

Supplementary Table 2 Description of RCTs of Prehabilitation versus No Prehabilitation for TKR/THR

Study Name	No. of patients	Type of surgery	Comparison	Rehabilitation	Results				
					Pain	Function improvement	Quality of Life	Resource use	others
Beaupre 2004	131	TKR	PT supervised exercise + postop education vs. usual care	Standard postop mobilization routine	WOMAC pain: NS SF-36 bodily pain: NS NS from 3mo. to 1 year postoperatively	Knee ROM: NS; Quadriceps strength: NS; Hamstring Strength: NS WOMAC stiffness and function: NS; SF-36 physical functioning: NS from 3mo. to 1 year postoperatively	SF-36: NS in each domains, PCS, and MCS from 3mo. to 1 yr postoperatively	Acute care LOS, transfer LOS, readmission LOS, and total LOS: NS (total LOS: -1.5 d) Institutional costs, homecare costs, readmission costs, total costs: NS (total cost: + \$33);	Postoperative complications:e. g. pulmonary emboli (n=2), deep vein thrombosis (n=9), infection (n=5), postoperative Angina: NS
Bitterli 2011	80	THR	Preoperative sensorimotor training at home (daily exercises at home) vs. no	Postop. Standard therapy protocol in hospital	SF-36 pain: : NS after surgery (4mo.,1 year)	SF-36 physical function: NS after surgery (4mo,1 year) WOMAC: NS after surgery (4mo, 1year)	SF-36: NS in each domains after surgery (4mo.,1year)	LOS: NS (14.6 vs. 14.6 d)	-

			therapy	Usual care						
				therapeutic modalities after discharge						
Brown 2012	32	TKR	Preop. exercise intervention vs. no prehabilitation	-	SF-36 pain : NS at 3mo. after surgery	SF-physical function score: ↑(MD+27.1)	SF-36:↑ in physical function score (MD+27.1)	-	-	-
							NS in other domains			
D'Lima 1996	30	TKR	Preop physical therapy vs. cardiovascular conditioning program with exercise vs. no intervention	-	Hospital for Special Surgery Knee Rating pain(0-30):NS from 3wk 1yr	Hospital for Special Surgery Knee Rating function (0-52):NS from 3wk to 1yr	Quality of Well Being scores (0-1): Percentage improvement - NS	LOS: NS	-	-
							Arthritis impact measurement scale scores (0-10): Percentage improvement NS			
Evgeniadis 2008	48	TKR	Preop.exercise vs. no intervention	-	-	ILAS score: NS after surgery(2, 6, 10, 14wks)	SF-36: NS at 1 day pervious to surgery (preop)	-	-	-
						Active ROM:NS after surgery				

(2, 10, 14wks)

Ferrara 2008	23	THR	Educational and PT supervised physiotherapy program vs. no intervention	Postop. 4weeks standard exercise protocol	VAS: ↓ at 1, 3 mo. (MD -1.8, -0.97) WOMAC pain: NS at 3 mo.	ROM external rotation: ↑ at 15days, 1 and 3 mo. after surgery (MD +7.69, +0.14)	SF-36 PCS: ↑ at 1 mo, but NS at 3 mo (MD +7.1 at 1 mo) SF-36 MCS: NS	-	-
						Harris Hip Score: NS at 1 and 3mo Barthel Index: NS at 1 and 3mo WOMAC stiffness and function: NS at 3mo			
Gilbey 2003	76	THR	8wks customized exercise program vs. no exercise	Postop. Exercise program (until 12wks after surgery) VS routine in- hospital PT	WOMAC pain: NS	Mean ROM at 3, 12, 24wks: ↑ (MD+6,+11,+12) Hip strength mean Z score after surgery (12, 24wks): ↑ (MD+0.35, +0.6) WOMAC total score after surgery (3,12,24wks): ↑(MD+8, +9, +9) WOMAC stiffness: NS, 3,12,24wks		-	-

						WOMAC function: ↑ 3, 12, 24wks			
Gocen 2004	60	THR	Physiotherapy and educational program vs. no exercise or education	Routine postop. Exercise and educational program	VAS at rest at discharge: NS (MD- 0.12) VAS at activity at discharge: NS (MD- 0.06)	Hip adduction at discharge: NS (MD-0.1) Harris Hip Score: NS at 3mo, 2 years after surgery (MD+0.9,+4)	-	LOS: NS	-
Gstoettner 2011	38	TKR	PT supervised exercise vs. no exercise	-	WOMAC pain: NS; 6wk postoperatively	KSS: NS; KSS function: NS; WOMAC stiffness: NS; WOMAC function: NS; Gait speed (60m):NS; Gait speed (stairs up):NS; Gait speed (stairs down): NS; Knee stability (OSI): NS; Knee stability (MLSI) : NS; 6wk postoperatively Knee stability (APSI) : ↓ (MD -0.6) 6wkpostoperatively	-	-	-

Hoogeboom 2010	21	THR	Therapeutic exercise program vs. usual care	Postop. usual care protocol till discharge	HOOS pain: NS VAS: NS At baseline and preop,	Functional recovery: NS HOOS (in all domains): NS LASA physical activity questionnaire (all domains): NS At baseline and preop	Patient-specific complaints (PSK): NS At baseline and preop	LOS: NS 6 vs. 6 days	2 postoperative complications in exercise group: femur fracture and intestinal obstruction. no serious AE
Matassi 2014	122	TKR	Preoperative home exercise program vs. regular activities	Same postop. physiotherapy routine	-	Mean time to reach 90° of knee ROM: ↓ (MD -1.1 day) Active knee flexion: NS at 6wks. 6mo, 1yr Passive knee flexion: NS at 6wks. 6mo, 1yr Knee score or patient function score (Knee Society Clinical Rating System): NS at 6wks, 6 mos. 1 yrs.	-	LOS: ↓ (MD -0.8 day)	-
McKay 2012	22	TKR	Lower-body strength training program vs. nonspecific upper-body	Standard postop. care	WOMAC pain: NS, MD+0.7, +0.9 at 6 and 12wks.	SF-36 PSC: NS Quadriceps strength: NS 50-foot walk: NS Stair test: NS Arthritis self-efficacy	SF-36 (PCS, MCS): NS after surgery	-	-

			strength training program (placebo)			(including pain, physical function, and other symptoms):			
Mitchell 2005	160	TKR	PT supervised pre- & postop home exercise (home PT) vs. no pre-op exercise + usual hospital PT postop	Postop home exercise or hospital PT	WOMAC pain: NS SF-36 bodily pain: NS NS at 12wk	WOMAC physical function: NS; WOMAC stiffness: NS; SF-36 physical function: NS at 12wk	SF-36: NS in each domains SF-6D: NS Patient satisfaction with PT: NS (86% in both groups) at 12wk	LOS: NS (MD - 0.4d) Cost of PT: NS(MD + £1.4) Total cost: NS(MD + £4.7)	45 withdrawn patients had significantly poor score on the SF-36 general health, energy, and more reported heart problems and stroke/TIA.
Oosting 2012	30	THA	PT supervised exercise vs. usual care	-	HOOS pain: NS VAS: NS 6wk changes from baseline.	TUG: NS; CRT: ↓ (MD -9.2s); 6MWT: NS; PSC: NS; HOOS other symptoms, function in daily living, function in sport and recreation: NS; LAPAQ: NS;	HOOS hip-related quality of life: NS Patient Specific Complaints (PSC) questionnaire score: NS	LOS: NS (MD - 0.3d) Nursing home after discharge: NS	No severe adverse events Complications: e.g. Wound, delirium, loss of sensation, decubitus ulcers, and

					6wk post-discharge changes				
					from baseline				
Rooks 2006	108	THA+ TKA	PT supervised exercise+education vs. education	-	For THR: WOMAC pain: NS SF-36 pain: NS 8wk and 26wk postoperatively	For both THR and TKR: WOMAC function: NS; SF-36 physical function: NS SF-36 role limitation physical: NS; 1-repetition maximum: NS ; Timed up and go: NS ; 8wk and 26wk postoperatively Functional reach: NS ; 8wk and 26wkpostoperatively	-	-	-
					SF-36 pain: NS 8wk postoperatively SF-36 pain: ↑(MD+11.5) 26wk changes from baseline				
Topp 2009	54	TKA	PT supervised exercise vs. usual care	Postoperative rehabilitation	Pain in Sit-to-stand, 6MWT, Ascent and descent stairs: NS? at 1, 3mo.	Sit-to-stand: NS? 6MWT: NS? Ascent and descent stairs: NS? Maximum extension strength of	-	-	-

					postoperatively	the surgical knee, nonsurgical			
					No between-group comparison	knee: ?			
						Maximum extension strength of the surgical knee:?			
						at 1, 3mo. postoperatively			
						No between-group comparison			
Tungtron	60	TKA	Quadriceps	-	Modified WOMAC	Total Modified WOMAC	-	-	-
gjit 2012			exercise vs. usual care		pain score: ↓ (MD -6.3)	score: ↓ (MD -26.7)			
					VAS: ↓ (MD -0.9)	Modified WOMAC stiffness score: ↓ (MD -2.5)			
					at 1 mo postoperatively	Modified WOMAC function score: ↓ (MD -17.7)			
					Modified WOMAC	Quadriceps strength: ↑(MD+1.5)			
					pain score: ↓ (MD -5.2)	at 1 mo postoperatively			
					VAS: ↓ (MD -1)	Total Modified WOMAC score: ↓ (MD -17.7)			
					at 3 mo postoperatively	Modified WOMAC stiffness score: ↓ (MD -2)			
					Modified WOMAC	Modified WOMAC function			

pain score: ↓ (MD -

2.3)

VAS: NS

at 6 mo

postoperatively

score: ↓ (MD -10.3)

Quadriceps strength:

↑(MD+2.2)

at 3 mo postoperatively

Total Modified WOMAC

score: NS

Modified WOMAC stiffness

score: NS

Modified WOMAC function

score: NS

Quadriceps strength: NS

at 6 mo postoperatively

Knee Flexion: NS

Knee Extension: NS

Total knee ROM: NS

at 1, 3, 6 mo postoperatively

Villadse n 2014	165	THA+ TKA	PT supervised exercise + education vs. education	Postoperative rehabilitation	For THR+TKR: KOOS/HOOS Pain: ↓ (MD -5.4) For THR: KOOS/HOOS Pain: NS changes at 6wk and 3mo postop from base line For TKR: KOOS/HOOS Pain: ↓ (MD -8)	For both THR+TKR or For TKR: KOOS/HOOS ADL: ↑ at 6wkpostop, but NS at 3mo postop For THR: KOOS/HOOS ADL: NS at 6wk and 3mo postop For THR+TKR or THR or TKR: KOOS/HOOS symptoms: NS KOOS/HOOS sport and recreation: NS At 6wk or 3 mo postop changes from baseline. Single-joint hip extension and hip abduction: ↑ (~15% and 35% improvement)	For both THR+TKR or TKR: EQ5D VAS: ↓ (MD - 7.6) at 6wk postop, but NS at 3mo postop For THR: EQ5D VAS: NS At 6wk and 3mo postop For TKR: EQ5D VAS: ↓ (MD - 8.8) changes at 6wk postop from baseline, but NS changes at 3mo postop from baseline For THR+TKR or THR or TKR: EQ5D index: NS	-	One patient with hip OA discontinued the exercise due to an increase in pain. 2 patients from the control group developed deep periprosthetic infection.
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					Chair stand: NS	KOOS/HOOS QOL:			
					20-m walk: NS	NS			
					Knee bends: NS	At 6wk or 3 mo postop			
					Contra: NS	changes from baseline.			
					at 3mo				
Vukoma novic 08	45	THA	PT supervised exercise +education vs. no interventions	Postoperative rehabilitation	Pain at rest (VAS): NS Pain on movement (VAS): NS at discharge postop	First day of activities – use of toilet↓ (MD -0.9d), use of chair↓ (MD -1.05d), and walking up and down stairs: ↓ (MD -1.67d) Changing position in bed: ↑(MD +0.95) Changing position on the edge: ↑(MD +0.9) From sitting to standing: ↑(MD +1.05) Standing: ↑(MD +1.1) Changing position to lying: ↑(MD +1.15) Walking: ↑(MD +1.15)	-	LOS: NS (- MD +0.4d) Class with the therapist: ↓ (MD- 1.65)	Five patients were excluded postoperatively because of complications during and post operation.

Use of toilet: ↑(MD +1.9)

Use of Chair: ↑(MD +1.9)

Walking up and down stairs:

↑(MD +1.8)

Endurance while walking:

↑(MD +1)

at the 3rd day postoperatively

Changing position in bed:

↑(MD +0.4)

Changing position on the edge:

↑(MD +0.45)

From sitting to standing: ↑(MD

+0.45)

Standing: ↑(MD +0.45)

Changing position to lying:

↑(MD +0.45)

Walking: ↑(MD +0.5)

Use of toilet: ↑(MD +1)

Use of Chair: ↑(MD +1.25)

Walking up and down stairs:

						↑(MD +1.85)			
						Endurance while walking:			
						↑(MD +1)			
						at the discharge			
						Flexion of the hip flexed knee:			
						NS			
						Flexion of the hip extended			
						knee: NS			
						Abduction:: NS			
						Harris hip score: NS			
						JOA hip score: NS			
						At discharge postoperatively			
						Oxford Hip Score: NS			
						At 15 mo postoperatively			
Wang	28	THA	PT supervised	Postoperative	-	Cadence (steps/min): ↑(MD	-	-	Complications:
2002			pre- & post-	exercise or		+18)			NS
			operative	usual care		Stride length: ↑(MD +0.06m)			no wound
			exercise vs. PT			Gait velocity: ↑(MD +0.28)			infections,
			supervised pre-			At 3 wk postoperatively			joint
			& post-operative						

usual care

Cadence (steps/min): ↑(MD +9)

Stride length: NS

Gait velocity: ↑(MD +0.2)

At 12 wk postoperatively

Cadence (steps/min): ↑(MD +10)

Stride length: NS

Gait velocity: ↑(MD +0.21)

At 24 wk postoperatively

6MWT: NS

At 12 wk postoperatively

6MWT: ↑(MD +64m)

At 24 wk postoperatively

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ielm
1993

TKP

PT supervised
exercise vs. no
exercise

-

VRS (no, mild,
moderate, and severe
pain): NS

Passive ROM: NS

-

-

-

No. patients grading the knee as
stable or unstable: NS

dislocations,
complications
requiring
return to the
operating
room,
or major
medical
complications

					Pain at walk: NS	Isokinetic quadriceps strength			
					At 3mo.	(at 30 and 90 degree): NS			
						Walking speed (self-selected and maximal): NS			
						at 3 mo postoperatively			
Williams on 2007	120	TKR	PT supervised exercise vs. education leaflet	-	VAS: NS (MD -0.09 at 3mo postop)	OKS: NS (MD +1.61) 50-m walk: NS (MD +2.51s) WOMAC: NS (MD+1.33) at 3mo postop	HAD score anxiety: NS (MD +1.84) HAD score depression: NS (MD -0.25)	HLOS: NS (MD - 1.27d) Cost of PT: £9 per patient	No adverse responses

6MWT: 6-minute walk test; ADL: activities of daily living; APSI: anteroposterior stability index; EQ5D: EuroQol 5 Dimension Health Questionnaire; HAD: Hospital Anxiety and Depression score; HOOS: Hip disability and Osteoarthritis Outcome Score; ILAS: Iowa Level of Assistance Scale; KOOS: Knee injury and Osteoarthritis Outcome Score; KSS: Knee Society Score; LASA: Longitudinal Aging Study Amsterdam; LOS: length of stay; MCS: mental component summary; MD: mean difference; MLSI: medio-lateral stability index; NS: not significant; OA: Osteoarthritis; OKS: Oxford Knee Score questionnaire; OSI: overall stability index; PCS: physical component summary; postop: postoperative; preop: preoperative; PT: physical therapist; ROM: range of motion; THR: total hip replacement; TKP: total knee replacement; TUG: Timed Up & Go; VAS: visual analogue scale; VRS: verbal rating scale; WOMAC: Western Ontario and McMaster Universities Arthritis Index

