

# Questionnaire on the perceptions of patients about total knee replacement

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**We have developed a 12-item questionnaire for patients having a total knee replacement (TKR). We made a prospective study of 117 patients before operation and at follow-up six months later, asking them to complete the new questionnaire and the form SF36. Some also filled in the Stanford Health Assessment Questionnaire (HAQ). An orthopaedic surgeon completed the American Knee Society (AKS) clinical score.**

**The single score derived from the new questionnaire had high internal consistency, and its reproducibility, examined by test-retest reliability, was found to be satisfactory. Its validity was established by obtaining significant correlations in the expected direction with the AKS scores and the relevant parts of the SF36 and HAQ. Sensitivity to change was assessed by analysing the differences between the preoperative scores and those at follow-up.**

**We also compared change in scores with the patients' retrospective judgement of change in their condition. The effect size for the new questionnaire compared favourably with those for the relevant parts of the SF36. The change scores for the new knee questionnaire were significantly greater ( $p < 0.0001$ ) for patients who reported the most improvement in their condition.**

**The new questionnaire provides a measure of outcome for TKR that is short, practical, reliable, valid and sensitive to clinically important changes over time.**

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The methods of measuring the outcome of total knee replacement (TKR) are normally derived from clinical and radiological data and depend on the judgement of the surgeon.<sup>1</sup> The concerns and priorities of patients and surgeons may differ,<sup>2</sup> and methods of recording the patients' perception of outcomes are required.<sup>3</sup> Research in many areas of medicine and surgery has shown that the patient can provide reliable and valid judgements of health status and of the benefits of treatment.<sup>4</sup>

A number of health questionnaires have been developed for general use and have proved valuable when applied to patients undergoing TKR.<sup>5-7</sup> They are often lengthy and contain questions which may be irrelevant to a specific health problem or surgical procedure.<sup>8</sup> Short questionnaires concerning a single disease or operation may be as sensitive to important changes as longer versions,<sup>9,10</sup> and are easier to use.

We describe the development of a short questionnaire for use in TKR which was designed to be reliable, reproducible, valid and sensitive to change, with a high rate of completion. It has been used in a prospective study of such patients.

## Patients And Methods

**Development of the questionnaire.** We interviewed 20 patients attending an outpatient clinic for consideration of TKR to identify how they experienced and reported problems with their knees. We then drafted a questionnaire containing 20 items and tested it on 20 new patients. They were also given a second copy of the questionnaire, and asked to complete it at home on the following day and to return it in a prepaid envelope. They were invited to add their comments to this questionnaire and to include any problems related to their knee which had not been addressed. Modifications were then made to items which appeared less reproducible or which patients found difficult. This procedure was repeated in two further series of 20 patients to produce the final questionnaire. Careful attention was paid to appearance as well as content. The final version contains 12 questions, each with five categories of response (Table I). Each item is scored from 1 to 5, from least to most difficulty or severity, and combined to

**Table I.** Scores obtained using the 12-item knee questionnaire before operation and at the six-month follow-up

| Item  | Scoring categories               | Preop (n = 117) |            | Postop (n = 87) |            |
|---|----------------------------------|-----------------|------------|-----------------|------------|
|   |                                  | Number          | Percentage | Number          | Percentage |
| <i>During the past four weeks</i>   |                                  |                 |            |                 |            |
| 1) How would you describe the pain you usually have from your knee?   | 1 None                           | 0               | (0)        | 22              | (25)       |
|   | 2 Very mild                      | 0               | (0)        | 25              | (29)       |
|   | 3 Mild                           | 6               | (5)        | 14              | (16)       |
|   | 4 Moderate                       | 43              | (37)       | 23              | (26)       |
|   | 5 Severe                         | 68              | (58)       | 3               | (3)        |
| 2) Have you had any trouble with washing and drying yourself (all over) because of your knee?                                       | 1 No trouble at all              | 26              | (22)       | 41              | (47)       |
|   | 2 Very little trouble            | 38              | (33)       | 26              | (30)       |
|   | 3 Moderate trouble               | 36              | (31)       | 9               | (10)       |
|   | 4 Extreme difficulty             | 14              | (12)       | 9               | (10)       |
|   | 5 Impossible to do               | 3               | (3)        | 2               | (2)        |
| 3) Have you had any trouble getting in and out of a car or using public transport because of your knee? (whichever you tend to use) | 1 No trouble at all              | 3               | (3)        | 14              | (16)       |
|   | 2 Very little trouble            | 18              | (15)       | 30              | (35)       |
|   | 3 Moderate trouble               | 54              | (46)       | 28              | (32)       |
|   | 4 Extreme difficulty             | 41              | (35)       | 14              | (16)       |
|   | 5 Impossible to do               | 1               | (1)        | 0               | (0)        |
| 4) For how long have you been able to walk before the pain from your knee becomes severe? (with or without a stick)                 | 1 No pain/>30 min                | 5               | (4)        | 42              | (48)       |
|   | 2 16 to 30 min                   | 30              | (26)       | 24              | (28)       |
|   | 3 5 to 15 min                    | 49              | (42)       | 9               | (10)       |
|   | 4 Around the house only          | 24              | (21)       | 8               | (9)        |
|   | 5 Not at all - severe on walking | 9               | (8)        | 4               | (5)        |
| 5) After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your knee?                    | 1 Not at all painful             | 2               | (2)        | 21              | (24)       |
|   | 2 Slightly painful               | 14              | (12)       | 39              | (45)       |
|   | 3 Moderately painful             | 37              | (32)       | 14              | (16)       |
|   | 4 Very painful                   | 57              | (49)       | 12              | (14)       |
|   | 5 Unbearable                     | 7               | (6)        | 1               | (1)        |
| 6) Have you been limping when walking, because of your knee?  | 1 Rarely/never                   | 1               | (1)        | 27              | (31)       |
|   | 2 Sometimes or just at first     | 7               | (6)        | 33              | (38)       |
|   | 3 Often, not just at first       | 7               | (6)        | 5               | (6)        |
|   | 4 Most of the time               | 38              | (33)       | 10              | (12)       |
|   | 5 All of the time                | 64              | (55)       | 11              | (13)       |
| 7) Could you kneel down and get up again afterwards?  | 1 Yes, easily                    | 1               | (1)        | 1               | (1)        |
|   | 2 With little difficulty         | 4               | (3)        | 11              | (13)       |
|   | 3 With moderate difficulty       | 16              | (14)       | 21              | (24)       |
|   | 4 With extreme difficulty        | 30              | (26)       | 10              | (12)       |
|   | 5 No, impossible                 | 66              | (56)       | 44              | (51)       |
| 8) Have you been troubled by pain from your knee in bed at night?   | 1 No nights                      | 3               | (3)        | 29              | (33)       |
|   | 2 Only 1 or 2 nights             | 9               | (8)        | 17              | (20)       |
|   | 3 Some nights                    | 32              | (27)       | 26              | (30)       |
|   | 4 Most nights                    | 31              | (27)       | 11              | (13)       |
|   | 5 Every night                    | 42              | (36)       | 4               | (5)        |
| 9) How much has pain from your knee interfered with your usual work (including housework)?  | 1 Not at all                     | 2               | (2)        | 23              | (27)       |
|   | 2 A little bit                   | 8               | (7)        | 28              | (33)       |
|   | 3 Moderately                     | 32              | (27)       | 20              | (23)       |
|   | 4 Greatly                        | 61              | (52)       | 12              | (14)       |
|   | 5 Totally                        | 14              | (12)       | 3               | (4)        |
| 10) Have you felt that your knee might suddenly "give way" or let you down?   | 1 Rarely/never                   | 10              | (9)        | 44              | (51)       |
|   | 2 Sometimes or just at first     | 19              | (16)       | 27              | (31)       |
|   | 3 Often, not just at first       | 17              | (15)       | 5               | (6)        |
|   | 4 Most of the time               | 48              | (41)       | 7               | (8)        |
|   | 5 All of the time                | 23              | (20)       | 4               | (5)        |
| 11) Could you do the household shopping on your own?  | 1 Yes, easily                    | 4               | (3)        | 25              | (29)       |
|   | 2 With little difficulty         | 15              | (13)       | 25              | (29)       |
|   | 3 With moderate difficulty       | 29              | (25)       | 11              | (13)       |
|   | 4 With extreme difficulty        | 34              | (29)       | 6               | (7)        |
|   | 5 No, impossible                 | 35              | (30)       | 20              | (23)       |
| 12) Could you walk down a flight of stairs?   | 1 Yes, easily                    | 2               | (2)        | 18              | (21)       |
|   | 2 With little difficulty         | 10              | (9)        | 23              | (26)       |
|   | 3 With moderate difficulty       | 46              | (39)       | 31              | (36)       |
|   | 4 With extreme difficulty        | 45              | (39)       | 13              | (15)       |
|   | 5 No, impossible                 | 14              | (12)       | 2               | (2)        |

produce a single score with a range from 12 (least difficulties) to 60 (most difficulties).

We then tested the questionnaire in a prospective study to determine if it had a high completion rate, internal consistency, reproducibility, validity and was sensitive to clinical change.<sup>11</sup> The *completion rate* was determined from the number of missing values from unanswered items. *Internal consistency* examines whether the questions measure a single underlying concept. *Reproducibility* shows whether the questionnaire yields the same results on repeated use under the same conditions. *Validity* determines whether the form measures what it aims to; this can be examined from a number of different perspectives. *Content validity* shows whether the questions cover the intended topics clearly. *Construct validity*, the extent to which the questionnaire supports a predefined hypothesis, is assessed by whether it produces a set of relationships with other expected variables such as clinical evidence. *Sensitivity* to change, or responsiveness, reflects the ability to detect changes of clinical significance over time.

We studied 117 consecutive patients who were about to have a unilateral TKR. None refused, and none was deemed unsuitable. They were seen in a preadmission assessment clinic at the Nuffield Orthopaedic Centre, Oxford, during a period of five months in 1995 and 1996. The surgeons did not know the questionnaire scores when they carried out the clinical assessment. Eleven patients were not fully assessed clinically before operation and the relevant information, apart from the American Knee Society (AKS) score, was obtained from their notes.

After operation the patients were sent an envelope containing a short form which they were asked to complete and bring to their next appointment with their surgeon. This asked for some details about the procedure, such as the type of prosthesis used, and any postoperative complications. A further assessment was carried out by post after six months using the new knee questionnaire and the SF36 questionnaire together with a small number of additional questions asking patients to assess the change in their condition after TKR.

There were 66 women and 51 men with a median age of 73 years (46 to 89). Of the 114 (97%) patients for whom diagnostic details were available, 98 (86%) had advanced, primary osteoarthritis while nine (8%) had osteoarthritis secondary to another condition such as osteonecrosis or old fracture. Nine patients (8%) had an inflammatory arthritis while eight (7%) had diagnoses representing one of a variety of diseases such as gout, Paget's disease and haemophilia (ten patients had more than one diagnosis).

Of the 117 patients, 97 (83%) had their operation within three months, 14 (12%) had their surgery cancelled indefinitely and four (3%) were delayed beyond the period of study. The remaining two (2%) patients had bilateral replacements and were excluded. Two patients (2%) died early in the postoperative period. The remaining 95 patients (81%) were sent the postal follow-up after six months and

this was completed and returned by 87 (92%), after a second 'reminder questionnaire' had been sent when necessary.

**Internal consistency.** Internal consistency was tested using Cronbach's alpha<sup>12</sup> before operation and at six months, to summarise the internal correlations of all items in a scale. The higher the alpha coefficient (range 0.0 to 1.0) the more internally consistent is the scale and the greater the likelihood that it is tapping an underlying single variable on the questionnaire. We examined correlations of all items with the overall score and also whether Cronbach's alpha was altered by the removal of any item.

**Reproducibility.** Reproducibility (test-retest reliability) was assessed by asking 66 patients at the preoperative stage to complete and return a second questionnaire 24 hours after the first. Correlations of total scores were measured by Pearson correlation coefficients. Paired *t*-tests were also performed to determine whether there was a change in the distribution of scores between the two tests. The data were also examined by means of the coefficient of reliability according to the method described by Bland and Altman.<sup>13</sup> Their method calculates the standard error of the differences in scores between time one and time two. This figure is multiplied by 1.96, and 95% of differences are expected to lie within two standard deviations.

**Construct validity.** This was examined by Pearson correlation coefficients between the total score of the questionnaire and other related measures obtained at the same assessment both before operation and at six months. We considered that scores for the study questionnaire should correlate moderately with the AKS clinical score as judged by an orthopaedic surgeon, and with the scores from two other health questionnaires (SF36 and HAQ).

The AKS clinical rating system<sup>14</sup> has two components. The first requires the surgeon to assess the knee itself for pain, stability and range of movement. A well-aligned knee with no pain, 125° of movement and negligible instability will obtain the maximum rating of 100 points. The overall function of the patient is then assessed by considering walking distance and the ability to climb stairs. Deductions are made for the use of walking aids. The patient is awarded a maximum score of 100 for the ability to walk an unlimited distance and ascend and descend stairs without holding a rail. A patient categorisation system is written at the top of the AKS assessment form which is identical to the one described by Charnley in relation to clinical assessment of the hip.<sup>15</sup> This suggests that patient function may only be assessed in those who have no other condition which may undermine walking ability apart from their knee problem.

The SF36 is a 36-item questionnaire which is widely used as a general assessment of health.<sup>16</sup> It measures physical function, social function, limitations due to physical problems, limitations due to emotional problems, general mental health, energy, bodily pain and general perceptions of health. The scores for each of these factors range from 0 (poor) to 100 (good).

The HAQ<sup>17</sup> is a measure of functional limitation in which patients rate, on a four-point scale, the degree of difficulty which they have experienced during the previous week with 20 tasks grouped into eight sections covering various aspects of daily life including dressing, rising, hygiene, reach, walking, eating, grip and activities. The responses are based on the functional class rating system of the American Rheumatism Association of 'normal' (no difficulty = 0), 'adequate' (some difficulty = 1), 'limited' (much difficulty = 2), and 'unable to do' (= 3). For any task for which the patient requires help or uses some aid or device to assist them, the score for that section is recorded as 'limited'. Scores are based on the highest within each group and may also be expressed as an overall mean ranging from 0 to 3. Pain is measured separately on a simple 15 cm visual analogue scale (VAS). In our study the VAS was modified by specifying 'pain in your knee'.

All patients were asked to complete the study knee questionnaire and SF36 at both the preoperative assessment and the six-month follow-up. Only 57 patients were asked to complete the HAQ before operation as we wished to limit the burden imposed on patients in a busy clinic. Some patients received help in completing the questionnaire from a relative, friend or researcher.

**Sensitivity to change.** The sensitivity to change was examined in two ways. First, the preoperative scores were compared with those obtained six months after operation. The changes in scores and effect sizes were calculated for our knee questionnaire and for individual parts of the SF36. The effect size calculates the extent of change measured in a standardised way which allows comparison between questionnaires.<sup>18</sup> It is calculated as the difference between the mean preoperative and postoperative scores, divided by the standard deviation of the preoperative scores. An effect size of 1.0 is equivalent to a change of one standard deviation in the sample. Effect sizes of 0.2, 0.5 and 0.8 are regarded as small, medium and large degrees of change, respectively.

In the second method, the change scores obtained by the study questionnaire were compared with those of the SF36

as regards the patients' appraisal of the success, or otherwise, of the operation and with their assessment of the change in their condition. Such retrospective judgement using questions comparing the current state of health with a specified past state have been shown to be accurate and valid methods of assessing outcomes in a number of areas of medicine,<sup>19,20</sup> including patients with arthritis.<sup>21,22</sup> The change scores for the questionnaires in our study should be significantly greater for patients who retrospectively report the most improvement.

The association between variables was measured using the Pearson correlation coefficient while *t*-tests have been used to compare changes in scores in subgroup analyses.

## Results

Table I gives the individual scores obtained for patients on the knee questionnaire before operation and after six months. Before operation all 12 items were answered by every patient on the new knee questionnaire while 14 patients (12%) missed at least one item on the SF36. On assessment at six months, two patients (2%) missed out an item or two on the knee questionnaire. This compared with 13 (15%) patients with missing responses on the SF36. Before operation, the summed score for the questionnaire had a median value of 45 (25 to 57) and a mean of 43.4 (95% CI 42.1 to 44.7). After operation the scores produced a median of 27 (12 to 56) and a mean of 29.3 (95% CI 27.1 to 31.6).

**Internal consistency.** Cronbach's alpha for the study questionnaire was 0.87 before operation (n = 117) and 0.93 at the six-month follow-up (n = 85). All but three items correlated with the total score at  $r \geq 0.53$  (items 6, 8 and 10  $r \geq 0.45$ ) at the preoperative assessment. After surgery all 12 items correlated with the total score at  $r \geq 0.51$  (Table II). Cronbach's alpha was not improved by removal of any item from the score.

**Reproducibility.** In the test-retest sample (n = 66), the correlation ( $r = 0.92$ ) between the total scores for the questionnaire was high ( $p < 0.0001$ ). No significant change

**Table II.** Internal consistency of the knee questionnaire determined in 117 patients before operation and in 85 at the six-month follow-up

| Question                            | Mean score (SD)                  | Item-total correlation | Alpha if item removed | Mean score (SD)                   | Item-total correlation | Alpha if item removed |
|-------------------------------------|----------------------------------|------------------------|-----------------------|-----------------------------------|------------------------|-----------------------|
| 1 Usual level of knee pain          | 4.53 (0.60)                      | 0.60                   | 0.86                  | 2.54 (1.23)                       | 0.81                   | 0.92                  |
| 2 Trouble with washing and drying   | 2.40 (1.04)                      | 0.53                   | 0.86                  | 1.91 (1.10)                       | 0.76                   | 0.92                  |
| 3 Trouble with transport            | 3.16 (0.79)                      | 0.64                   | 0.85                  | 2.49 (0.95)                       | 0.72                   | 0.92                  |
| 4 Walking time before severe pain   | 3.02 (0.97)                      | 0.54                   | 0.86                  | 1.94 (1.17)                       | 0.69                   | 0.92                  |
| 5 Pain on standing up from sitting  | 3.45 (0.85)                      | 0.57                   | 0.86                  | 2.23 (1.01)                       | 0.79                   | 0.92                  |
| 6 Limping when walking              | 4.34 (0.90)                      | 0.45                   | 0.86                  | 2.36 (1.37)                       | 0.68                   | 0.92                  |
| 7 Difficulty with kneeling          | 4.33 (0.90)                      | 0.56                   | 0.86                  | 3.98 (1.17)                       | 0.51                   | 0.93                  |
| 8 Pain in bed at night              | 3.85 (1.08)                      | 0.47                   | 0.86                  | 2.36 (1.20)                       | 0.67                   | 0.92                  |
| 9 Work interference due to pain     | 3.66 (0.84)                      | 0.69                   | 0.85                  | 2.35 (1.12)                       | 0.83                   | 0.92                  |
| 10 Sense of knee instability        | 3.47 (1.22)                      | 0.47                   | 0.86                  | 1.85 (1.14)                       | 0.66                   | 0.92                  |
| 11 Doing household shopping alone   | 3.69 (1.13)                      | 0.61                   | 0.85                  | 2.67 (1.53)                       | 0.63                   | 0.93                  |
| 12 Trouble with walking down stairs | 3.50 (0.88)                      | 0.65                   | 0.85                  | 2.52 (1.06)                       | 0.69                   | 0.92                  |
|                                     | Preoperative Cronbach alpha:0.87 |                        |                       | Postoperative Cronbach alpha:0.93 |                        |                       |

**Table III.** Correlation between the 12-item knee score and the AKS score, SF36 and HAQ assessments in 117 patients before operation and in 85 at the six-month follow-up

| Test               | Correlation coefficient |         |
|--------------------|-------------------------|---------|
|                    | Preop                   | Postop  |
| AKS assessment     |                         |         |
| Knee score         | -0.47**                 | --      |
| Function†          | -0.54**                 | --      |
| SF36               |                         |         |
| Physical           | -0.69**                 | -0.66** |
| Pain               | -0.71**                 | -0.78** |
| Role-physical      | -0.52**                 | -0.43** |
| Role-mental        | -0.25**                 | -0.46** |
| Social function    | -0.56**                 | -0.78** |
| Mental health      | -0.19*                  | -0.41** |
| Energy             | -0.35**                 | -0.62** |
| Health perceptions | -0.07                   | -0.41** |
| HAQ                |                         |         |
| Pain VAS           | 0.53**                  | --      |
| Disability index   | 0.61**                  | --      |

\* p &lt; 0.05

\*\* p &lt; 0.01

† excludes patients with a second symptomatic knee or impaired ability to walk due to another condition (72)

occurred in the distribution of scores between the two assessments for reliability (paired *t*-test >0.05). At the first test the mean score was 43.20 (SD 7.3) and at retest 24 hours later it was 42.8 (SD 8.2). The differences in the scores between the first and second test were plotted against their means. The scatter appeared normal and showed the same variability across the range of scores at all levels of disability and severity. The estimated mean (0.41) of score differences was not significantly different from 0. The coefficient of reliability was calculated as 6.45 using the Bland and Altman method;<sup>13</sup> 95% of score differences fell between 0 ± 6.45. Overall, 89% of score differences lay between 0 ± 4 points.

**Construct validity.** Before operation the questionnaire correlated moderately well with both components of the AKS clinical scores (Table III). There was also significant agreement between the questionnaire and the parts of the SF36

and HAQ with related content, particularly for physical function and pain.

**Sensitivity to change.** Patients reported a very substantial improvement at the six-month follow-up. The effect size (2.19) was larger for the study questionnaire than for any of the individual parts of the SF36 (Table IV), and the change scores were significantly greater for patients who retrospectively reported the most improvement in their condition (Table V). This finding also applied to the health change, pain, social and physical aspects of the SF36.

## Discussion

Our 12-item questionnaire imposed very little burden on the patients; they had little difficulty in completing it. It had a consistently higher completion rate than the other widely used health-status questionnaires. The items assessed were consistent and reproducible internally: the questionnaire was as reliable as clinical scores in assessing outcomes.<sup>23</sup>

In assessing the content validity, efforts were made to include items in the questionnaire which had arisen from the preliminary interviews with patients, rather than imposing clinical assumptions. Construct validity was tested by examining the level of agreement of our questionnaire with clinical data and with relevant parts of existing health-status questionnaires. All correlations were in the expected direction with poor scores in our knee assessment correlating with poor scores in both the AKS clinical score and the two other established questionnaires. The correlations were highest in the assessment of pain and physical function.

The responsiveness, or sensitivity to clinically important change, is the aspect least likely to be examined by questionnaire, despite being of the greatest importance in any form of prospective outcome study.<sup>24</sup> When the sensitivity to change of the knee questionnaire was compared with the relevant parts of the SF36 the standardised effect size was highest for the study questionnaire, indicating that it could be particularly sensitive to improvements obtained by TKR. This is probably because the SF36 was not developed to be used specifically in relation to outcomes of TKR. A pre-

**Table IV.** Comparison of change scores and effect sizes between the 12-item knee score and the SF36 assessment regarding their ability to measure change in condition following TKR in 85 patients before operation and at the six-month follow-up

| Test                     | Mean score   |       | Six-month follow-up | SD    | Mean change score | Effect size |
|--------------------------|--------------|-------|---------------------|-------|-------------------|-------------|
|                          | Preoperative | SD    |                     |       |                   |             |
| 12-item knee score       | 44.61        | 6.99  | 29.33               | 10.65 | 15.28             | 2.19        |
| SF36                     |              |       |                     |       |                   |             |
| Health perceptions       | 70.53        | 18.35 | 68.03               | 18.62 | 2.50              | 0.14        |
| Health change            | 45.64        | 14.95 | 62.95               | 26.87 | -17.31            | -1.16       |
| Physical activity        | 18.51        | 17.21 | 42.60               | 23.76 | -24.09            | -1.40       |
| Pain                     | 31.91        | 20.44 | 59.04               | 27.81 | -27.13            | -1.33       |
| Role limitation-physical | 10.29        | 21.23 | 28.96               | 39.18 | -18.67            | -0.88       |
| Role limitation-mental   | 57.36        | 43.88 | 58.75               | 42.84 | -1.39             | -0.03       |
| Social function          | 54.02        | 32.34 | 69.54               | 30.19 | -15.52            | -0.48       |
| Mental health            | 72.77        | 16.79 | 75.18               | 15.69 | -2.41             | -0.14       |
| Energy                   | 45.70        | 20.81 | 53.07               | 19.67 | -7.37             | -0.35       |

**Table V.** Comparison of change scores between the 12-item knee score and SF36 assessments in relation to the patients' view of the success of their TKR operation together with their retrospective assessment of change in health

|  | Knee score | SF36               |          |          |               |             |                 |               |          |               |
|--|------------|--------------------|----------|----------|---------------|-------------|-----------------|---------------|----------|---------------|
|  |            | Health perceptions | Physical | Pain     | Role-physical | Role-mental | Social function | Mental health | Vitality | Health change |
| <i>How successful do you feel your knee operation has been?</i>                                      |            |                    |          |          |               |             |                 |               |          |               |
| Very successful  | 20.32      | -1.64              | -26.71   | -35.61   | -28.98        | -15.56      | -30.02          | -2.64         | -12.89   | -31.11        |
| Everyone else  | 8.95†      | 8.18*              | -20.91   | -16.96** | -6.94*        | 17.14*      | 1.17†           | -1.60         | -0.95**  | 0.00†         |
| <i>How have the problems related to your knee changed since you had your operation?</i>              |            |                    |          |          |               |             |                 |               |          |               |
| Much better  | 19.80      | -0.37              | -28.72   | -37.04   | -27.50        | -17.65      | -25.93          | -3.68         | -11.44   | -27.94        |
| Everyone else  | 7.29†      | 7.71               | -16.79*  | -10.39†  | -5.00**       | 27.59**     | 1.08†           | 0.41          | -0.67*   | 0.81†         |
| <i>Have you experienced a change in the level of pain from your knee since having the operation?</i> |            |                    |          |          |               |             |                 |               |          |               |
| Much better  | 19.46      | -0.24              | -29.90   | -35.28   | -27.19        | -17.54      | -26.11          | -2.89         | -11.29   | -24.14        |
| Everyone else  | 4.50†      | 9.59               | -10.91** | -8.00†   | 1.09**        | 39.13†      | 8.00†           | 0.64          | 1.67**   | 0.0**         |
| <i>How has your knee operation changed your day-to-day life so far?</i>                              |            |                    |          |          |               |             |                 |               |          |               |
| Much better  | 20.67      | -0.74              | -33.08   | -38.89   | -32.74        | -21.97      | -27.54          | -4.37         | -15.45   | -31.25        |
| Everyone else  | 8.82†      | 6.76               | -12.97†  | -13.16†  | -3.95†        | 24.07†      | -2.56†          | 0.44          | 1.71†    | -0.66†        |

\* p &lt; 0.05

\*\* p &lt; 0.01

† p &lt; 0.0001

vious similar study found that SF36 scores were susceptible to other influences such as pain and disability arising from other weight-bearing joints and other symptomatic conditions.<sup>25</sup>

Our questionnaire may be compared with others that have been successfully applied to the treatment of osteoarthritis, but it has the advantage over assessments such as the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and the Arthritis Impact Measurement Scales (AIMS), in that it is intended specifically for use with knee surgery alone, and is simpler and quicker to process.<sup>26,27</sup>

The availability of a short, simple and validated questionnaire to assess the outcome, as judged by the patient, will be of value in the large multicentre trials which are needed to identify factors influencing the results of TKR.

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