



# The 2011 Knee Society Knee Scoring System©

## LICENCED USER MANUAL

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## Background

In 1989, The Knee Society Clinical Rating System was developed to rate both the knee prosthesis function and patients' functional abilities after total knee arthroplasty (TKA) (Insall). While this scoring system became the most popular method of reporting outcomes after total and partial knee arthroplasty it was felt to not provide enough detail specifically in documenting the functional capabilities of more contemporary knee arthroplasty patients. The original score was only physician-derived, leaving unresolved the poor correlation between objective physician-assessed knee scores and patient-derived satisfaction scores. It became clear that an updated and validated Knee Society scoring system, with improved responsiveness and reliability was needed.

With these issues in mind, the new Knee Society Scoring System, copyrighted in 2011, is a validated system that combines an objective physician-derived component with a subjective patient-derived component that evaluates pain relief, functional abilities, satisfaction, and fulfillment of expectations (Noble; Scuderi). This score prioritizes the patient perspective, to better track patient expectations, satisfaction, and activity levels than was possible with its predecessor.

## Method of Validation

The new score was validated by a multi-centered study over a several-year period capturing regionally diverse patients and physicians, with over 500 patients examined and surveyed both preoperatively and postoperatively. Objective and subjective data were captured and compared to the KOOS and SF-12 scores for validation. Using statisticians and epidemiologists, each question in the functional score was analyzed to detect differential item functioning. The new updated Knee Society Scoring System has been proven to be broadly applicable across gender, age, activity level, and implant type. Given the diverse activity profiles of many contemporary patients, the functional component of the score was expanded to include a patient-specific survey, which evaluates features such as standard activities of daily living as well as patient-specific sports and recreational activities, patient satisfaction, and patient expectations. Portions of the original Knee Society Scoring System have been integrated into the new version to try to maintain integrity of the prior version of the Knee Society score.

## Components of the 2011 Knee Society Score ©

The new Knee Society Score is composed of five components:

1. Patient Demographics
2. Objective Knee Score - completed by the surgeon.
3. Patient Expectations – completed by the patient
4. Patient Satisfaction Score – completed by the patient
5. Functional Knee Score– completed by the patient

## Patient Demographics

This section is self-explanatory and includes a detailed modification of the Charnley Functional Classification. This should be included at each evaluation period since the functional classification can change with length of follow-up.

## Objective Knee Score

The new score is not significantly different from the objective knee score of the original KSS. Unlike the old scoring system the new objective score allows for more than 100 points in patients with greater than 125° of flexion and a stable painless knee as outlined below.

“Alignment” has a maximum of 25 points and is determined on a weight-bearing AP radiograph measuring the femoral-tibial (Anatomic) axis.

“Instability” allows a maximum of 25 points for a knee that is stable in the coronal and sagittal axis.

“Joint Motion” allows one point for each 5° of joint motion. Unlike the old scoring system that allowed a maximum of 25 points the new system allows greater than 25 points for patients with greater than 125° of motion. There are deductions for flexion contracture and extension lag. The presence of recurvatum is not specifically addressed however patients with recurvatum will have significant ligament laxity in other planes that is captured in the

“Instability” category of the objective score. Maximum allowable points 25+

“Symptoms” category contains two 10-level scales, ranging from “none” to “severe” for each patient to rate their pain with walking on level ground and on stairs/inclines. The patient starts with 10 points on each scale for a painless knee with deductions of up to 10 points deductions as indicated by the patient’s response on each pain scale. There is an additional question regarding how “normal” the knee feels to the patient. Maximum allowable points 25.

## Patient Expectations and Satisfaction

These elements are considered vital in the clinical and functional assessments of patients undergoing knee arthroplasty and feature prominently in the new KSS.

“Patient Expectations” is a three-question fifteen-point scale that is collected pre-operatively and post-operatively. The pre-operative questions reflect the patient’s opinion on the extent to which the patient expects that the operation will improve their knee pain, and their ability to perform their activities of daily living and recreational activities.

The post-operative questions reflect the extent to which the outcome after the operation has met the patient’s pre-operative expectations with respect to pain and function.

“Patient Satisfaction” is a five-question 40-point scale that is collected preoperatively and at each follow-up visit.

## Functional Score

The functional score has been greatly expanded to include more detailed patient-specific activities not only activities of daily living, but also sports and recreational activities. The individual items were derived from a comprehensive inventory of activities that were condensed and validated from a 120-item survey. The final group of questions was validated at 18 arthroplasty centers and form the basis of this score. The functional score is composed of four subgroups and has a maximum score of 100.

“Walking and Standing” has a maximum value of 30 points with deductions for the use of walking aids and supports.

“Standard Activities” has a maximum of 30 points and evaluates “standard” activities of daily living. Patients can also respond if they never participate in the activities. *Patients responding “I never do this” receive zero points for that activity.*

“Advanced Activities” has a maximum of 25 points and evaluates function in performing more vigorous activities ranging from climbing a ladder or step-stool to running. Patients can also respond if they never participate in the activities. *Patients responding “I never do this” receive zero points for that activity.*

“Discretionary Activities” has a maximum of 15 points and allows patients to select the three activities that they consider most important to them personally from a group of seventeen recreational and exercise activities. Patients who do not participate in any of the discretionary activities will have a functional knee score that is limited to 85 points. The discretionary activities do not need to be identical in the pre-operative and post-operative period.

***In patients with severe functional disabilities the functional score may actually be a negative number. In these cases the score will default to zero.***

It has been documented that patient functional scores decrease with time after TKA due to multiple musculoskeletal and general medical conditions. (Benjamin) Inclusion of both the “Advanced and Discretionary Activities” in the new scoring system will allow more accurate identification of activities that patients participate in prior to and after knee arthroplasty surgery.

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## Frequently Asked Questions

**Q1: Is there an instructional manual for the 2011 KSS?**

**A:** We do not have a scoring manual at this time, but would refer our users to the *CORR* article (available upon request). A manual would be helpful to foster reporting consistency, and it is something we are considering.

**Q2: Please send the scoring algorithm and scoring instructions for the 2011 KSS.**

**A:** We do not have any particular instructions or algorithm. Please clarify/elaborate on your request.

**Q3: Please provide guidance on scoring when there is missing data.**

**A:** It is not possible to provide a truly valid estimate of the score for any domain (e.g. satisfaction, function, etc) that is missing responses. However, to satisfy the criteria for unidimensionality of each subscale on the instrument, we selected individual items that were themselves strongly correlated which gives robustness to the final estimates of function, satisfaction and expectation. In practice, we recommend that clinicians or research investigators: (a) contact the patient and ask them to answer the missing items, or (b) to enter dummy values equal to the average of all of the other items in the same domain. This practice is limited to instances where fewer than 50% of responses are missing, preferably less than 25%.

**Q4: What if a patient indicates less than three (3) activities?**

**A:** If patients do <3 activities, we suggest inserting a mean score for the missing items.

**Q5: Reporting of outcomes: is it to be reported as a two-part score?**

**A:** No. Outcomes are only scored using the patient reported responses. Data derived from items on the “objective” (clinician-generated) component of the questionnaire is collected for background information and to facilitate comparison of patient outcome with the old KSCR.

**Q6: Scoring details: Are the PROs to be combined or reported individually for each sub-score?**

**A:** The new score consists of separate components: Function, Satisfaction and Expectation, and so should be reported as three separate scores. One for each component. The subcomponents of the “Objective” score (Alignment, Instability, Joint Motion, Symptoms) are separate parameters and so cannot be totaled to make a single score with statistical validity.

## Continuous Variables that could be dichotomized for scoring

### 2. RANGE OF MOTION (Measured by Goniometer)

Extension

 °

Check if hyperextension

Passive Flexion

 °

### c. Anatomic alignment (Measured by goniometer)

Enter a positive number

 °

Varus

Valgus

Neutral

**Q7:** Continuous variables, including range-of-motion, and anatomic alignment, have been dichotomized. What if they were collected as continuous and the computer dichotomized them?

**A:** This could be done, as long as the final score is preserved. The reason for the “dichotomized” treatment of deformity (i.e. acceptable alignment: 25/25 points; significant varus or valgus 15/25 points) is that both deviations are considered a detractor from the ideal knee function and appearance and appear to impact the longevity of TKA. Range-of-motion (ROM) has not been dichotomized and is still continuous; however, penalties are present for extensor lag and flexion contracture, regardless of the total arc of motion. Note: Measuring ROM with a goniometer is notoriously difficult with high inter- and intra-observer variability. This becomes a problem with differing ROM scores reported at different follow-up times when in fact there has been no change.

**Q8:** In our experience, it is not advisable to show the point values to the study subjects, as it can influence their responses. Can the point values be removed when we create forms with our own headers?

**A:** Yes. This is a suggestion that will be considered for future updates.

**Q9:** Many of the point values of the new AKS are similar to the old AKS; however, for pain (symptoms), there is a challenge. Pain does not map easily.

**A:** We recommend you use the patient-generated score instead of the objective score. We found the old pain score unpredictable and subject to marker inter-observer bias. The

new pain score was derived from our studies which demonstrated the most important pain-related questions.

**Q10: Race and ethnicity are not per FDA guidance.**

**A:** This is correct. As the Knee Score is used throughout the world and is affected by cultural factors, we have developed a new classification system based on feedback from investigators from different centers worldwide.

**Q11: Has the minimal clinically important difference been identified?**

**A:** We have not identified a minimally clinically important difference, but plan to do so.

**Q12: Please clarify if question #4 (ROM) has a point maximum?**

**A:** In designing the scoring system for the Objective Score, the intent was to give bonus points for extra ROM without completely changing the scaling of the original KSS. In theory, a thin patient with normal ROM (say 155 degrees) would score 31 points for the ROM component, and could hypothetically score more than 100 points for the Objective Score as a whole. In practice this expected to happen only rarely.

**Q13: How do we relate the new 2011 KSS to the old score?**

**A:** The 2011 Knee Society Score consists of 4 separate sub-scales: (1) An “Objective” Knee Score (seven items: 100 points), (2) A Patient Satisfaction Score (five items: 40 points), (3) A Patient Expectation Score (three items: 15 points), and (4) A Functional Activity Score (19 items: 100 points).

Both the new and old scores attempt to quantify patient outcome after TKA, and both have an “Objective” score with sub-scales for Pain, Alignment, Stability, and ROM (100 points) plus a separate score for Function (100 points). The old and new Knee Society Scores differ primarily in the activities contributing to the Function Score, the weightings of each activity, and the fact that we have additional scales for Expectations and Patient Satisfaction. Moreover, the new score has been formally validated in a multi-center trial using standard psychometric procedures. The new score is not intended to be numerically related to the old score.

**Q14: How do the components of pain, ROM, alignment, and function correlate to the new 2011 KSS?**

**A:** The “Objective” components of the original and new Knee Society Scores are very similar. The New Objective Score assesses the following domains:

- Pain with walking (30 points); Pain with stairs (20 points)
- Alignment (Standing Radiograph) (max deduction: 10 points)
- Stability: Medial/Lateral (15 points); Anterior/Posterior (10 points)
- Joint Motion: ROM (25 points: adjusted for flexion contracture and extension lag)

**Q15: Before, the scoring tool consisted of the KSS and the Knee Society Function Score (each worth 100 points). With the New KSS tool do these continue to be separate or is it now combined?**

**A:** They continue to be separate.

**Q16: We are concerned for the repeated collection of post-op demographic data, can this form be omitted and/or modified?**

**A:** We all agree that collection of redundant data is not necessary and should be avoided wherever possible. This practice can be minimized by patient ID#s linked to a central data base. However, the New Score collects some “demographic” data that we believe is both important and relevant in providing much needed context to the interpretation of outcome scores. Thus, the new forms request information concerning Charnley Classification and ethnicity, in addition to the data obtained in the past.

**Q17:** If the user is not able to modify the form, how do you identify the individual? Can the user add the following information?

- Account #/Patient Name on Demographic Page
- *At least* Account # *and/or* initials and the Date on Subsequent Pages of the evaluation

**A:** Yes, the patient’s name name or identification number may be added to the form.

**Q18:** Please clarify the following conflict: The KS forms that the patient completes the SYMPTOMS portion of the evaluation, regarding pain with walking and pain with stairs, *but the article in CORR indicates that this is completed by the surgeon.*

**A:** The pain data is collected from the patient during the patient interview and recorded on the form in the Objective evaluation section. We chose to leave the pain score in the objective section since this was its place in the old score and allowed for easy comparison.

**Q19:** For postoperative evaluations, how do you evaluate the information if the patient changes the activities they list as most important? Are all the activities considered of equal point value?

**A:** We are interested in the extent to which knee symptoms and function impact the ability of each patient to do whatever activities they consider most important. WE realize the identity of these activities may change with time. However, though the activities may change, their contribution to the function score does not change.

**Q20:** Is the new Knee Society score meant to be used *instead of or in conjunction with* other outcome measures? (i.e. the SF12, SF36, WOMAC, Oxford, activity ratings such as the UCLA?)

**A:** The new Knee Society Score can be used in conjunction with other outcome measures that you find useful. Part of the validation process involved confirmation that it was generally consistent with other “knee-specific” scores. Other outcome instruments may provide more general insight into patient health and disability.

**Q21:** Is the evaluation form meant to be used as part of a combined “Pre-Op Packet” and a “Post-Op Packet” with the surgeon and patient information together?

**A:** Yes, it is important to have a pre-operative and post-operative score. This permits comparison and evaluation of change in the individual components of the score.

**Q22:** What are the recommended intervals for postoperative evaluation?

**A:** That is determined by the physician or the study protocol. A common practice is to score the patient pre-op, and then post-op at 3 months, 6 months, 1 year and then annually as needed.

**Q23:** At our institution, we have collected KS Scores and the Oxford Survey for many years - preoperatively and at postoperative follow-up. What is the recommendation for how we would compare our data over time to the new KS evaluation?



**A:** It is recommended that you continue your standard practice of collecting the data with the Oxford Survey and that you convert over to the New Knee Society Score. This will allow you to assess whether the patients outcome has changed (based on the Oxford Score) and to establish a new baseline for future comparison, based on the New Knee Society Score.

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If you have additional questions that have not been addressed, please email them to [knee@aaos.org](mailto:knee@aaos.org).