

# Comparison of self-reported and measured range of motion in total knee arthroplasty patients

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**Abstract:** Total knee arthroplasty (TKA) is an established method used in the treatment of end-stage knee osteoarthritis. Range of motion (ROM) and relief from pain show success of TKA. One of the most important aims of this treatment is to achieve an adequate ROM. Numerous outcome instruments and patient-reported questionnaires are in use to evaluate of TKA patients. For this purpose, disease-specific questionnaires and self-reported ROM and function evaluation tools are also being developed. The most important criteria in musculoskeletal care is assessing the joint mobility of the patient's. Joint mobility can be measured with visual estimates, universal goniometer, X-ray radiography, digital gravity goniometers and applications found in smart phones. Apart from the reliability and validity of the method, obtaining the same results from different examiners is very important. The clinical follow-up of patients is an important part of postoperative care after TKA. The follow-up interval and duration remain dependent on the physician's anticipation of the clinical progress of the individual patient. Long-term surveillance of joint arthroplasty is necessary, but it has also become increasingly burdensome as greater numbers of TKAs are performed, and in younger populations. Patient self-reported questionnaires and self-goniometric measurement are used by many investigators to decrease this burden on the surgeon or staff, and in combination with telemedicine radiographs might be a reasonable option to routine clinic visits. They could reasonably be expected to lower the burden on both the patient and the clinician without eliminating contact and thus sacrificing quality of care. At the same time, it would reduce the financial burden too. Self-reported measured ROM can use in the routine follow-ups to reduce surgeons, physiotherapist and other staff.

**Keywords:** Total knee arthroplasty (TKA); goniometric measurement; range of motion (ROM); self-reported

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Total knee arthroplasty (TKA) is an established method used in the treatment of end-stage knee osteoarthritis. Range of motion (ROM) and relief from pain show success of TKA. One of the most important aim of this treatment is to achieve an adequate ROM (1,2). The postoperative flexion is an important factor that affecting patient satisfaction after TKA. Normal activities of daily living require a minimum of 105° and 110° of flexion, patients from non-Western cultures often engage in activities such as kneeling and squatting that require higher flexion. ROM affects individuals' activities carried out during the day (3).

Knee flexion and extension ROMs are incorporated into orthopaedic knee scoring systems to assess disease severity,

are frequently used to track recovery after various knee surgeries, and are also used as clinical indicators by which to monitor and benchmark physiotherapy or rehabilitative performance (4).

Numerous outcome instruments and patient-reported questionnaires are in use to evaluate of TKA patients. For this purpose, disease-specific questionnaires and self-reported ROM and function evaluation tools are also being developed (5). These evaluation tools are used by surgeons, research assistants, physiotherapist and patients.

American Knee Society (AKS) questionnaire consistently reported significantly less pain to the physician during the clinic visit than they did when self-reporting. The fact that

the patient-reported pain and function after TKA differed significantly from those recorded in the clinician's office may have important implications for the use of these scoring instruments. However, a significant difference between patient-reported and clinician-recorded values was observed for the AKS pain and function subscores but not for the Oxford Knee Score. But, there is a need to more studies on this issue (5).

The AKS functional score records only walking distance, assistive devices used and how stairs are climbed. Patients may overstate the distance walked, exaggerate their stair-climbing ability or minimize their need for assistive devices in an attempt to please their surgeon when asked these questions in his/her presence (5).

The most important criteria in musculoskeletal care is assessing the joint mobility of the patient's. Joint mobility can be measured with visual estimates, universal goniometer, X-ray radiography, digital gravity goniometers and applications found in smart phones. Apart from the reliability and validity of the method, obtaining the same results from different examiners is very important.

Goniometry is an essential assessment skill in musculoskeletal practice, with the resultant measures used to determine the presence or absence of dysfunction, guide treatment interventions and generate evidence of treatment effectiveness. Universal goniometers (UG) are the most common form of goniometer used in clinical practice. They are easily accessible, relatively inexpensive, portable and easy to use. Reliability studies have shown that on repeated measures the UG demonstrated good overall intra- and inter-tester reliability. The validity of UG measures for knee range of motion have been reported, using measures taken from radiographs as a reference standard. The correlation between universal goniometer measures and radiographs were reportedly higher for larger degrees of knee flexion than for smaller degrees of knee flexion. The reliability and validity of UG measures can be affected by incorrect application of the goniometer (6).

Older people tend to make errors and a statistical trend that less educated people are more likely to make errors. Use of patient self-assessment of ROM is suitable for young and educated populations (7).

The major advantage of digital photographs is that one clinician can measure and re-measure the standardized image at each time. This could be useful in a setting where different clinicians measure the ROM. It is better than goniometric measurement (4,8).

Although radiographic measurements give the most

accurate information in clinical practice, many surgeons prefer to goniometric measurement. Use of radiographs to reliably measure range of motion following knee arthroplasty has allowed us to set up a 'virtual knee clinic' (9).

In recent years the advent of smartphones has brought a range of new technological applications within the reach of most consumers. Number of smartphone based goniometry apps are now available. Universal goniometer has been demonstrated in repeated measurements better results than apps. The Smartphone application used may be considered as precise and accurate in clinical practice (10,11). Navigation, inclinometer and camera measurements can be performed in smartphones. Camera-based smartphone measurement of the knee range of motion is fit for purpose in a routine clinical setting (12).

The clinical follow-up of patients is an important part of postoperative care after TKA. The follow-up interval and duration remain dependent on the physician's anticipation of the clinical progress of the individual patient. Long-term surveillance of joint arthroplasty is necessary, but it has also become increasingly burdensome as greater numbers of TKAs are performed, and in younger populations. Patient self-reported questionnaires and self-goniometric measurement are used by many investigators to decrease this burden on the surgeon or staff, and in combination with telemedicine radiographs might be a reasonable option to routine clinic visits. They could reasonably be expected to lower the burden on both the patient and the clinician without eliminating contact and thus sacrificing quality of care. At the same time, it would reduce the financial burden too (13).

"A Comparison of Patient-Reported and Measured Range of Motion in a Cohort of Total Knee Arthroplasty Patients" is written by Drs. Jamie E. Collins, Benjamin N. Rome, Meghan E. Daigle, *et al.* and was published on *The Journal of Arthroplasty* on February 2014 (14).

At this study, subjects were assessed pre-operatively at baseline and at 3 and 6 months post-operatively. Knee extension was measured in standing; knee flexion measurements were performed using a wheelchair. They reported that the height of the chair is not important but there is no citation about it. Considering the difference between the height of the patient, we believe that this type of measurement would affect the results. There is no information and education about how to make measurements of patients who were attended the survey by mail.

There is not blind the person who made the assessment. This situation may have influenced the results of the study

and it can lead to bias.

A total of 112 patients were included in the analysis. But, only follow-up patients were focused in the analysis (Patients with both self-rated and objectively measured ROM: n=100 at baseline, n=62 at month 3 and n=53 at month 6). Patients who come to the clinic for evaluation were included in that study. However, patients who were followed by the mail, initially given the impression that they were also included in the study. There is no relationship with these patients and that study. There is a table and information about who were followed by mail and those patients' information didn't use in anywhere or any statistical analysis. The presence of this information is senseless and unnecessary. Although written like that "*Patients were given the option to complete the post-operative visits in person or to mail in a study survey*" in method section, "*Patients were given the option to complete follow-up visits in the clinic or over the phone*" were written in discussion.

In general, it is not a study that can easily be understood by another researcher. Everything is not expressly mentioned in that study. But, self-reported measured ROM can use in the routine follow-ups to reduce surgeons, physiotherapist and other staff.

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### Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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