**Appendix Table F29. Description of tools**

| **Name** | **Number of items** | **Short description; references** |
| --- | --- | --- |
| Numerical Rating Scale (NRS) | Not applicable since it is a 11--point numerical rating scale | NRS measures pain severity by asking the patient to select a number (from 0 to 10) to represent how severe the pain is. Another possible customary range for NRS is 0-100. 336  A high score indicates a high level of symptoms 337 |
| SF-36 (The MOS (Medical Outcomes Study) 36-Item Short-Form Health Survey) | 36 items 338 | SF-36 measures eight health concepts and two summary scales, physical and mental:   1. Physical functioning 2. Role limitations because of physical health problems 3. Bodily pain 4. Social functioning 5. General mental health (psychological distress and psychological well-being) 6. Role limitations because of emotional problems 7. Vitality (energy/fatigue) 8. General health perceptions 338   The scores for the SF-36 scale range from 0 to100, with a higher score indicating better health status 339 |
| American Academy of Orthopedic Surgeons (AAOS)Sports Knee Rating Scale | 27 items | This is an instrument developed by AAOS. It consists of 6 scales.340   1. Lower Limb Core Scale: It consists of symptoms attributable to the knee only; has seven items combined into three subscales:  * Pain attributed to the lower limb * Stiffness and swelling * Function  1. Knee Giving Way Scale that consists of 4 items 2. Knee Locking or Catching Scale that consists of 4 items 3. Preinjury function scale that consists of 4 items 4. Current (postinjury) Limitations on Activity Scale that consists of 4 items 5. Pain on Activity Scale that consists of 4 items |
| Bellamy et al. Low Intensity Symptom State-attainment Index (BLISS) | Not applicable | BLISS (Bellamy et al. Low Intensity Symptom State-attainment) Index is a group of attainment criteria according to which ‘‘better is good, but good is best’’ with respect to goal attainment. 341  Pain is selected as the primary measure for the BLISS analysis. There are five analyses that are considered when measuring BLISS:  1) Time to first BLISS day (a measure of initial pain relief), from baseline. The time to first BLISS day from baseline is determined by calculating the number of elapsed days.  2) BLISS days per patient over 12 months. The number of BLISS days over 12 months is calculated on a per-patient basis using the patient’s WOMAC pain subscale score. The line joining the WOMAC scores and the intersection of the BLISS line is used to estimate the number of BLISS days.  3) Patients with a BLISS response at month 12  4) Patients with a BLISS response at any time during the study, and  5) Number of BLISS periods per patient over 12 months. The number of BLISS periods during the 12 months is calculated as patients who may be in a BLISS period more than once, that is, have WOMAC pain scores below the threshold, then above, then below.  There are five threshold levels of BLISS response based on the WOMAC Pain Scale (WOMAC-P), from a very low level of pain to higher levels of pain.  The threshold levels of the WOMAC-P includes: WOMAC pain score <5 NU, <10 NU, <15 NU, <20 NU, and <25 NU (0 = no pain, 100= extreme pain). |
| Chronic Pain Grade | 7 items | Chronic Pain Grade is a measure of chronic pain severity in three dimensions: persistence, intensity and disability. 342 This instrument provides a score which enables patients with chronic pain to be classified into one of four hierarchical categories according to pain severity or interference: Grade I, low disability-low intensity; Grade II, low disability-high intensity; Grade III high disability-moderately limiting; and Grade IV, high disability-severely limiting.  The measures of chronic pain severity includes 343:   1. Characteristic Pain Intensity, that is, theaverage of 0-10 ratings of pain right now, average pain, and worst pain multiplied by 10 to yield a 0-100 score (Dworkin et al. 1990) 2. Days in Pain in the prior 6 months 3. Time since Onset, or the elapsed time since the first episode of the pain condition 4. Disability Score, the average of three 0-10 interference ratings multiplied by 10 to yield a 0-100 score 5. Disability Days, the number of days in the prior 6 months that the subject was unable to carry out usual activities (work, school, housework) due to the pain condition of interest. The points for disability days are as follow: 6. 0-6 days: 0 points 7. 7-14 days: 1 point 8. 15-30 days: 2 points 9. 31+ days: 3 points   Grade I: Characteristic Pain Intensity less than 50, and less than 3 Disability Points  Grade II: Characteristic Pain Intensity of 50 or greater, and less than 3 Disability Points  Grade III: 3-4 Disability Points, regardless of Characteristic Pain Intensity  Grade IV:5-6 Disability Points, regardless of Characteristic Pain Intensity |
| Short Physical Performance Battery (SPPB) | 3 tests | The SPPB score is derived from the performance in three objective tests: usual walking speed over 4 m, five timed repeated chair rises, and standing balance (SB).344  Each test is scored from 0 to 4, and the sum of three scores gives a total score ranging from 0 to 12 (12 = best).345 |
| Fast self-paced walk time (completed over 40 meters) | Not applicable | Patients are timed while they walk two lengths (turn excluded) of a 20-m indoor course in response to the instruction: "walk as quickly as you can without overexerting yourself."346 |
| Health assessment questionnaire (HAQ) |  | The HAQ questionnaire addresses eight aspects of functional status: dressing and grooming, arising, eating, walking, hygiene, reach, grip, and general activity. For each aspect, responses to the questions are coded as follows: 0, no difficulty; 1, some difficulty; 2, much difficulty; and 3, unable to perform. Any aspect requiring assistance, mechanical or otherwise, receives a score of 2. The highest scores in each aspect are summed and divided by eight to yield a summary measure of disability. Hence, scores range from 0 to 3, with higher numbers indicating worse disabilities.347, 348 |
| International Knee Documentation Committee | 18 questions | There are 18 questions (10 main questions, plus 8 sub questions regarding activity limitations due to knee disorders) in 3 subsets: symptoms, sports activities, and function. Items are ranked according to presence or absence of symptoms, a 5-point Likert scale, a 6-point Likert scale, or an 11-point (ie, 0-10) scale. 349  The IKDC Subjective Knee Form was designed as an evaluative measure to detect improvement or deterioration in symptoms, function, and sports activity experienced by patients with a variety of knee conditions, including ligament and meniscal injuries, articular cartilage lesions, and patellofemoral pain. 350  The IKDC Subjective Knee Evaluation Form is scored by summing the scores for the individual items and then transforming the score to a scale that ranges from 0 to 100. A score of 100 is interpreted to mean no limitation with activities of daily living or sports activities and the absence of symptoms. |
| Patient global assessment of disease status | None | This is assessed by the question, “Considering all the ways your arthritis affects you, mark an “x” through the line for how well you are doing”. The answer is indicated on a 0-100mm VAS scale. Higher scores indicate worse status. |
| Investigator global assessment of disease status | None | This is assessed by the question, “Make a global assessment of the patient’s disease status by marking an “x” in one box below”; 0 = very well, 1 = well, 2 = fair, 3 = poor, 4 = very poor”. |
| Knee extensor force in Newtons | None | Bilateral isometric knee extensor muscle force is assessed using a load cell (XTran Model S1W; Applied Measurement, Victoria, Australia) fixed onto the metal framework of a chair and connected to a simple software program sampling at 80 Hz. During assessment patients are seated on the chair with the back and thigh well supported, hands resting on the thighs, the foot free, and the knee passively drawn into 90o flexion by gravity. A soft cuff, attached via an adjustable non-elastic metal cord to the load cell, is fitted with Velcro just above the ankle. Patients are asked to build up their force and then to “push” or “pull” as hard as they could for 5 seconds.351 |
| Knee flexor force in Newtons | None | Bilateral isometric knee flexor muscle force is assessed using a load cell (XTran Model S1W; Applied Measurement, Victoria, Australia) fixed onto the metal framework of a chair and connected to a simple software program sampling at 80 Hz. During assessment patients are seated on the chair with the back and thigh well supported, hands resting on the thighs, the foot free, and the knee passively drawn into 90o flexion by gravity. A soft cuff, attached via an adjustable non-elastic metal cord to the load cell, is fitted with Velcro just above the ankle. Patients are asked to build up their force and then to “push” or “pull” as hard as they could for 5 seconds 351 |
| Knee, Injury and Osteoarthritis Outcome Score (KOOS) | 42 items | The KOOS questionnaire covers five dimensions that are as follows: pain (nine items), symptoms (seven items), activities of daily living (17 items), sport and recreation function (five items), and knee-related quality of life (four items). Each item can be answered by a 5–point Likert scale (0-4). Each of the five scores is calculated as the sum of the items included, in accordance with score calculations of the WOMAC Osteoarthritis Index. Scores are then transformed to a 0-100 scale, with zero representing extreme knee problems and 100 representing no knee problems.352 |
| Lequesne Knee Index | 10 items | The Lequesne OA index directly aggregates symptoms and functions which are not graded separately.353  The index includes three sections with a total of 10 questions.  The first section (1A-1E) asks about pain or discomfort at ‘night’ (1A), ‘after getting up in the morning’ (1B), ‘when standing’ (1C), and ‘when walking’ (1D). Question 1E addresses pain ‘when rising from sitting’ (knee index) and pain when ‘sitting 2h’ (hip index). Questions 1C and 1E are graded dichotomously: 0=no, 1=yes. Questions 1A, 1B and 1D have three categories with 0 =no; categories 1 and 2 are different for each question (1A: 1 = only with movement or in certain positions, 2 = with no movement; 1B: 1 = more than one but less than 15 min, 2 = 15 min or more; 1D: 1 = only after walking some distance, 2 = initially and increasingly with continued walking).  The second section asks about the maximum walk distance [graded from 0 = unlimited to 6 = less than 100m (328 ft). If patients use one or more walking aids the score is upgraded by one and two points, respectively.  The third section addresses physical function disability with four categories graded from 0 = without difficulty to 2 = unable to do so. The knee index asks about ‘climbing one flight of stairs upward’, ‘downward’, ‘squatting’ and ‘walking on uneven ground’. The hip index asks about ‘putting on socks’, ‘pick up an object on the floor’, ‘going up or down one flight of stairs’ and ‘getting out of a car or a chair’.  The Lequesne OA index is scored as the sum of all questions. The score range of each section is from 0 to 8 resulting in a total score ranging from 0 to 24. |
| Modified Lysholm Knee Scoring Scale | 8 items | The Modified Lysholm Knee Scoring Scale was first described by Tegner and Lysholm in 1985.349  Eight symptoms and disabilities are assessed: limping, use of support, locking or catching, instability, pain, swelling, difficulty with stair climbing, and difficulty with squatting. Points range from 5 for the absence of a limp, lack of use of support, or no problems squatting, up to 25 for no pain or no instability. |
| Six minute walk test | Not applicable | Patients are instructed to cover as much distance as possible during the 6 minute time frame with opportunity to stop and rest if required.346 |
| Timed Up and Go Time (TUG) | Not applicable | Patients are required to rise from a standard arm chair, walk at a safe and comfortable pace to a tape mark 3-m away, then return to a sitting position in the chair.346 |
| Short form Arthritis Impact Measurement Scale 2 (AIMS2-SF) | 26 items | The AIMS2 is a self-administered questionnaire with 78 items that include information on patients’ socio-demographic and clinical characteristics, as well as 26 core items that form the AIMS2 –SF.354  The AIMS2-SF has 26-items that measures 5 different domains of health status. Respondents are asked to indicate, on a 5-point Likert scale, how much of their time is limited due to physical function (mobility, walking, and bending, self-care, etc.), role function (work), and social function (social activities and support), and how much of the time they are bothered by symptoms (arthritis pain) and affect (level of tension and mood).355 |
| Algofunctional index for osteoarthritis (same as Lequesne index) | 10 questions | It consists of 8 points for pain, 8 for the maximum distance walked, and 8 for activities of daily living. |
| Functional Reach Test | Not applicable | Functional reach can be measured using an electronic functional reach device or clinically by using a 48-inch “yardstick”.356  In the electronic method, the individuals are asked to assume a position of normal, relaxed stance near the center of a force platform. In this position their shoulders should be perpendicular to the reach instrument device. In order to maintain identical foot placement during all testing conditions, the foot position is traced on a sheet of paper attached to the surface of the platform. The stance width is obtained from the foot tracing by measuring the distance between the medial borders of the heels.  The electronic functional reach measurement device is elevated to the height of the acromion. Subjects are then required to extend the right arm horizontally (approximately 90°) and place a closed fist against the sliding handle (position 1). Then they are asked to slide the handle bar as far forward as they comfortably could without taking a step or losing their balance (position 2). Functional reach is defined as the mean difference between positions 1 and 2, over three trials.  The clinically accessible measure of reach consists of a 48-inch yardstick” secured to the wall at the height of the right acromion. During this procedure, the platform foot tracing is placed on the floor and subjects are asked to assume the identical foot position as in the electronic method. They are then asked to make a fist and extend their arm forward as in the previous test (position 1) and the placement of the end of the third metacarpal along the yardstick is recorded. Then, they have to reach as far forward as they could without losing their balance or taking a step (position 2), and the placement of the end of the third metacarpal is again recorded. Functional reach is defined as the mean difference between positions 1 and 2 over three trials. |
| Giving Way Test | Not applicable | It is one of the items of the Knee Standardized Clinical Interview (KNE-SCI) questionnaire357  The subject is asked: “Does the knee feel as if it’s going to give away?” If yes, “has it actually given way in the last 6 months?” If yes, “How often has it given way in the last 6 months?” |
| Step Test | Not applicable | It is a clinical test of balance that incorporates dynamic single limb stance.358  During this test, the subjects are required to stand unsupported with the feet parallel to each other and a block 5 cm directly in front of them. Subjects are then advised which leg was the stepping leg and asked to place the whole foot onto the block, then return it fully back down to the floor. This procedure is repeated as fast as possible. The subject is not supposed to move the other foot during the test period. One completed step comprised placing the foot fully onto the block and then on the floor. The number of times the subject completed one step usually over 15 seconds is recorded. |
| Arthritis Self- Efficacy Scale (ASES) | 20 items | The ASES measures self-efficacy in 3 domains 359:   1. pain management, 2. physical function, and 3. other arthritis symptoms   It uses a visual analog scale in which a higher score indicates greater self-efficacy, a positive result. The total possible range is 0-100.360, 361 |
| Standing Balance Test | Not applicable | It is a timed, single-leg standing balance test that is done during clinical examination.  It is a measure of the number of seconds for which a subject is able to stand unsupported on one foot while looking straight ahead with hands on hips.362 |
| Knee Proprioception Test | Not applicable | To assess knee proprioception, a device based on recommendations by Sharma L. and Pai et al. is used.363  This device consists of a chair with a computer-controlled motor and transmission system and 2 attached free-moving arms. Each arm supports the subject’s shank and foot. The joint of each arm is moved by a computer-controlled stepper motor and transmission system for angular displacement. The foot/ankle is attached with an air splint to the footrest, which is a moving component of the apparatus. Angular motion is detected by angular displacement and force transducers. Two handheld buttons were attached to the tray.  Each time, the leg is moved to a starting position of 30° knee flexion. Following a random delay, the subjects are asked to extend the knee further with an angular velocity of 0.3°/second. They are then instructed to push a handheld button at the moment of definite detection of knee joint position change. The angular displacement between the starting position at 30° flexion and the position in the extension direction at the instance when the button was pushed is recorded as the measure of knee joint proprioception. A low value indicates good proprioception. |
| Knee Patient-Specific Index (KPSI) | 43 items | The KPSI consists of 43 items divided into three main areas:364  1) symptoms  2) bothersome activities, and  3) difficulties with physical function  The number of items in the scale varies with the individual’s selection of attributes (items) relevant to them.  Patients can add additional specific individual concerns to the existing 43 items.  Patients can separately rate the severity and importance of their complaint(s) using seven response categories. For severity, the response categories are as follows: not severe, minimally severe, somewhat severe, moderately severe, very severe, extremely severe, and most severe imaginable.  For importance, the response categories are as follows: not important at all, minimally important, a little important, important, moderately important, very important, and extremely important. If an item was deemed not applicable (e.g., the symptom of knee swelling was no longer present) then the item was not rated for either severity or importance.  The raw score is transformed to a 0-100 scale with higher scores indicating worse outcomes. |
| Influence of Rheumatic Disease on General Health & Lifestyle (IRGL) | 70 items | The IRGL (Involved van Reuma op Gezondheid en Leefwijze = Influence of Rheumatic Disease on General Health & Lifestyle) is a Dutch version of the Arthritis Impact Measurement Scale. 365  It consists of 12 scales encompassing four health dimensions:   1. Physical functioning: 2. Mobility scale: 7 items 3. Self-care scale: 8 items 4. Pain scale: 6 items 5. Psychological functioning: 6. Anxiety scale: 10 items 7. Depressed mood scale: 6 items 8. Cheerful mood scale: 6 items 9. Social functioning: 10. Perceived support scale: 5 items 11. Actual support scale: 3 items 12. Mutual visit: 2 items 13. Social network scale: One item for number of neighbors with whom one associates and one item for the number of friends one has. 14. Disease impact: It measures the disease impact on several domains of daily life like work, activities, leisure, relationships, sexuality, food, sleep. 15. Disease impact scale: 10 items that measure Impact activities scale: 5 items:366 |