the outcome of their TKR; a remarkably consistent percentage amongst the various studies. They too reported that satisfaction was most highly correlated with relief of pain, followed by improvement in function, using forward stepwise logistic regression. They produced

Table I. Correlation between patient satisfaction and different domains of general health and disease-specific questionnaires in patients after knee arthroplasty surgery in Sweden. Reproduced with permission from **Dunbar MJ.** Subjective outcomes after knee arthroplasty. *Acta Orthop Scand Suppl* 2001;72:1-63.

Questionnaire	Spearman	n
NHP		
Pain	0.62	669
Physical Mobility	0.47	690
Energy	0.42	711
Emotional Reaction	0.36	674
Sleep	0.33	702
Social isolation	0.20	699
SF-12		
Physical component summary	0.42	579
Mental component summary	0.25	579
SF-36		
Body pain	0.48	704
Physical component summary	0.45	485
Physical functioning	0.43	628
General health	0.39	666
Social functioning	0.38	687
Vitality	0.35	684
Mental health	0.34	686
Role-emotion	0.32	687
Mental component summary	0.32	485
Role-physical	0.29	693
Oxford-12		
	0.68	899
WOMAC		
Pain	0.67	957
Physical function	0.64	854
Stiffness	0.63	977
$p < 0.001$ for all correlations		

risk ratios for dissatisfaction. A complication requiring re-admission to hospital carried a risk ratio for dissatisfaction post-operatively of 1.9 pain at rest prior to surgery had a risk ratio of 2.5. The largest risk ratio for dissatisfaction was associated with unmet expectations after the surgery with a very large risk ratio of 10.8. This is several times larger than the next highest, and gives significant insight into some of the psychology behind dissatisfaction. In another recent prospective cohort study pre-operative expectations were found broadly to determine the patients overall satisfaction after lower limb joint replacement in 4709 patients.⁹

There are several consistent themes that emerge regarding patient satisfaction. Firstly, the rates of dissatisfaction as reported in three registry studies from three different countries were remarkably consistent at approximately 18%. These rates of dissatisfaction are higher than those reported for hip replacement.^{13,14} Secondly, satisfaction after TKR is related to both pre- and post-operative pain and physical function. Thirdly, the patient's expectations regarding their post-surgical health state, and the inability to meet them is a very significant risk factor for dissatisfaction.^{9,11} Finally, and perhaps related to expectations, is the apparent relationship between the chronic state of the

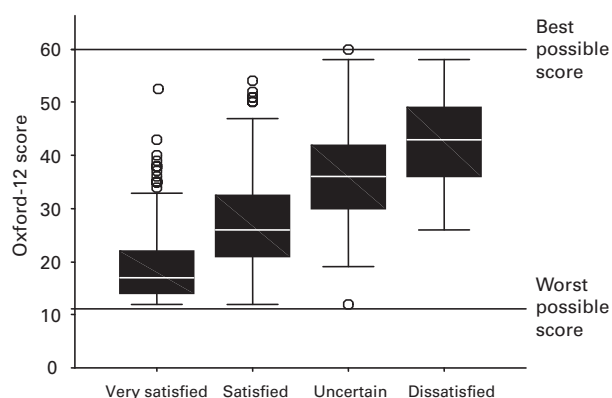


Fig. 6

For patients having expressed the same level of satisfaction, the range of their Oxford-12 Item Knee Score is expressed as a box-plot showing the median (white line), interquartile range (block box representing 25% of scores on each side of the median), fences (horizontal lines between which 95% of the score lie), and outliers (circles). Solid horizontal lines represent the best (maximum) and worst (minimum) possible scores. Reproduced with permission from **Dunbar MJ**. Subjective outcomes after knee arthroplasty. *Acta Orthop Scand Suppl* 2001;72:1-63.

disease prior to surgery and satisfaction, with those suffering the longest having the highest satisfaction rates.³ Given these conclusions it would appear that effective strategies to reduce dissatisfaction post TKR should focus on expectations, pain, and function.

Expectations

Patients should be encouraged to list several examples of what they would like or expect to do after their TKR. Surgeons must appropriately counsel them regarding the relative probability that they would be able to accomplish each of their stated goals. In the case of a significant mismatch between what the patient expects and what surgeons know the operation can deliver, the first approach is for the surgeon to explain how realistic the patients' hopes are. This should be seen as an essential component of informed patient consent.

Ultimately, a TKR is a substitution procedure in which cartilage, bone and ligaments are replaced with metal and plastic. The patient giving consent should have an understanding of this. Patients with more recent onset of disease should be identified as at risk for dissatisfaction, with careful attention paid to these patients' expectations.

Pain and Function

Patient satisfaction is most strongly correlated to improvement in subjective pain scores after TKR.⁴ Peri-operative pain management with patient specific multimodal analgesia is advised.^{15,16} Pain at rest prior to surgery is a risk factor for dissatisfaction and should elicit a more detailed history regarding chronicity of pain as well as types and amounts of medication.¹¹ Signs of depression or 'catastrophising' should be elicited.^{17,18} 'Catastrophising' can lead

to worse subjective outcomes and may be manageable with appropriate psychological counseling.^{19,20} Narcotic dependent patients should be identified and treated appropriately, with special attention directed at peri-operative pain management.²¹ Some pain after routine TKR is not uncommon. In relation to expectations and their effect on satisfaction, patients should be counseled that the normal functioning of a TKR inevitably involves some pain on occasion, which may be related to function.²²

Conclusion

Patient satisfaction is being increasingly considered after TKR. However, it is a complex psychometric construct that is influenced by a myriad of variables. The rates of satisfaction after TKR are remarkably consistent in many countries (approximately 80%). Unmet expectation seems to be a major cause of unsatisfactory outcomes and satisfaction is most strongly correlated with relief of pain, followed by improvement in physical function.

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