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# High patient satisfaction in 445 patients who underwent fast-track hip or knee replacement

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**Background and purpose** — Patient satisfaction is important in fast-track total hip and knee replacement (THR, TKR). We assessed: (1) how satisfied patients were with the treatment; (2) factors related to overall satisfaction; and (3) whether there was a difference between THR and TKR regarding length of stay (LOS) and patient satisfaction.

**Patients and methods** — In this follow-up study, a consecutive series of 445 patients undergoing THR and TKR completed a questionnaire 2 weeks after discharge. LOS and short-term patient satisfaction with the fast-track management were measured. Patient satisfaction was measured using a numerical rating scale (NRS; 0–10).

**Results** — For THR, the median satisfaction score was 9–10 and for TKR it was 8.5–10 in all parameters. Older THR patients had higher overall satisfaction. No association was found between overall satisfaction following THR or TKR and sex comorbidity, or LOS. THR patients had shorter mean LOS than TKR patients, even though the median LOS was 2 days for both groups. THR patients were more satisfied than TKR patients in the first weeks after discharge.

**Interpretation** — Patient satisfaction is high following fast-track THR and TKR, with scores ranging from 8.5 to 10 on the NRS. A qualitative investigation of the first weeks after discharge is required to learn more about how to improve the experience of recovery.

Kehlet 2013), with the increased focus on reduced length of stay (LOS) it is even more important to look at the results of treatment and care from the patient's point of view. Approximately 18,000 patients in Denmark underwent THR and TKR in 2012 (Danish Hip Arthroplasty Register 2013, Danish Knee Arthroplasty Register 2013), making these amongst the more common surgical procedures. Since the year 2000, fast-track surgery has been implemented in all Danish departments performing THR and TKR and it has reduced LOS from 10–11 days in 2000 to 4 days in 2009 (Husted et al. 2012).

Little is known about short-term patient satisfaction in fast-track primary unilateral THR and TKR surgery. Only 8 studies met the inclusion criteria for a review on patient-reported outcomes and experiences in enhanced recovery after orthopedic surgery (Jones et al. 2014). Only 2 of these 8 studies referred to short-term patient satisfaction in fast-track primary unilateral THR and TKR, but neither had patients staying 3 days or less postoperatively (Husted et al. 2008, 2010a). To our knowledge, no publications to date have reported satisfaction in fast-track patients staying in hospital for 3 days or less. Our aim was to: (1) investigate how satisfied patients are with the process of treatment and care; (2) identify factors related to overall satisfaction in fast-track primary unilateral THR and TKR; and (3) investigate whether there might be a difference between THR and TKR regarding LOS and patient satisfaction.

## Patients and methods

This single-center questionnaire follow-up study was carried out in a Danish regional hospital between August 2012 and June 2013. A consecutive series of 250 THR patients and 250 TKR patients was included in the study. The inclusion criteria dictated that patients should have undergone elective primary

Patient satisfaction and subjective outcome are some of the most important measures of success for today's patient-centered models of care. Objective outcomes such as radiographs may be important, but these might not really matter if the patient's perception of the outcome is negative. In fast-track surgery (Kehlet and Wilmore 2008, Husted et al. 2010b, 2012,

Table 1. Questions used in the questionnaire

1. Sex: <i>Female / Male</i>
2. Age: <i>Years</i>
3. What type of surgery did you have? (last surgery): <i>Total knee replacement / Total hip replacement</i>
4. How many days did you stay in hospital after your surgery?: <i>Days</i>
5. Do you have any of the following conditions? (please mark the conditions you have): <i>Diabetes, Cardiovascular disease, Lung disease, Rheumatoid arthritis</i>
6. Did you receive a pre-admission leaflet?: <i>Yes / No</i>
7. Did you receive any home care before surgery?: <i>Yes / No</i>
8. If yes, how often did you receive home care before admission?: <i>Several times a day / Once a day / Several times a week / Once a week</i>
9. How satisfied were you with the information you received before surgery <sup>a</sup> ?:
10. How satisfied were you with the rehabilitation you received from the physiotherapists and the nursing staff during admission <sup>a</sup> ?:
11. How satisfied were you with the pain treatment you received during admission <sup>a</sup> ?:
12. How satisfied were you with the information you received during your admission <sup>a</sup> ?:
13. Were you satisfied with the length of your stay in hospital?: <i>Yes / No, I would have preferred a longer stay / No, I would have preferred a shorter stay / Don't know</i>
14. How well-informed did you feel about the time after discharge <sup>a</sup> ?:
15. How satisfied were you with your discharge procedure <sup>a</sup> ?:
16. How satisfied were you throughout the first few weeks after discharge <sup>a</sup> ?: <i>0–10</i>
17. How was your overall satisfaction with the entire process <sup>a</sup> ?:

<sup>a</sup> (on a scale from 0 to 10, where 0 is not satisfied at all and 10 is best possible satisfaction)

THR or TKR and should be 18 years of age or older. Patients were not included if they could not read or write in Danish, if they were cognitively impaired, or if they had received simultaneous bilateral surgery. Patients undergoing THR or TKR in the department were all allocated to the same ward and treated according to the same fast-track program (Specht et al. 2015).

### Questionnaire procedure

10 days after discharge, a paper questionnaire along with an envelope with prepaid postage was sent to potential participants. Before discharge, the first author or a project assistant informed patients verbally about the study and the questionnaire. The patients were asked to return the questionnaire to the hospital within 3 days. Those who did not return the questionnaire received a reminder after 3–4 weeks.

### Study questionnaire

The questionnaire (Table 1) was developed and pilot-tested by the Danish Health and Medicine Authority (Danish Health and Medicine Authority 2006, Husted et al. 2010a). Satisfaction outcomes were measured on a numerical rating scale (NRS) from 0 (not satisfied at all) to 10 (best possible satisfaction).

Responses to 3 questions (questions 9, 12, and 14 in Table 1) concerning satisfaction with information given prior to admission, during the hospital stay, and immediately before

Table 2. Characteristics of primary THR and TKR patients in fast-track surgery. Values are number (%) unless otherwise stated

	THR n = 215	TKR n = 230
Age, years; mean (range)	69 (34–91)	68 (42–88)
Women	116 (54)	144 (63)
Comorbidity		
diabetes	17 (8)	32 (14)
lung disease	15 (7)	9 (4)
heart and vascular disease	18 (8)	19 (8)
rheumatoid arthritis	17 (8)	21 (9)
one or more comorbidities	58 (27)	73 (32)
Pre-admission leaflet received	204 (95)	227 (99)
Home care received before surgery (from 1 visit per week to daily visit)	10 (5)	13 (6)

discharge (each on a scale of 0–10) were summed up, resulting in a satisfaction NRS total score from 0 to 30. The 3 items were merged into one item, and are reported in this paper as “information given”.

Possible associations of overall satisfaction with age group (< 50, 50–59, 60–69, 70–79, and > 79 years), gender, surgeons, LOS, measured satisfaction parameters, and comorbidity were assessed.

### Statistics and analyses

Patient characteristics are reported as frequencies and percentages.

**Bivariate analyses:** Kruskal-Wallis equality-of-populations rank test was used to test for differences in overall satisfaction between surgeons and satisfaction with LOS. Non-parametric tests for trend, as described by Cuzick (1985), were used to explore the trend of overall satisfaction measured on the NRS for age group, LOS, and satisfaction with: information given, pain treatment, rehabilitation during hospitalization, discharge procedure, and the first weeks at home. 2-sample Wilcoxon rank-sum (Mann-Whitney) tests were used to explore differences between genders and types of operation (THR and TKR).

**Multiple regression:** Due to the possible clustering on operating surgeon, we used mixed linear regression models to estimate the intraclass correlation of the clustering on operating surgeon. We found that there was no statistically significant intraclass correlation. Thus, linear regression with robust standard errors using the STATA command “cluster (cluster variable)” was used—which relaxes the independence assumption and requires only that the observations should be independent across the clusters (STATA 2013). Overall satisfaction was treated as the outcome and comorbidities were treated as the independent variables. LOS, age group, and gender were coded as dummy variables (Table 2), and were tested for interactions between LOS and comorbidities. Statistically significant interactions were included in the final analysis. Of the 9 surgeons who performed the operations, each per-

formed a mean of 48 (8–79) operations. It has been shown that a random variation exists between surgeons (Randsborg et al. 2010). We therefore checked to determine whether the operating surgeon should be included as a random variable, taking into account the random variation across surgeons using linear mixed-effect model analysis.

The statistical assumptions for a linear mixed-effect model analysis apply to both the between-subjects and within-subjects effects. The between-subjects assumptions are the same as those in a standard regression analysis: the independence of scores, normality of the residuals, and equal variances (known as homogeneity of variance). As this was not the case, we applied cluster robust standard errors using the Hubert-White sandwich estimator. This relaxes the assumption of independence, thus producing “correct” standard errors (in the measurement sense) even if the observations are correlated. Even so, caution is needed in interpreting the results. In addition, the mixed model also assumes a linear relationship between the dependent and independent variables, equality of variances of the difference scores for all pairs of scores at all levels of the within-subjects factor, and equal covariances for the between-subjects factor. This assumption is known as the sphericity assumption. Sphericity is especially important for mixed model analysis. Bartlett’s test for sphericity was performed to test for this, and it showed no statistically significant departure from the sphericity assumption. Thus, we decided to assess the intraclass correlation of the model using a linear mixed model with robust standard errors—as the assumptions for this model appeared to be fulfilled. If a statistically significant intraclass correlation was evident, a mixed linear regression model was used; if not, then “normal” OLS linear regression with robust standard errors was used. As no significant intraclass correlation was found, a “normal” OLS linear regression with robust standard errors was performed and q-q normal plots were used to check for normality of the residuals of the model. STATA 13 and SPSS 17.1 were used for the analyses.

## Ethics

The Danish Data Protection Agency approved the study (entry no. 2012-41-0326). According to Danish law, the Regional Ethical Committee found that formal approval was not required.

## Results

### Response rate

During the study period, 256 THR patients and 262 TKR patients underwent surgery and were eligible for the study. Of the 6 THR patients and 12 TKR patients excluded, 3 and 6, respectively, could not read or write in Danish, 2 and 6 had undergone simultaneous bilateral surgery, and 1 THR patient had cognitive impairment. Responses were received from 445

patients, 86% of the THR patients (177 early responses and 38 late) and 92% of the TKR patients (195 early responses and 35 late).

### Patients

Those patients who underwent THR and TKR had a similar age distribution, but the TKR patients had a higher proportion of women and multiple comorbidities (Table 2).

### Responders vs. non-responders

In both THR and TKR patients, the responders and non-responders had similar age distribution and median LOS. There was a preponderance of women in the TKR non-responders only.

### Length of stay

The median LOS for both THR patients and TKR patients was 2 days with an IQR of 2 and 3, respectively (range 1–12 and 1–15, respectively). THR patients had a statistically significantly shorter LOS ( $p = 0.02$ ).

### Overall satisfaction and satisfaction with length of stay

The median overall satisfaction NRS was 10 (95% CI: 9–10) for THR and 9 (95% CI: 9–10) for TKR (IQR 9–10, range 1–10 for THR; and IQR 8–10, range 2–10 for TKR;  $p = 0.2$ ). 89% of THR patients and 91% of TKR patients answered “Yes” to the question: “Were you satisfied with the length of stay in hospital?”, and 10% and 8% (respectively) answered “No, I wanted to stay longer in hospital”. 1% of the THR patients had wanted a shorter stay whereas none of the TKR patients had wanted a shorter stay and 1% were undecided.

### Satisfaction with information given

The median satisfaction NRS score (on a scale from 0 to 30) for information given for THR and TKR was 28 for both (IQR 26–30; range 13–30 and 11–30, respectively;  $p = 0.8$ ).

### Satisfaction with pain treatment

The median NRS score for satisfaction with pain treatment was 9 for both THR and TKR (IQR 8–10; range 0–10 and 2–10, respectively;  $p = 0.3$ ).

### Satisfaction with rehabilitation during hospitalization

The median NRS score for satisfaction with rehabilitation during hospitalization was 9 for both THR and TKR (IQR 8–10; range 0–10 and 3–10, respectively;  $p = 0.5$ ).

### Satisfaction with discharge procedure

The median NRS score for satisfaction with the discharge procedure was 9.5 for THR and 10 for TKR (IQR 8–10; range 4–10 and 0–10 respectively;  $p = 0.9$ ).

### Satisfaction with the first weeks at home

The median satisfaction NRS score for the first weeks at home

**Table 3.** Overall satisfaction of THR and TKA patients in relation to patient-related outcome measures (p-values for bivariate analyses)

Variable	THR (n = 215) p-value	TKR (n = 230) p-value
Age group <sup>a</sup>	0.8	0.5
Men	0.20	0.03
LOS <sup>b</sup>	< 0.001	0.3
Comorbidities:		
rheumatoid arthritis	0.2	0.04
cardiovascular disease	0.9	0.1
lung disease	0.3	0.1
diabetes	0.02	0.5
> 1 comorbidity	0.6	0.3
Satisfaction with:		
information given	< 0.001	< 0.001
pain treatment	< 0.001	< 0.001
rehabilitation during hospitalization	< 0.001	< 0.001
discharge procedure	< 0.001	< 0.001
first weeks at home	< 0.001	< 0.001
LOS <sup>b</sup> yes (reference)		
no, wanted to stay longer	0.01	1.0
no, wanted a shorter stay	1.0	-
do not know	1.0	0.3

<sup>a</sup> Age group: < 50, 50–59, 60–69, 70–79, and > 79 years.<sup>b</sup> LOS: length of stay in hospital.

after discharge was 9 for THR and 8.5 for TKR (IQR 8–10, range 1–10 for THR; and IQR 7–10, range 0–10 for TKR;  $p = 0.002$ ).

### Factors related to overall satisfaction

**Bivariate analyses:** No association was found between overall satisfaction and age group (THR and TKR), sex (THR), or LOS (TKR). In TKR patients men had higher overall satisfaction than women, with a median NRS score of 10 for men and 9 for women ( $p = 0.03$ ) (Table 3). No association was found between overall satisfaction and satisfaction with LOS, except in THR patients who wanted to stay longer ( $p = 0.01$ ). All other satisfaction variables listed in Table 3 showed an association with overall satisfaction. The association of comorbidities with overall satisfaction was significant in TKR patients with rheumatoid arthritis ( $p = 0.04$ ) and THR patients with diabetes ( $p = 0.02$ ) (Table 3). No association was found between operating surgeon and overall satisfaction in THR or TKR patients ( $p = 0.2$  and  $p = 0.5$ ).

**Multiple regression:** An association between age groups and overall satisfaction was found in THR patients but not in TKR patients ( $p = 0.01$  and  $p = 0.9$ ). No statistically significant association was found between gender or LOS and overall satisfaction in both THR patients and TKR patients (Table 4). The association between NRS overall satisfaction for THR and TKR and other measures of satisfaction is shown in Table 4. Associations for THR and TKR were found between overall satisfaction and satisfaction with information given ( $p = 0.01$  and  $p = 0.04$ ), but not with other measures of satisfaction (Table 4). There was no effect of comorbidity on overall satisfaction, except in TKR patients with diabetes ( $p = 0.01$ ). No other interactions were found (Table 4). No statistically significant random variation was found between surgeons ( $p = 1.0$ ).

### Discussion

The main finding of the study was that THR and TKR patients in a fast-track setting were very satisfied. The median NRS score ranged from 8.5 to 10 in all parameters. Husted et al. (2008) also found high overall short-term patient satisfaction in both THR and TKR patients, with mean NRS scores of 9.4 and 9.3. However, in Husted's study, the patients returned the questionnaire at discharge, which may have introduced bias. Our results support the existing evidence that fast-track pathways for orthopedic patients do not compromise patient satisfaction (Jones et al. 2014).

**Table 4.** Overall satisfaction of THR and TKR patients in relation to patient-related outcome measures (coefficients with 95% CI and p-values for multiple regression)

Variable	THR (n = 215) Coefficient (95% CI) p-value		TKR (n = 230) Coefficient (95% CI) p-value	
Age group <sup>a</sup>	0.13 (0.07 to 0.18)	0.01	0.01 (-0.15 to 0.14)	0.9
Men	0.02 (-0.39 to 0.42)	0.9	-0.03 (-0.25 to 0.19)	0.7
LOS <sup>b</sup>	-0.04 (-0.21 to 0.14)	0.6	0.01 (-0.01 to 0.03)	0.1
Comorbidities:				
rheumatoid arthritis	0.47 (-0.60 to 1.54)	0.3	0.29 (-0.14 to 0.72)	0.1
cardiovascular disease	0.73 (-0.85 to 2.31)	0.2	0.12 (-0.06 to 0.29)	0.2
lung disease	-0.09 (-1.07 to 0.90)	0.8	-0.34 (-1.87 to 1.19)	0.6
diabetes	-0.30 (-0.97 to 0.38)	0.3	0.21 (0.09 to 0.34)	0.01
> 1 comorbidity	0.12 (-0.71 to 0.96)	0.7	-0.07 (-1.00 to 0.86)	0.9
Satisfaction with:				
information given	0.20 (0.09 to 0.31)	0.01	0.18 (0.01 to 0.35)	0.04
pain treatment	0.27 (-0.07 to 0.61)	0.09	0.16 (-0.03 to 0.35)	0.08
rehabilitation during hospitalization	-0.01 (-0.22 to 0.24)	0.9	0.07 (-0.20 to 0.33)	0.5
discharge procedure	-0.01 (-0.25 to 0.23)	0.9	0.04 (-0.25 to 0.32)	0.7
first weeks at home	0.10 (-0.15 to 0.34)	0.3	0.08 (-0.01 to 0.18)	0.08
LOS <sup>b</sup> yes (reference)				
no, wanted to stay longer	0.01 (-0.71 to 0.72)	0.9	0.47 (-0.35 to 1.29)	0.2
no, wanted a shorter stay	-0.38 (-1.66 to 0.90)	0.4	-	-
do not know	1.30 (0.87 to 1.73)	0.002	-0.04 (-0.54 to 0.45)	0.8

<sup>a</sup> Age group: < 50, 50–59, 60–69, 70–79, and > 79 years.<sup>b</sup> LOS: length of stay in hospital.



Our THR and TKR patients had a median score for overall satisfaction of 10 and 9. This demonstrates that the concept of fast-track surgery with a median LOS of 2 days is not a disadvantage to patients. This is supported by another Danish study, which found that THR and TKR patients with a LOS of 5 days or less had a mean overall satisfaction score of 9.0 for THR and 8.3 for TKR (Husted et al. 2006). The TKR patients in Husted's study seem to have been less satisfied, as they fell outside the 95% CI of the overall satisfaction score in our study (median 9, 95% CI: 9–10). Husted et al. (2006, 2010a) used the same Danish questionnaire as in our study, but it was sent out at different time points between 2 and 10 months after surgery, resulting in a risk of recall bias (Husted et al. 2006, 2010a).

The THR patients in our study were in hospital for a shorter time than the TKR patients, even though both groups had a median LOS of 2 days. The majority of patients found the short LOS convenient, and only 10% (THR) and 8% (TKR) had wanted to stay longer. These results agree with those of Jones et al. (2014), who found that orthopedic patients in a fast-track pathway prefer a shorter LOS. An explanation could be that in a fast-track setting all sub-components of care are prioritized, especially oral and written information, in order to ensure that patients are safe when they leave the hospital.

We found no association between age and overall satisfaction in TKR patients, but in THR patients, the older ones were more satisfied. Overall, it is unclear whether age has an effect on satisfaction (Lau et al. 2012).

We found no association between gender and overall satisfaction in THR and TKR patients, as previously found by Lau et al. (2012).

We found no relationship between comorbidities and overall satisfaction, except in TKR patients with diabetes. This is corroborated by Bourne et al. (2010), who found no relationship between satisfaction and comorbidity in TKR patients using the American Society of Anesthesiologists (ASA) physical status score. In contrast to our study, Clement et al. (2013) found that diabetes had no influence on patient satisfaction in TKR patients and Anakwe et al. (2011) did not find any relationship between diabetes and dissatisfaction in THR patients. However, Husted et al. (2008) found that patients with no comorbidities were more satisfied than patients with 1 or more comorbidities following THR and TKR. These conflicting findings about the effect of comorbidities on overall satisfaction were also discussed in a review by Lau et al. (2012).

The strength of our study is that the questionnaire was completed at home without any influence from the healthcare providers at the hospital, and the questionnaire was filled out at an early time point to eliminate recall bias. The high percentage of patients who participated strengthens the study, and inclusion of the patients consecutively helped to minimize selection bias. Finally, the very high response rate also strengthened the study. A limitation of the study was that the questionnaire was only pilot-tested by the Danish Health and Medicine Author-

ity (Danish Health and Medicine Authority 2006, Husted et al. 2010a) and was not validated using an accepted validation method. The questionnaire could be limited in terms of a ceiling effect (Taylor 2010), because a high proportion of the patients gave the highest possible score on some of the questions. We must therefore consider that the satisfaction measured reflects the parameters of the instrument rather than the patients' real satisfaction.

In conclusion, we found that THR and TKR patients were very satisfied with the treatment and care they received in a fast-track setting. Both groups of patients had similarly high scores in all parameters, except in the first weeks at home where TKR patients gave a lower score than THR patients. A qualitative investigation of the lowest-scoring parameter, in the first weeks after discharge, is required to learn more about the kinds of challenges that patients deal with at home. No relationship was found between overall satisfaction and comorbidity, except in TKR patients with diabetes. Older THR patients were more satisfied.

KS: study design, performance of the investigation, and writing of the manuscript. HK, PK, and BDP: study design. NW: statistical analysis. All the authors participated in the interpretation of data, discussions, and critical revision of the manuscript.

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