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| **Table 2. Study Characteristics** |
| **Study** | **Risk of Bias** | **Sample Description** | **Intervention(s)** | **Comparison(s)** | **Participant Number** |
| **Adie et al50****2012** **Systematic Review** | Low | Primary TKA for OAMean age across studies64.2 to 73.8  | Cryotherapy alone (Cryotherapy defined as ice packs, cooling pads, or other cold devices within 48 hours of surgery) | compression only | **# studies /outcome**Pain POD1=6 |
| nothing | Pain POD2=4 |
| Cryotherapy with compression | compression only | Pain POD3=6 |
| nothing  | Knee flexion POD1-6=6 |
| Knee flexion discharge=2 |
| Swelling=4 |
| LOS=5 |
| **Alaca et al29****2015** | Moderate | TKA Mean ageI: 68.7C: 68.1 | Standard TKA program followed by PNF exercise to involved LE 1x/d starting POD1  | Standard TKA program and CPM | I: 15C:15 |
| **Alkire & Swank28****2010****RCT** | High | TKAMean ageI: 65.6C: 66.9 | CPM 3X/d PT 2x/d | No CPM PT 2x/d | I: 33 C: 32 |

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| **Beaupre et al55****2001****RCT** | Low | TKAMean age 68.4 | **I1:** slider board and standard exercise 2, 10 min sessions/day, independently  | Exercise onlyExercises walking as tolerated with assistive deviceactiveROM using slider board 10-15 min, short-arc quad ex Isometric knee extensionSLR after 4 daysStairs after 4 days | I1: 38I2: 40C: 39 |
| **I2:** CPM and standard exerciseCPM= 3, 2 hr sessions/day with ROM increasing dailyAll: Exercises walking as tolerated with assistive deviceactiveROM using slider board 10-15 minshort-arc quad ex Isometric knee extensionSLR after 4 daysStairs after 4 days |

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| **Bennett et al27****2005 ‘****RCT** | Moderate | TKAMean ageI1: 70.7I2:71.4C: 71.7 | **I1:** CPM in recovery; 0-40 degrees for 3 hoursPOD 0: CPM 0-45 degrees in am for 3 hours and afternoon at 0-50 degrees for 3 hoursPOD1-4 CPM increased 5 degrees twice a day until stopped at POD5**I2**: CPM in recovery, cycled 50-90 degrees for 3 hours, knee rested at 90 degrees flexion overnightPOD1: CPM 40-90 degrees for 3 hours in AM; rest at 90 degrees on CPM; then 30-90 degrees in PM for 3 hours; rest at 90 degrees overnightPOD2 CPM 20-90 degrees for 3 hrs AM and 10-90 PM; extension splint at nightPOD3-5: CPM 0- 90 degrees 3 hours AM and PM knee splint at night | Exercise only30 min 2x/d Exercise=Active ankleIsometric quad sets Active/active-assist short arc quadsIsometric glutealActive hip/knee flex on slider board then over side of bedTransfersWalkingStairs | I1: 47 I2: 48C: 52  |
| All: exercise program beginning POD1 |
| **Boese et al30****2014** **RCT** | High | TKAMean ageI: 69.1C1: 66,7C2: 68.3 | CPM immediately postop 0-110 degrees, adjusted per pt. tolerance daily for minimum 5 hrs minimum of 2 days Continued until 90 degrees knee flexion achieved PT 2x/d: AROM of knee, hip, ankle Walking; Rocking chair; Sand bag on knee to hold in extension | **C1**: CPM immediately postop at ~90 degrees and held for 8-19 hrsPT 2x/d: All subsequent days=same as I group. | I: 55C1: 51C2: 54 |
| **C:2**: No CPM PT 2x/d onlyAll subsequent days=same as I group. |
| **Borckardt et al36****2013** **RCT** | Low | TKAMean age67.0 | Transcranial direct current stimulation in PACU, 4 hours later, am postop day 1, pm postop day 1; 20 min @2mA on BA9 and C1h/C2h | Sham tDCS=electrodes placed; Output @ 2mA for 30 seconds, then off for remainder of 20 min. | I: 20C: 20 |
| **Bruun-Olsen et al56****2009** **RCT** | High | TKA Mean ageI :68C: 71 | CPM plus active exercisesEx=30 min/d active exercise, transfer training, gait training | Active exercises alone | I: 30C: 33 |

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| **Chang et al39** | Low | TKAMean ageI: 71.23C: 70.74 |  Auricular acupressure3 min/point, 3x/d, for 3 d | Sham acupressure | I: 31C:31 |
| **Demoulin et al45****2012** **RCT** | Moderate | TKA Age range40-85 | Gaseous cryotherapy (hyperbaric CO2)Sprayed on 3X/day90 sec internal side of knee; 30 sec lateral side of knee, 30 sec popliteal fossaPT 30 min/d: knee mobilization, muscle strengthening gait training. | **C1:** cold pack over knee 5x/day, 20 min PT 30 min/d  | I: 22C1: 22C2: 22 |
| **C2:** Cryocuff over knee 5x/day, 20 minPT 30 min/d  |
| **Den Hertog et al40****2012** | Moderate | TKAMean ageI:66.6C:68.3 | Mobilization on POD0positive and competitive messages to pt; PT 2 hr/d with walking exercises, passive knee ROM strengthening of the lower limbmuscles, respiratory training; focus on ADL  | Mobilization on POD2PT 1hr/d walking exercises, passive knee ROM strengthening of the lower limbmuscles, respiratory training | I:74C:73 |
| **Denis et al57****2006** **RCT** | Low | TKA Mean ageI1: 69.6I2: 68.4C: 67.1 | **I1:**CPM starting POD2; 35 min/d; 35-45 deg; increasing based on flex ROM + PT**I2**: CPM starting POD2; 2 continuous hrs/d; 35-45 deg; increasing based on flex ROM + PT | PT only: supervised sessions of cardio/pulm ex; active and passive knee, hip ROM; transfer training and walking | I1: 26 I2: 28 C: 27 |
| **Ebert et al54****2013** **RCT** | Low | TKA Mean age I= 70.8C=69.2 | MLD30 min postop day 2,3,4.Knee ROM; 10 repetitions, 3x dailyCryotherapy for 20 min 3 to 4x dailyCPM 1 hour, 2x daily | Knee ROM exercises; 10 repetitions,3x daily; | I= 26C= 24  |
| **He et al18** **2013** **RCT** | Low | TKA Mean ageI:62.56C:61.58 | Auricular acupressureImbedded seed in ear4 acupuncture points in ipsilateral ear: knee joint, shenmen, subcortex, sympathesisPressure on each point with fingers for 3 min, 4x/d for 7 days | Auricular acupressureImbedded seed in ear4 non-acupuncture points ion helix of ipsilateral earPressure on each point with fingers for 3 min, 4x/d for 7 days | I:45C:45 |
| **Kim et al18****2009** **RCT** | High | Bilateral TKA Mean age 67.9  | PROM provided by PT for first TKAPlus CPM 50 min/day;Quad strengthening; Gait training, AROM | No PROM for second TKA on other side | N=53106 knees |
| **Labraca et al53****2011** **RCT** | Low | TKAMean ageI:65.5C:66.4 | Rehabilitation started within 24 hours post-surgery Rehabilitation=Active, active assisted and passive exercises of knee, ankle and hip; transfer training; walking; stairs | Rehabilitation (same as intervention group) started 48-72 hours post-surgery  | I:138 C:135  |
| **Lang19****1998** **Quasi-experimental** | High | TKAMean ageI=68.9C=67.6 | 7 Days Therapy: CPM 3x/dayExercise and precautions educationGait trainingStair trainingCare giver education | 6 Days Therapy: same as intervention group | I=25C=23 |
| **Lau and Chiu31****2001****Quasi-experimental** | High | Unilateral or bilateral TKA Mean Age69.5 | CPM 23 hrs/d  6 d | Immobilization for 6 d | N = 48 N=17 with bilateral served as own controls |
| **Leach et al32****2006** **RCT** | Moderate | TKAMean age I=71.2C=72.9  | CPM: POD1, 0-30 degrees, 1hr, 2x/dIncreased by 10 degrees each dayPT POD1 slider board used independentlyquad strengtheningPOD3 walking  | No CPMPT POD1: :Slider board quad strengtheningPOD3: Walking  | I=38C=44 |
| **Lenssen et al52****2006** **RCT** | Low | TKA Mean ageI=70C=67 | PT 2x/d, 40 minutes daily totalPT: active and passive ROM ofthe knee, quadriceps strengthening; transfer training; walking;stair climbing | PT (same as intervention group) 1x/d, 20 minutes daily total | I: 21C: 22 |
| **Maniar et al46****2012****RCT** | High | TKAMean AgeI1: 66.81I2:66.06C: 67.42 | **I1:** One day of CPM**I2:** Three days of CPM | No CPM | I1: 28I2: 30C: 28 |
| **Mau-Moeller et al44****2014** **RCT** | Moderate | TKAMean age 67.95 | Sling exercise training | Continuous passive motion (CPM) | I=19C=19 |
| **Munk et al47****2002** **RCT** | Moderate | TKAMean ageI: 65, C: 63 | Medical elastic compression stocking. | No stocking. | I: 43C: 42 |
| **Ni et al51****2015****Systematic Review** | Moderate | TKA | Cryotherapy | Any comparison | **# studies /outcome**Pain on POD1: 7 studies, 469 TKAs  |
| Pain on POD2: 4 studies, 262 TKAs |
| POD3: 5 studies, 371 TKAs |
| **Nigam etal20** **2011** **RCT** | High | TKA Mean ageI: 67.9C: 69.3;  | Non-invasive, interactive Neurostimulation using InterX Plus ‘Standard’ rehabilitation3d2-3x/d20 min36 electrodes in contact with skinintensity strong but comfortablePreset pulses/sec (1 or 4) | Standard rehabilitation Chair transferWalking with deviceROM exercises; stairsCar transfers3 d2x/d | I: 30C: 31 |
| **Pereira and Jolles33** | Moderate | TKAMean age71.1 | A+ mobilization for knee flexion and extension 2x/d from POD1 to POD7; plusStandard care | Standard care only | I: 19C: 21 |
| **Pichonnaz et al48****2016****RCT** | High | TKAMean ageI:70.1C: 71.3 | Manual lymphatic drainage 30 min from POD2 and POD7 plus standard rehabilitation program 2x/d (active, active-assistive, and muscle strengthening exercises, CPM, weight-bearing on POD2, ice) | Relaxation exercise sessions plus standard rehabilitation | I: 30C: 30 |

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| **Pongkunakorn and Sawatphap22****2014****Quasi-experimental** | High | TKAMean ageI: 67.0C: 68.5 | Drop and dangle operative leg over side of bed while sitting; passively flexing by pushing on the leg with opposite foot; followed by active extension with assistance by pushing with opposite foot on the calf1 hr, 3x/d | CPM starting from 0 to 60 degrees and increasing by 15 degrees or more each day as tolerated.1 hr, 3x/d | I: 36C: 33 |
| **Pope et al21****1997** **RCT** | High | TKAMean ageI1: 72.5I2: 72.7C: 69.6 | **I1:** CPM 0 to 40 degrees**I2:** CPM 0-70 degrees | No CPM | I1:19I2: 18C: 20 |
| **Pua et al23****2014****Quasi-Experimental** | High | TKAMean ageI:66.1C: 66.8 | Ambulation on POD1 plus standard physiotherapy (knee ROM and strengthening) | Ambulation on POD2 plus standard physiotherapy (knee ROM and strengthening) | I: 803C: 701 |
| **Rakel et al41****2014****RCT** | Low | TKAMean age I:63C1:62C2:62 | TENSContinuous, frequency of 150pps, duration 150μsecApplied 20 min prior to and during exercise sessionExercise session: flexibility, strengthening and endurance1-2x/d | **C1**: placebo TENS with exercise session**C2:** exercise sessions and standard pharmacological management of pain | I: 122C1: 128C2:72 |
| **Renkawitz et al24****2010****Controlled Trial** | High | TKAMean ageI:67.0C:68.1 | Optimized accelerated clinical pathway | Standard accelerated clinical pathway | I:76C:67 |
| **Starks et al25****2014****Quasi-experimental (historical comparison group)** | High | TKAMean AgeI:71C:72 | Enhanced Recovery Pathway | Standard Care | I:1,245C:1,099 |
| **Thienpont26****2013****RCT** | High | TKAMean AgeI:67.5 C:68.5 | Advanced Cryotherapy: computer assisted device for continuous cold therapy at 11 degrees CFull weight-bearing and active ROM POD1 | Cold Pack: intermittent cold at -17 degree C for 15 minFull weight-bearing and active ROM POD1 | I:58C:58 |
| **Tsang et al38****2007****RCT** | Low | Bilateral TKAMean age I:70.6C:66.1 | Acupuncture start POD4Points=ST32, ST33, GB31, GB35, GB34, ST3613-25mm deepmanipulated until numbness and tingling, every 5 min for 20 minbreathing exercisesactive and passive lower limb exercises iceQuadriceps strengthening exerciseNEMS if quad strength<3Full weight-bearing ambulation with assistive device | Sham acupuncture start POD42 cms away from points=ST32, ST33, GB31, GB35, GB34, ST36<5mm deepnot manipulatedBreathing exercisesActive and passive lower limb exercises IceQuadriceps strengthening exerciseNMES if quad strength<3Full weight-bearing ambulation with assistive device | I: 18C: 18 |
| **Wang, et al34****2015****RCT** | Moderate | Elective TKAMean ageC: 71.7 I: 73.5  | CPM with 30 min biofeedback –assisted progressive muscle relaxation training | CPM without biofeedback therapy | C: 33I: 33 |
| **Wanich, et al43****2011****RCT** | Moderate | TKA | Percutaneous neuromodulation beginning 36 to 48 hrs post-op.2x/d, 30 min, strong intensity per patient sensationCPM 2x dayPhysical therapy | Sham percutaneous neuromodulation beginning 36 to 48 hrs post-op.2x/d, 30 min, strong intensity per patient sensationCPM 2x dayPhysical therapy | I: 13C: 10 |
| **Yang et al35****2013****RCT** | Moderate | TKA | **I1:**TCM, CPM, PT, NSAIDS**I2:** TCM, CPM, NSAIDSTCM: rotate skin and muscle of thigh inward with push/pull along hip; mobilize hip, foot, ankle with rotating and shaking; acupressure or massage calf, leg, thigh, gluteal and lower back; slow mobilization of knee as tolerated (3-5x)CPM= 8 hrs/dPT= daily, isotonic, isometric knee and hip muscles; walking with device and weight-bearing; transfers | C:PT,CPM, NSAIDs | I1: 13I2:11C: 17 |
| Mean ageI1: 70.9I2: 68C: 69.5 |
| **Yashar et al49****1997****RCT** | Moderate | Bilateral or unilateral TKAMean ageI: 69.8C: 69.1 | CPM with accelerated flexion beginning in PACU70-100 degrees of motion for 24 hrs40-100 degrees of motion after 24 hrs Progressed as toleratedPT with emphasis on walking and ROM | Knee immobilizer for 24 hrs postop; CPM 0-30 degree starting POD1;Progressing 10 to 15 degrees per day as toleratedPT with emphasis on walking and ROM | I: 104C: 106 |
| **Zietek, et al42****2015****RCT** | Moderate | TKAMean AgeC:70I:68 | Two 15 minute walks, 4 to 6 hours after recovery from anesthesiaActive and passive exercises, transfers, full weight bearing on POD1, stairs on POD2; cold | One 15-minute walk, 4 to 6 hours after recovery from anesthesiaActive and passive exercises, transfers, full weight bearing on POD1, stairs on POD2; cold | I:31C:31 |

Abbreviations: AROM: active range of motion; C: comparison group; CPM: continuous passive motion; d: day; I: intervention group; hr: hour; MLD: manual lymphatic drainage; NMES: neuromuscular electrical stimulation NSAIDS: non-steroidal anti-inflammatory drugs; OA: osteoarthritis; PACU: post-anesthesia care unit; PCA: patient controlled analgesia; preop: pre-operative; POD: post-operative day; postop: post-operatively; PROM: passive range of motion; pt: patient; PT: physical therapy; RA: rheumatoid arthritis; RCT: randomized controlled trial; ROM: range of motion; sec: second; TCM: traditional Chinese medicine; TKA: total knee arthroplasty