

individual studies. Future studies should validate the findings so as to help clinicians identify high risk fallers following THA/TKA, and to develop specific fall prevention programs for high risk individuals.

Table 1 Summary of risk factors for falls following total hip arthroplasty (THA) or total knee arthroplasty (TKA)

Risk factors for falls	THA patients	TKA patients
Common factors for inpatient and post-discharge falls	Advanced age (OR: 1.04-21.5)*	
Inpatient setting	Males (OR: 1.07-1.19) [#] Postoperative complications or comorbidities (OR: 1.11-3.17) [#] Revision THA/TKA (OR: 1.92-2.13) [#] Minority race (black and Hispanic) (OR: 1.13-1.14)* Rural hospitals (OR: 1.16) [#] Small size hospitals (OR: 1.20) [#]	
	NA	Neuraxial anesthesia (reduced risk) (OR: 0.70) [#] Perioperative continuous catheter FNB (OR: 4.40)* Anemia (OR: 1.43-1.98) [#]
Post-discharge setting	Females (OR: 5.54)* Medications (OR: 4.09) [#] Pharmacologically treated psychiatric diseases (OR: 2.80) [#] Living alone (OR: 2.09) [#]	
	Prior history of TKA (OR: 6.67)* Shorter postoperative duration (OR: 1.12)*	Bisphosphonate administration (OR: 1.25)* Reduced knee ROM (OR: 3.61, β : 0.59)* Reduced ankle ROM (OR: 1.68)* Preoperative GDS score (OR: 1.27)* History of falls (OR: 7.23-7.75)* Post-operative fear of falling (OR: 11.90) [#] Contralateral knee KL grade ≥ 3 (OR: 6.54-16.97)* Hyper-kyphosis (OR: 3.91)* Post-operative WOMAC pain (β : 0.058)* Post-operative WOMAC stiffness (reduced risk) (β : -0.014) [#]
Note: * $p < 0.05$; [#] $p < 0.01$		

GDS: Geriatric Depression Scale; KL grade = Kellgren and Lawrence; ROM = range of motion; WOMAC = Western Ontario & McMaster Universities Osteoarthritis Index

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THE DESIGN, USER CHARACTERISTICS AND EFFICACY OF ONLINE SUPPORT GROUPS FOR ARTHRITIS AND OTHER CHRONIC MUSCULOSKELETAL DISORDERS: A SYSTEMATIC REVIEW

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Purpose: To systematically review the literature investigating peer-to-peer online support groups (OSGs) for persons with chronic musculoskeletal disorders in order to: i) describe the design features of the OSGs; ii) describe the characteristics of OSG participants; and iii) review the efficacy of OSGs.

Methods: Six electronic databases were searched from inception to September 2018. The search was based on population and intervention keywords and medical subject headings. Studies focused on peer-to-peer adult OSGs in chronic musculoskeletal conditions were eligible for inclusion. OSGs are virtual spaces where individuals meet to provide each other with various types of non-physical support (e.g. providing advice) for a shared concern. Studies of multi-component online interventions were also eligible if data pertaining to non-synchronous discussion forums were reported independently from other components. Study rigour was assessed using the Critical Appraisal Skills Programme checklist for qualitative study designs, and the Risk of Bias in Non-randomised Studies of Interventions (ROBINS-I) tool for quantitative study designs. The type of host platform; characteristics of group members; presence and type of moderation; and volume of user posts were extracted to describe the OSG design and users' characteristics. Efficacy of OSGs was determined by synthesising qualitative and quantitative data. First, processes and themes providing insight into how OSGs could be efficacious were extracted. Second, quantitative data measuring participants' level of achievement of these themes or frequency that these themes were discussed were extracted to determine the magnitude of efficacy. Assessment of study rigour and data

extraction was performed by a minimum of two reviewers and checked for errors by an additional two. Narrative synthesis of results was conducted due to the heterogeneity of study designs and outcome measures.

Results: Of 14,324 titles screened, a total of 19 studies were eligible for inclusion. Ten studies were qualitative, eight were quantitative cross-sectional or cohort studies and one study had a mixed methods design. Arthritis and rheumatic diseases were the primary focus of the OSGs studied (n=15), other conditions were fibromyalgia (n=5), complex regional pain syndrome (n=2) and thoracic outlet syndrome (n=1). Qualitative studies were, on average, moderate-to-high quality. Quantitative study designs were of low-to-moderate risk of bias. The majority of OSGs (n=12) were public, with nine hosted on a purpose-built website. Six studies reported moderation in their studied OSGs, primarily by experienced group members, and discussions were conducted in multiple European languages (e.g., English, Dutch, Italian). Duration of OSG membership ranged from one month to 2.5 years, and the frequency of posting ranged from two per user to more than once per day.

The majority of participants in OSGs were women who had the disorder that was the focus of the OSG. Of the six studies reporting employment status, "not working/unemployed" was the most prevalent. The motivation for joining OSGs was reported in five studies. Three studies reported emotional and social support as primary motivators. Sharing information was also listed as a primary motivator in three studies. Efficacy of OSGs was investigated in nine studies. Qualitative studies indicated that OSG efficacy could be achieved through patient empowerment or improving any of the following: health literacy, social support and self-management processes. Two studies reported that over 78% of content in the OSGs they investigated was emotionally supportive or contained information support/guidance about aspects of disease management. This implies that OSG users had high exposure to content that could result in positive outcomes. The magnitude of improvement in patient empowerment (measured as improvements in social support and health literacy) was quantified in two studies. After using OSGs, users rated their improvement as approximately 3 on the 5-point scale, (anchors 1: completely disagree, 5 completely agree). Both studies used the same sample of participants to establish these findings, meaning there is limited generalisability beyond these OSGs.

Conclusions: OSGs for chronic musculoskeletal conditions are available in multiple languages and multiple platforms. Similar to other internet-based interventions and consistent with the female predilection for many of the conditions studied, women appear to be the most frequent users of these services. Most of the literature focused on how OSGs may be efficacious as opposed to the magnitude of their efficacy. Thus, whether OSGs actually improve social support and health information remains largely unknown. Limited evidence indicated a small positive effect in patient empowerment, however, further investigation is required in a wider sample of OSGs using randomised control trials designed for the expressed purpose of determining efficacy.

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INVESTIGATION OF THE FUNCTIONAL STATUS OF PATIENTS WITH UNICONDYLAR KNEE PROSTHESIS

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Purpose: Knee osteoarthritis (OA) is common and problems from OA increase with age. Knee and foot / ankle pathology is probably present in patients undergoing knee replacement surgery. However, the condition of the foot / ankle against the valgus or varus deformity is not clearly understood. Unicompartmental knee arthroplasty (UKA) is an effective treatment option for rapid functional recovery. Is UKA an effective method in the treatment of unicompartmental knee osteoarthritis, especially in the development of functional status and performance, and does foot/ankle affect the outcome of the surgery and the performance of the patients? The aim of this study was to investigate the functional status of patients with unicondylar knee prosthesis.

Methods: Patients who underwent unicondylar knee arthroplasty between 2012-2018 in the orthopedics and traumatology clinic were evaluated. Descriptive data of the patients and the presence of problems related to the foot / ankle were recorded with a prepared form. The pain level of the patients at rest, sleep, and walking before and after surgery was evaluated by using visual analog scale. The range of motion and Q angles of the affected knees of the patients were evaluated using

universal goniometry; quadriceps and hamstring muscle strength were evaluated using the handheld dynamometer. Stance test was performed on one foot with eyes closed for balance assessment. Functional status of patients was determined by The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), short physical performance battery (SPPB) and disease-related quality of life.

Results: Twenty-five women and 5 men with a mean age of 58.08 ± 8.66 years were included in the study. Thirteen patients (52%) were affected by dominant side and 12 (48%) patients had nondominant affected sides. The majority of the patients were housewives (68%). There were 7 (28%) patients with foot / ankle problems. There was a statistically significant decrease ($p = 0.000$) when the pain level of the patients were compared before and after surgery. Affected and unaffected sides were compared with NEHA, Q angle, quadriceps and hamstring muscle strength and eyes closed balance durations on one leg. There was a statistically significant difference ($p = 0.005$) in knee flexion ROM in favor of the unaffected side whereas there was no significant difference in all other parameters ($p > 0.05$). Patients' complaints of pain and stiffness were low and their physical functions (31.19 ± 22.37) and physical performances ($X = 8.37 \pm 2.48$) were good, and health-related quality of life (physical status $X = 38.89 \pm 12.40$, mental status $X = 52.48 \pm 17.51$) was moderate level. When the patients with and without foot / ankle problems were compared, it was found that there was no difference in pain, ROM, muscle strength, physical function and performance status ($p > 0.05$)

Conclusions: There was a significant decrease in activity and perceived pain level at rest after surgery. Affected side extension AEHA, Q angle, quadriceps and hamstring muscle strength, balance status did not differ with the unaffected side. Physical function and performance were found to be good and quality of life was moderate level. The functional status of patients with foot / ankle problems such as pain, swelling and stiffness is not affected. Since our study was a preliminary study, the patients' foot / ankle status and problems, physical functions and performances were not evaluated before the surgery. Comprehensive evaluations before surgery, foot / ankle status and problems are evaluated and studies with more participants are needed.

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FUNCTIONAL OUTCOMES AFTER CLINICAL PATHWAY FOR INPATIENT REHABILITATION OF TOTAL KNEE ARTHROPLASTY

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Purpose: This study was undertaken to investigate short-term (TKA) and to examine group effects of unilateral and bilateral TKA patients.

Methods: In this retrospective cohort study, A total of 184 patients (57 males and 127 females; average age 71.5 ± 5.9 years) who had received unilateral and bilateral TKA were followed up from preoperative to postoperative 3 months. Clinical pathways for inpatient rehabilitation included early, intensive individualized rehabilitation (progressive resistance exercise using air resistance machines at 30% of their one-repetition maximum, for three sets of 15 repetitions, progressive gait training using anti-gravity treadmill starting from a workload of 50% bodyweight (BW) and a speed of 2.0 km/hr, and aerobic exercise using ergometer) twice a day, five times a week for 2-week period. Patients completed performance-based physical function tests including stair climbing test (SCT), 6-minute walk test (6MWT), timed up and go test (TUG), isometric knee flexor and extensor strength of the surgical knee, gait speed, range of motion of knee flexion and extension. Self-reported physical function and pain were measured using the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) and Visual Analog Scale (VAS), and self-reported quality of life was measured using the EuroQOL five dimensions (EQ-5D) questionnaire. These evaluations were performed preoperatively, 1 month and 3 months postoperatively, respectively.

Results: The various performance-based and self-reported physical function and quality of life measures improved nonlinearly over time. Specifically, 6MWT, TUG, gait speed, WOMAC-pain, WOMAC-function, VAS, EQ-5D scores showed significant improvements in the first 1 month post-TKA, and SCT, peak torque (PT) of the extensor and flexor of the surgical knee, WOMAC-stiffness scores showed gradual, but, substantial improvements over the 3-month observational period. Group difference (unilateral and bilateral TKA groups) influenced the time course of various functional measures including SCT, 6MWT, TUG, VAS, WOMAC-stiffness, and WOMAC-function. Unilateral TKA

group showed steeper improvements in TUG, WOMAC-function, and VAS scores during the first 1 month post-TKA, and in 6MWT and WOMAC-function scores during the 3-month post-TKA than bilateral TKA group. In addition, SCT scores exhibited significantly slower values in the bilateral TKA group than in the unilateral TKA group at 1 month postoperatively, and preoperative WOMAC-stiffness values were significantly higher in the bilateral TKA patients than in the unilateral TKA.

Conclusions: This study confirmed that patients underwent clinical pathway for early intensive inpatient rehabilitation showed significant improvements in various functional measurements during the first 3 months after TKA, with group difference observed in the several functional measures.

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HOW CO-ACTIVATION IS AFFECTED BY DIFFERENCES IN CONTRACTION INTENSITY OF KNEE EXTENSOR IN TOTAL KNEE ARTHROPLASTY PATIENTS

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Purpose: Total knee arthroplasty (TKA) is performed for the purpose of pain reduction and functional improvement for recent knee osteoarthritis patients. Several studies have presented ensemble average electromyographic profiles for asymptomatic controls showing that the muscle activation patterns of the major muscle groups such as the knee flexors, knee extensors and plantar flexors are distinct from one another and are related to specific roles during gait. Consistent among electromyographic studies of knee osteoarthritis is the concept of increased muscle co-activation compared to asymptomatic subjects. Co-activation of the quadriceps and hamstrings contributes to the stability of tibiofemoral joint. But excessive co-activation may result in impaired movement and weakness in TKA patients. However, co-activation by differences in contraction intensity is not well established in TKA patients. The purpose of this study was to investigate and consider hamstrings co-activation during quadriceps activation due to differences in contraction intensity of knee extensor in TKA patients compared to healthy seniors and young adults.

Methods: Three groups were considered: TKA (nine subjects four months after surgery, average age 68.2), elderly (ten healthy seniors, average age 68.0), young adult (ten healthy young adults, average age 22.9). Each participant provided informed consent to the potential hazards associated with their participation. Bilateral, isometric strength of the quadriceps and hamstrings was measured at 1 month after TKA. Subjects were positioned in a Biodex System 3 Dynamometer (Biodex Medical System Inc., Shirley, NY) with their knee flexed and stabilized at 60° flexion. First, subjects were asked to perform a maximal voluntary isometric contraction (MVIC) of the hamstrings followed by an MVIC of the quadriceps muscle. Next, isometric muscle strength of the quadriceps muscle with 20%, 40%, 60% and 80% of MVIC were measured based on 100% MVIC using visual feedback. Surface electromyograph (EMG) signals were recorded using a 16-channel electrode system (TeleMyo 2400 G2, Noraxon Co, USA). EMG signals of the vastus lateralis, biceps femoris were recorded on both legs in the TKA group or the dominant leg in the elderly and young group. EMG was used to quantify hamstrings co-activation during a quadriceps MVIC similar to previously described methods. Surface EMG signals were band-pass filtered between 10 and 500 Hz and sampled at 1500 Hz. Amplitudes of EMG signals were estimated using a root-mean-square average with a moving window of 100 ms. After signal processing, the hamstrings (biceps femoris) peak EMG signal during a maximal quadriceps MVIC was normalized to the peak hamstrings EMG signal during a maximal hamstrings MVIC to calculate co-activation (peak hamstrings EMG during quadriceps MVIC / peak hamstrings EMG during hamstrings MVIC). Co-activation in each % MVIC was also calculated. Statistical analysis was performed using SPSS software, version 19.0 (SPSS, Inc.). As a statistical method, two-way analysis of variance was used to compare the co-activation between groups and compare the co-activation by differences in % MVIC with in each group. We used the Bonferroni method as an adjustment of the multiple comparisons. The level of significance was set at 0.05.