NKR-41 Superviseret styrketræning versus standard behandling efter total hoftealloplastik

Review information

Authors

Sundhedsstyrelsen[1]

[1][Empty affiliation]

Characteristics of studies

Characteristics of included studies

Husby 2009

Methods	**Study design:** Randomized controlled trial **Study grouping:** Parallel group

Participants	**Baseline Characteristics**
	Intervention
	  ● *Age, mean (SD)*: 58 (5)
	  ● *Female, N (%)*: 7 (58)
	  ● *BMI, mean (SD)*: 28.1 (2.9)
	
	Control
	  ● *Age, mean (SD)*: 56 (8)
	  ● *Female, N (%)*: 8 (67)
	  ● *BMI, mean (SD):* 28.2 (6.5)
	
	Included criteria: Inclusion criteria were age less than 70 years, a diagnosis of primary osteoarthritis as the main cause for elective THA surgery, and an ASA score of PI.
	Excluded criteria: Exclusion criteria included muscular or skeletal disease that might influence the training and physical testing performance, heart or lung diseases, and diabetes mellitus.

Interventions	**Intervention Characteristics**
	Intervention
	  ● *Strength training*: Usual care + strength training.
	  ● *Dose/duration*: 4 sets 5/wk for 4 weeks, intensity 85% of max
	
	Control
	  ● *Strength training*: Usual care, inpatient rehabilitation.
	  ● *Dose/duration*: 5 days/wk, 2 patients home-based

Outcomes	*Patientrapporteret funktionsevne, efter endt behandling*
	  ● **Outcome type**: Continuous Outcome
	  ● **Reporting**: Fully reported
	  ● **Scale**: Merle D'Aubigné and Postelscoring system
	  ● **Range**: 3-18
	  ● **Unit of measure**: Points
	  ● **Direction**: Higher is better
	  ● **Data value**: Endpoint
	
	Præstationsbaseret funktionsevne, efter endt behandling
	  ● **Outcome type**: Continuous Outcome
	  ● **Reporting**: Not reported
	
	Smerte (hofterelateret), efter endt behandling
	  ● **Outcome type**: Continuous Outcome
	  ● **Reporting**: Not reported
	
	Helbredsrelateret livskvalitet
	  ● **Outcome type**: Continuous Outcome
	  ● **Reporting**: Fully reported
	  ● **Scale**: SF-36 Physical Component Score (PCS)
	  ● **Range**: 0-100
	  ● **Unit of measure**: Points
	  ● **Direction**: Higher is better
	  ● **Data value**: Endpoint
	
	Patientrapporteret funktionsevne, langtidseffekt
	  ● **Outcome type**: Continuous Outcome
	  ● **Reporting**: Not reported
	
	Hofteluksation, i interventionsperioden
	  ● **Outcome type**: Adverse Event
	  ● **Reporting**: Not reported
	
	Reoperation, i interventionsperioden
	  ● **Outcome type**: Adverse Event
	  ● **Reporting**: Not reported
	
	Hævelse, i interventionsperioden
	  ● **Outcome type**: Adverse Event
	  ● **Reporting**: Not reported
	
	Træningsinducerede skader i bevægeapparatet, i interventionsperioden
	  ● **Outcome type**: Adverse Event
	  ● **Reporting**: Not reported

	Smerte (ikke hofterelateret), i interventionsperioden ● **Outcome type**: Adverse Event ● **Reporting**: Not reported
Identification	**Sponsorship source:** No commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit on the authors or on any organization with which the authors are associated. **Country:** Norge **Authors name:** Husby, 2009
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Blinding of participants and personnel	High risk	Judgement Comment: Not feasible to blind participants.
Selective outcome reporting	Low risk	Judgement Comment: Reports both data with and without effect. No sign of selective outcome reporting.
Incomplete outcome data	Low risk	Judgement Comment: All participants included in analysis.
Other sources of bias	Unclear risk	Judgement Comment: No information
Blinding of outcome assessors	High risk	Judgement Comment: Not blinded participants. Not described regarding physical performance test.
Sequence Generation	Low risk	SUPPORTING ANNOTATIONS: "We randomly assigned the patients manually by drawing lots. The procedure was performed by 2 persons not familiar with the different treatment options. We"
Allocation concealment	Unclear risk	SUPPORTING ANNOTATIONS: "We randomly assigned the patients to either the group performing maximal strength train- ing in addition to the conventional rehabilitation program (STG), or to the group that participated in the conventional rehabilitation program only (CRG)."

Mikkelsen 2014

Methods	**Study design:** Randomized controlled trial **Study grouping:** Parallel group
Participants	**Baseline Characteristics** Intervention ● *Age, mean (SD)*: 64.8 (8) ● *Female, N (%)*: 14 (44) ● *BMI, mean (SD)*: 27.5 (4) ● *Sit-to-stand test (repetitions in 30sec), mean (SD):* 11.56 (3.9) Control ● *Age, mean (SD)*: 65.1 (10) ● *Female, N (%)*: 12 (40) ● *BMI, mean (SD):* 25.4 (4) ● *Sit-to-stand test (repetitions in 30sec), mean (SD):* 11.90 (4.6) **Included criteria:** Inclusion criteria were: Primary unilateral THR for hip osteoarthrosis (OA), preoperative HOOS ADL67, age>18 years, residence within 30 km from the hospital and willing to participate in training twice a week for 10 weeks. **Excluded criteria:** Exclusion criteria were: Resurfacing hip implant,body mass index (BMI)>35, pre-planned supervised rehabilitation, pre-planned contralateral THR within 6 months, inability to speak or read Danish and mental or physical conditions impeding the intervention
Interventions	**Intervention Characteristics** Intervention ● *Strength training*: Strength training (ST) + home-based exercises ● *Dose/duration*: ST 2/wk for 10 weeks, 10-12RM - 8RM (60-80%) and home-based exercises 5 days a week Control ● *Home-based exercises:* The standardised exercise program consisted of unloaded exercises in the movement directions: hip flexion, -extension, -abduction and knee flexion/extension. One set of 10 repetitions twice a day in their maximum possible range of motion. ● *Dose/duration*: One set of 10 repetitions twice a day in their maximum possible range of motion, 7 days a week.
Outcomes	*Patientrapporteret funktionsevne, efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Fully reported ● **Scale**: HOOS ADL ● **Range**: 0-100 ● **Unit of measure**: Points ● **Direction**: Higher is better ● **Data value**: Endpoint *Patientrapporteret funktionsevne, langtidseffekt* ● **Outcome type**: Continuous Outcome ● **Reporting**: Fully reported ● **Scale**: HOOS ADL ● **Range**: 0-100 ● **Unit of measure**: Points ● **Direction**: Higher is better ● **Data value**: 1 year *Præstationsbaseret funktionsevne, efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Fully reported ● **Scale**: Rejse/sættes sig test (30 sek) ● **Unit of measure**: Antal oprejsninger på 30 sek ● **Direction**: Higher is better

- **Data value**: Endpoint

Smerte (hofterelateret), efter endt behandling
- **Outcome type**: Continuous Outcome
- **Reporting**: Fully reported
- **Scale**: HOOS Pain
- **Range**: 0-100
- **Unit of measure**: Points
- **Direction**: Higher is better
- **Data value**: Endpoint

Helbredsrelateret livskvalitet, efter endt behandling
- **Outcome type**: Continuous Outcome
- **Reporting**: Fully reported
- **Scale**: HOOS QOL
- **Range**: 0-100
- **Unit of measure**: Points
- **Direction**: Higher is better
- **Data value**: Endpoint

Hofteluksation, i interventionsperioden
- **Outcome type**: Adverse Event
- **Reporting**: Fully reported
- **Data value**: Endpoint

Reoperation, i interventionsperioden
- **Outcome type**: Adverse Event
- **Reporting**: Not reported
- **Data value**: Endpoint

Hævelse, i interventionsperioden
- **Outcome type**: Adverse Event
- **Reporting**: Not reported

Træningsinducerede skader i bevægeapparatet, i interventionsperioden
- **Outcome type**: Adverse Event
- **Reporting**: Fully reported
- **Data value**: Endpoint

Smerte (ikke hofterelateret), i interventionsperioden
- **Outcome type**: Adverse Event
- **Reporting**: Partially reported
- **Data value**: Endpoint

Identification	**Sponsorship source:** The study was supported by grants from The Health Research Fund of Central Denmark Region, The Danish Rheumatism Association (R70-A1104), The Association of Danish Physiotherapists,The Health Foundation and Aase and Ejnar Danielsens Foundation(10-000067). The study sponsors had no role in the study design, collection, analysis and interpretation of data; nor in the writing of the manuscript or the decision to submit the manuscript for publication **Country:** Danmark **Authors name:** Mikkelsen, 2014
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Blinding of participants and personnel	High risk	Judgement Comment: Not feasible to blind participants.
Selective outcome reporting	Low risk	Judgement Comment: None detected.
Incomplete outcome data	Low risk	Judgement Comment: Small and equal drop out rate i the groups.
Other sources of bias	Low risk	Judgement Comment: None detected.
Blinding of outcome assessors	High risk	Judgement Comment: Not blinded participants. Outcome assessores were blinded regarding physical performance test.
Sequence Generation	Low risk	Judgement Comment: "Sequence in permuted blocks with equal numbers of "intervention" and "control" assignments was obtained".
Allocation concealment	Low risk	SUPPORTING ANNOTATIONS: "equal distribution between the groups. Sequence in permuted blocks with equal numbers of "intervention" and "control" assignments was obtained using a simple "shuffling envelope" procedure before study initiation by a secretary not involved in the study. During admission, staff and patients".

Suetta 2004

Methods	**Study design:** Randomized controlled trial **Study grouping:** Parallel group
Participants	**Baseline Characteristics** Intervention - *Age, mean (range)*: 69 (60–86) - *Female, N (%)*: 6 (46) - *BMI, mean (SE)*: 28.2 (1.7) - *Sit to stand x 5 (seconds), mean (SE):* 12.7 (4.0) Control - *Age, mean (range)*: 68 (62–78) - *Female, N (%)*: 7 (58) - *BMI, mean (SE):* 27.4 (1.4)

	● *Sit to stand x 5 (seconds), mean (SE):* 14.3 (3.1)
	Included criteria: Eligibility criteria included age of 60 and older and unilateral primary hip replacement due to primary hip osteoarthrosis in patients without card-iopulmonary, neurological, or cognitive problems. To avoid differences in comorbidity between groups, only patients withan American Society of Anesthesiologists (ASA) score of I to II(I=no comorbidity, II=comorbidity but no systemic affection) were included **Excluded criteria:** See inclusion
Interventions	**Intervention Characteristics** Intervention ● *Strength training*: Strength training + home-based exercise ● *Dose/duration*: 3/wk for 12 weeks Control ● *Strength training*: Home-based exercises ● *Dose/duration*:
Outcomes	*Patientrapporteret funktionsevne, efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Fully reported ● **Scale**: Merle D'Aubigné and Postelscoring system ● **Range**: 3-18 ● **Unit of measure**: Points ● **Direction**: Higher is better ● **Data value**: Endpoint *Præstationsbaseret funktionsevne, efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Fully reported ● **Scale**: Sit-to-stand test (5 reps) ● **Unit of measure**: Seconds ● **Direction**: Lower is better ● **Data value**: Endpoint *Patientrapporteret funktionsevne, langtidseffekt* ● **Outcome type**: Continuous Outcome ● **Reporting**: Not reported *Smerte (hofterelateret), efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Not reported *Helbredsrelateret livskvalitet, efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Not reported *Hofteluksation, i interventionsperioden* ● **Outcome type**: Adverse Event ● **Reporting**: Not reported *Reoperation, i interventionsperioden* ● **Outcome type**: Adverse Event ● **Reporting**: Not reported *Hævelse, i interventionsperioden* ● **Outcome type**: Adverse Event ● **Reporting**: Not reported *Træningsinducerede skader i bevægeapparatet, i interventionsperioden* ● **Outcome type**: Adverse Event ● **Reporting**: Fully reported ● **Data value**: Endpoint *Smerte (ikke hofterelateret), efter endt behandling* ● **Outcome type**: Adverse Event ● **Reporting**: Not reported
Identification	**Sponsorship source:** None stated **Country:** Danmark **Authors name:** Suetta, 2004
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Blinding of participants and personnel	High risk	Judgement Comment: Staff was blinded, but blinding participants seems impossible
Selective outcome reporting	Unclear risk	Judgement Comment: No reasons to suspect selective outcome repoting from report however, no pre-specified protocol.
Incomplete outcome data	High risk	Judgement Comment: 25% drop out in control group and 18% in intervention group. No intention-to-treat analysis.
Other sources of bias	High risk	Judgement Comment: 32 out of 68 refused to participate in trial
Blinding of outcome assessors	High risk	Judgement Comment: Not blinded participants. Likely blinded assessors regarding physical performance test.
Sequence Generation	Low risk	SUPPORTING ANNOTATION: "The randomization procedure was performed with the aid of a computer program (Minimize version 2.1, C. V. Jensen, Rigshospitalet; Copenhagen,Denmark), and patients were stratified by age and sex."

Allocation concealment	Unclear risk	Judgement Comment: No infomation.

Winther 2018

Methods	**Study design:** Randomized controlled trial **Study grouping:** Parallel group
Participants	**Baseline Characteristics** Intervention ● *Age, mean (SD)*: 61 (range 35-77) ● *Female, N (%)*: 17 (55) ● *BMI, mean (SD)*: 28 (4) ● *6-minute walking test (meter), mean (SD):* 499 (124) Control ● *Age, mean (SD)*: 66 (range 44-83) ● *Female, N (%)*: 15 (52) ● *BMI, mean (SD)*: 27 (3) ● *6-minute walking test (meter), mean (SD):* 498 (125) **Included criteria:** Patients diagnosed with primary osteoarthritis, scheduled for elective THA surgery at St Olavs University Hospital, Norway, living within short travel distance to the hospital, were asked to participate in the study **Excluded criteria:** Severe osteoarthritis of the contralateral hip, not fully recovered from previous THA surgery, communication difficulties, discharged to a rehabilitation institute, or any illness or disorder that could infl uence the training and/or physical test-ing performance.
Interventions	**Intervention Characteristics** Intervention ● *Description*: Maximal strenght training (MST). 2 strength training exercises. 5 repetitions x 4 series starting with a load equal to 85-90% of 1RM ● *Dose/duration*: 3 weekly visits for 3 months (optional up to 6 months) Control ● *Description*: Conventional physiotherapy (CP). Conventional rehabilitation regimen advised by the hospital ● *Dose/duration*: 3-6 months
Outcomes	*Patientrapporteret funktionsevne, efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Fully reported ● **Scale**: HOOS PS ● **Range**: 0-100 ● **Unit of measure**: Points ● **Direction**: Lower is better ● **Data value**: Endpoint (3 months) *Præstationsbaseret funktionsevne, efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Fully reported ● **Scale**: 6 MWT (m) ● **Unit of measure**: metres ● **Direction**: Higher is better ● **Data value**: Endpoint (3 months) *Smerte (hofterelateret), efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Fully reported ● **Scale**: Numeric Rating Scale (NRS) ● **Range**: 0-100 ● **Unit of measure**: Points ● **Direction**: Lower is better ● **Data value**: Endpoint (3 months) *Patientrapporteret funktionsevne, langtidseffekt* ● **Outcome type**: ContinuousOutcome ● **Reporting**: Fully reported ● **Scale**: HOOS PS ● **Range**: 0-100 ● **Unit of measure**: Points ● **Direction**: Lower is better ● **Data value**: Endpoint (12 months) *Helbredsrelateret livskvalitet, efter endt behandling* ● **Outcome type**: Continuous Outcome ● **Reporting**: Not reported *Hofteluksation, i interventionsperioden* ● **Outcome type**: Continuous Outcome ● **Reporting**: Not reported *Reoperation, i interventionsperioden* ● **Outcome type**: Continuous Outcome ● **Reporting**: Not reported Hævelse, *i interventionsperioden* ● **Outcome type**: Continuous Outcome ● **Reporting**: Not reported *Træningsinducerede skader i bevægeapperatet, i interventionsperioden* ● **Outcome type**: Continuous Outcome ● **Reporting**: Not reported

	Smerte der ikke er hofterelateret, i interventionsperioden ● **Outcome type**: Continuous Outcome ● **Reporting**: Not reported
Identification	**Sponsorship source:** Liaison Committee between the Central Norway Regional Health Authority (RHA) and the Norwegian University of Science and Technology [grant number 2010/708/MOCA] **Country:** Norway **Setting:** University Hospital **Authors name:** Siri B Winther **Institution:** Orthopaedic Research Centre, Department of Orthopaedic Surgery, Clinic of Orthopaedics, Rheumatology and Dermatology, St Olavs Hospital HF, Trondheim; 2 Department of Neuromedicine and Movement Science, Faculty of Medicine and Health Science, Norwegian U. **Email:** Siri.bjorgen@ntnu.no **Address:** Postbox 8905 MTFS, NO-7491, Trondheim, Norway
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Blinding of participants and personnel	High risk	Judgement Comments: Not possible to blind participants or personnel
Selective outcome reporting	Unclear risk	Judgement Comments: Primary outcomes matches protocol. HOOS, 6MWT and NRS however are not reported in protocol (NCT02498093)
Incomplete outcome data	Low risk	Judgement Comments: Low attrition rates (intervention 4/31, control 2/29 at 3 months)
Other sources of bias	Low risk	SUPPORTING ANNOTATIONS: "Technology [grant number 2010/708/MOCA]. <b>The funding sources had no impact on the analyses, interpretation, or presentation of the data."
Blinding of outcome assessors	High risk	Judgement Comments: Not reported. Some outcomes are self-reported.
Sequence Generation	Low risk	SUPPORTING ANNOTATIONS: "The randomization was stratified by sex and concealed by using a web-based service provided by the research department at the university."
Allocation concealment	Low risk	SUPPORTING ANNOTATIONS: "The randomization was stratifi ed by sex and concealed by using a web-based service provided by the research department at the university."

Footnotes

Characteristics of excluded studies

Austin 2017

Reason for exclusion	Wrong intervention

Barker 2013

Reason for exclusion	Wrong intervention

Barker 2013a

Reason for exclusion	Abstract only

Barker 2013b

Reason for exclusion	Wrong intervention

Beck 2019

Reason for exclusion	Wrong intervention

Coulter 2017

Reason for exclusion	Wrong intervention

Eichler 2019

Reason for exclusion	Wrong intervention

Elibol 2016

Reason for exclusion	Abstract only

Elibol 2018

Reason for exclusion	Abstract only

Fatoye 2020

Reason for exclusion	Wrong study design

Garvin 2018

Reason for exclusion	Abstract only

Hansen 2019

Reason for exclusion	Wrong study design

Klugarova 2016

Reason for exclusion	Wrong study design

Mitrovic 2017

Reason for exclusion	Wrong intervention

Monaghan 2015

Reason for exclusion	Abstract only

Monaghan 2017

Reason for exclusion	Abstract only

Monaghan 2017a

Reason for exclusion	Wrong intervention

Monticone 2014

Reason for exclusion	Wrong intervention

Morishima 2014

Reason for exclusion	Wrong intervention

Nankaku 2016

Reason for exclusion	Wrong dose

Nyberg 2002

Reason for exclusion	Wrong intervention

Okoro 2016

Reason for exclusion	Wrong intervention

Umpierres 2014

Reason for exclusion	Wrong intervention

Wijnen 2018

Reason for exclusion	Wrong study design

Wijnen 2018a

Reason for exclusion	Wrong study design

Wu 2019

Reason for exclusion	Wrong study design

Footnotes

References to studies

Included studies

Husby 2009

Husby,V. S.; Helgerud,J.; Bjørgen,S.; Husby,O. S.; Benum,P.; Hoff,J.. Early Maximal Strength Training Is an Efficient Treatment for Patients Operated With Total Hip Arthroplasty. Archives of Physical Medicine and Rehabilitation 2009;90(10):1658-1667. [DOI: 10.1016/j.apmr.2009.04.018]

Mikkelsen 2014

Mikkelsen,L. R.; Mechlenburg,I.; Soballe,K.; Jorgensen,L. B.; Mikkelsen,S.; Bandholm,T.; Petersen,A. K.. Effect of early supervised progressive resistance training compared to unsupervised home-based exercise after fast-track total hip replacement applied to patients with preoperative functional limitations. A single-blinded randomised controlled trial. Osteoarthritis and cartilage / OARS, Osteoarthritis Research Society 2014;22(12):2051-8. [DOI:]

Suetta 2004

Suetta,C.; Magnusson,S. P.; Rosted,A.; Aagaard,P.; Jakobsen,A. K.; Larsen,L. H.; Duus,B.; Kjaer,M.. Resistance training in the early postoperative phase reduces hospitalization and leads to muscle hypertrophy in elderly hip surgery patients - A controlled, randomized study. Journal of the American Geriatrics Society 2004;52(12):2016-2022. [DOI:

10.1111/j.1532-5415.2004.52557.x]

Winther 2018

Winther, Siri B.; Foss, Olav A.; Husby, Otto S.; Wik, Tina S.; Klaksvik, Jomar; Husby, Vigdis S.. A randomized controlled trial on maximal strength training in 60 patients undergoing total hip arthroplasty.. Acta Orthopaedica 2018;89(3):295-301. [DOI:]

Excluded studies

Austin 2017

Austin, Matthew S.; Urbani, Brian T.; Fleischman, Andrew N.; Fernando, Navin D.; Purtill, James J.; Hozack, William J.; Parvizi, Javad; Rothman, Richard H.. Formal Physical Therapy After Total Hip Arthroplasty Is Not Required: A Randomized Controlled Trial.. Journal of Bone & Joint Surgery - American Volume 2017;99(8):648-655. [DOI:]

Barker 2013

Barker,Karen L.; Newman,Meredith A.; Hughes,Tamsin; Sackley,Cath; Pandit,Hemant; Kiran,Amit; Murray,David W.. Recovery of function following hip resurfacing arthroplasty: a randomized controlled trial comparing an accelerated versus standard physiotherapy rehabilitation programme. Clinical rehabilitation 2013;27(9):771-84. [DOI:]

Barker 2013a

Barker K.; Newmany M.; Hughes T.; Kiran A.; Pandit H.; Murray D.. Recovery of function following hip resurfacing: A randomised controlled trial comparing a tailored versus standard physiotherapy rehabilitation programme. Osteoarthritis and Cartilage 2013;21(Journal Article):S146-S147. [DOI:]

Barker 2013b

Barker, Karen L.; Newman, Meredith A.; Hughes, Tamsin; Sackley, Cath; Pandit, Hemant; Kiran, Amit; Murray, David W.. Recovery of function following hip resurfacing arthroplasty: a randomized controlled trial comparing an accelerated versus standard physiotherapy rehabilitation programme.. Clinical rehabilitation 2013;27(9):771-784. [DOI:]

Beck 2019

Beck, Heidrun; Beyer, Franziska; Gering, Franziska; Gunther, Klaus-Peter; Lutzner, Cornelia; Walther, Achim; Stiehler, Maik. Sports Therapy Interventions Following Total Hip Replacement.. Deutsches Arzteblatt International 2019;116(1-2):1-8. [DOI:]

Coulter 2017

Coulter, Corinne; Perriman, Diana M.; Neeman, Teresa M.; Smith, Paul N.; Scarvell, Jennifer M.. Supervised or Unsupervised Rehabilitation After Total Hip Replacement Provides Similar Improvements for Patients: A Randomized Controlled Trial.. Archives of Physical Medicine & Rehabilitation 2017;98(11):2253-2264. [DOI:]

Eichler 2019

Eichler, Sarah; Salzwedel, Annett; Rabe, Sophie; Mueller, Steffen; Mayer, Frank; Wochatz, Monique; Hadzic, Miralem; John, Michael; Wegscheider, Karl; Voller, Heinz. The Effectiveness of Telerehabilitation as a Supplement to Rehabilitation in Patients After Total Knee or Hip Replacement: Randomized Controlled Trial.. JMIR Rehabilitation And Assistive Technologies 2019;6(2):e14236-. [DOI:]

Elibol 2016

Elibol N.; Unver B.; Karatosun V.. Effectiveness of balance exercises on falling risk in the acute post-operative period following total hip arthroplasty-A pilot study. HIP International 2016;26(Journal Article):S19-. [DOI: http://dx.doi.org/10.5301/hipint.5000450]

Elibol 2018

Elibol N.; Unver B.; Karatosun V.. Investigation of the effects of balance training on balance and functional status in patients with total hip arthroplasty due to osteoarthritis: A randomised controlled pilot study. Annals of the Rheumatic Diseases 2018;77(Journal Article):1609-. [DOI: http://dx.doi.org/10.1136/annrheumdis-2018-eular.1591]

Fatoye 2020

Fatoye, Francis; Wright, J. M.; Yeowell, G.; Gebrye, T.. Clinical and cost-effectiveness of physiotherapy interventions following total hip replacement: a systematic review and meta-analysis. Rheumatology international 2020;(Journal Article):-. [DOI:]

Garvin 2018

Garvin, Kevin L.. Supervised and Independent Post-Discharge Rehabilitation Did Not Differ for Improving Pain and Function After Unilateral Total Hip Replacement. Journal of Bone & Joint Surgery, American Volume 2018;100(16):1433-1433. [DOI: 10.2106/JBJS.18.00633]

Hansen 2019

Hansen, Sebrina; Aaboe, Jens; Mechlenburg, Inger; Overgaard, Soren; Mikkelsen, Lone Ramer. Effects of supervised exercise compared to non-supervised exercise early after total hip replacement on patient-reported function, pain, health-related quality of life and performance-based function - a systematic review and meta-analysis of randomized co. Clinical rehabilitation 2019;33(1):13-23. [DOI:]

Klugarova 2016

Klugarova, Jitka; Klugar, Miloslav; Mareckova, Jana; Gallo, Jiri; Kelnarova, Zuzana. The effectiveness of inpatient physical therapy compared to outpatient physical therapy in older adults after total hip replacement in the post-discharge period: a systematic review. JBI Database Of Systematic Reviews And Implementation Reports 2016;14(1):174-209. [DOI:]

Mitrovic 2017

Mitrovic, Dragica; Davidovic, Mladen; Erceg, Predrag; Marinkovic, Jelena. The effectiveness of supplementary arm and upper body exercises following total hip arthroplasty for osteoarthritis in the elderly: a randomized controlled trial.. Clinical rehabilitation 2017;31(7):881-890. [DOI:]

Monaghan 2015

Monaghan B.; Blake C.; Hing W.; Cusack T.. Functional exercise after total hip replacement (feather). Physiotherapy (United Kingdom) 2015;101(Journal Article):eS1024-eS1025. [DOI: http://dx.doi.org/10.1016/j.physio.2015.03.1895]

Monaghan 2017

Monaghan, Brenda M.. Functional exercise after total hip replacemen; The FEATHER project. International Journal of Integrated Care (IJIC) 2017;17(Generic):1-1. [DOI: 10.5334/ijic.3411]

Monaghan 2017a

Monaghan, B.; Cunningham, P.; Harrington, P.; Hing, W.; Blake, C.; O'Dohertya, D.; Cusack, T.. Randomised controlled trial to evaluate a physiotherapy-led functional exercise programme after total hip replacement.. Physiotherapy 2017;103(3):283-288. [DOI:]

Monticone 2014

Monticone, Marco; Ambrosini, Emilia; Rocca, Barbara; Lorenzon, Chiara; Ferrante, Simona; Zatti, Giovanni. Task-oriented exercises and early full weight-bearing contribute to improving disability after total hip replacement: a randomized controlled trial.. Clinical rehabilitation 2014;28(7):658-668. [DOI:]

Morishima 2014

Morishima Y.; Mizushima T.; Yamauchi K.; Morikawa M.; Masuki S.; Nose H.. Effects of home-based interval walking training on thigh muscle strength and aerobic capacity in female total hip arthroplasty patients: A randomized, controlled pilot study. PLoS ONE 2014;9(9):e108690-. [DOI: http://dx.doi.org/10.1371/journal.pone.0108690]

Nankaku 2016

Nankaku, Manabu; Ikeguchi, Ryosuke; Goto, Koji; So, Kazutaka; Kuroda, Yutaka; Matsuda, Shuichi. Hip external rotator exercise contributes to improving physical functions in the early stage after total hip arthroplasty using an anterolateral approach: a randomized controlled trial.. Disability & Rehabilitation 2016;38(22):2178-2183. [DOI:]

Nyberg 2002

Nyberg,K.. Sjukgymnastick gruppträning jämfört med hemträning för patienter opererade med total höftledsplastik.. 2002;6(Journal Article):82-88. [DOI:]

Okoro 2016

Okoro, Tosan; Whitaker, Rhiannon; Gardner, Andrew; Maddison, Peter; Andrew, John G.; Lemmey, Andrew. Does an early home-based progressive resistance training program improve function following total hip replacement? Results of a randomized controlled study.. BMC Musculoskeletal Disorders 2016;17(Journal Article):173-. [DOI:]

Umpierres 2014

Umpierres, Carolina Sant'anna; Ribeiro, Tiango Aguiar; Marchisio, Angela Elisabete; Galvao, Livia; Borges, Ingrid Nemitz Kras; Macedo, Carlos Alberto de Souza; Galia, Carlos Roberto. Rehabilitation following total hip arthroplasty evaluation over short follow-up time: randomized clinical trial.. Journal of Rehabilitation Research & Development 2014;51(10):1567-1578. [DOI:]

Wijnen 2018

Wijnen, Annet; Bouma, Sjoukje E.; Seeber, Gesine H.; van der Woude,Lucas H V.; Bulstra, Sjoerd K.; Lazovic, Djordje; Stevens, Martin; van den Akker-Scheek, Inge. The therapeutic validity and effectiveness of physiotherapeutic exercise following total hip arthroplasty for osteoarthritis: A systematic review. PLoS ONE [Electronic Resource] 2018;13(3):e0194517-. [DOI:]

Wijnen 2018a

Wijnen A.; Hoogland J.; Munsterman T.; Gerritsma C.; Dijkstra B.; Annegarn J.; Ibarra F.; Zijlstra W.; Stevens M.. Effectiveness of a home-based rehabilitation program driven by a tablet application compared to usual care in the Netherlands for patients after a total hip arthroplasty. HIP International 2018;28(Journal Article):27-28. [DOI: http://dx.doi.org/10.1177/1120700018801118]

Wu 2019

Wu, Jia-Qi; Mao, Lin-Bo; Wu, Jian; Mayr., Johannes. Efficacy of exercise for improving functional outcomes for patients undergoing total hip arthroplasty: A meta-analysis. Medicine 2019;98(10):e14591-e14591. [DOI: 10.1097/MD.0000000000014591]

Studies awaiting classification

Ongoing studies

Other references

Additional references

Other published versions of this review

Classification pending references

Data and analyses

1 Styrketræning vs standard behandling

| Outcome or Subgroup	Studies	Participants	Statistical Method	Effect Estimate
1.1 Patientrapporteret funktionsevne, efter endt behandling	3	145	Std. Mean Difference (IV, Random, 95% CI)	-0.09 [-0.42, 0.23]
1.2 Præstationsbaseret funktionsevne, efter endt behandling	3	142	Std. Mean Difference (IV, Random, 95% CI)	-0.22 [-0.55, 0.11]
1.3 Smerte (relateret til hofteregionen), efter endt behandling)	2	114	Std. Mean Difference (IV, Random, 95% CI)	-0.26 [-0.63, 0.11]
1.4 Patientrapporeret funktionsevne, langtidseffekt, længste follow-up (6-12 måneder efter endt behandling)	2	121	Std. Mean Difference (IV, Random, 95% CI)	-0.11 [-0.47, 0.24]
1.5 Helbredsrelateret livskvalitet, efter endt behandling	2	84	Std. Mean Difference (IV, Random, 95% CI)	-0.09 [-0.52, 0.34]
1.6 Træningsinducerede skader i bevægeapperatet, i interventionsperioden	2	82	Risk Ratio (M-H, Random, 95% CI)	2.82 [0.12, 66.62]
1.7 Smerte der ikke er hofterelateret, i interventionsperioden	1	73	Risk Ratio (M-H, Fixed, 95% CI)	2.92 [0.12, 69.43]
1.8 Hofteluksation, i interventionsperioden	1	73	Risk Ratio (M-H, Fixed, 95% CI)	0.32 [0.01, 7.71]
1.9 Reoperation, i interventionsperioden	1	73	Risk Ratio (M-H, Fixed, 95% CI)	0.32 [0.01, 7.71]
1.10 Hævelse, i interventionsperioden	0		Risk Ratio (M-H, Fixed, 95% CI)	No totals

Figures

Figure 1 (Analysis 1.1)

Study or Subgroup	Styrketræning Mean	SD	Total	Ingen styrketræning Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Husby 2009 (1)	-17	1	12	-17	1	12	16.6%	0.00 [-0.80, 0.80]
Mikkelsen 2014 (2)	-89.1	10	31	-86.5	13	30	41.9%	-0.22 [-0.73, 0.28]
Winther 2018 (3)	14	12	31	14	13	29	41.5%	0.00 [-0.51, 0.51]
Total (95% CI)			74			71	100.0%	-0.09 [-0.42, 0.23]

Heterogeneity: Tau² = 0.00; Chi² = 0.43, df = 2 (P = 0.81); I² = 0%
Test for overall effect: Z = 0.56 (P = 0.58)
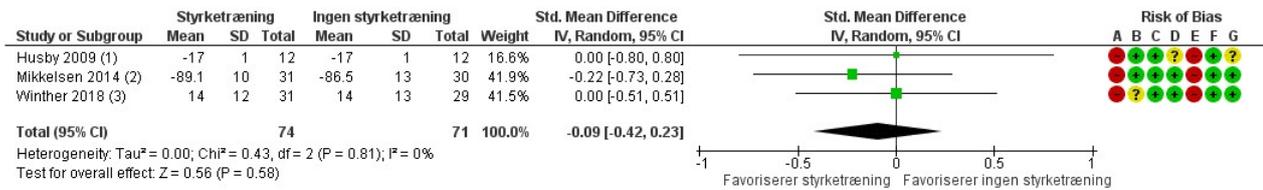
Footnotes
(1) Målt med Merle D'Aubigné and Postel scoring system (3-18).
(2) Målt med HOOS ADL (0-100)
(3) Målt med HOOS-PS (0-100)

Risk of bias legend
(A) Blinding of participants and personnel
(B) Selective outcome reporting
(C) Incomplete outcome data
(D) Other sources of bias
(E) Blinding of outcome assessors
(F) Sequence Generation
(G) Allocation concealment

Forest plot of comparison: 1 Superviseret styrketræning vs standard behandling, outcome: 1.1 Patientrapporteret funktionsevne, efter endt behandling.

Figure 2 (Analysis 1.2)

Study or Subgroup	Styrketræning Mean	SD	Total	Ingen styrketræning Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Mikkelsen 2014 (1)	-14.41	3.9	32	-13.13	4.3	30	43.6%	-0.31 [-0.81, 0.19]
Suetta 2004 (2)	8.8	8.6	11	13.3	9.6	9	13.6%	-0.48 [-1.37, 0.42]
Winther 2018 (3)	-583	97	31	-578	129	29	42.7%	-0.04 [-0.55, 0.46]
Total (95% CI)			74			68	100.0%	-0.22 [-0.55, 0.11]

Heterogeneity: Tau² = 0.00; Chi² = 0.90, df = 2 (P = 0.64); I² = 0%
Test for overall effect: Z = 1.29 (P = 0.20)

Footnotes
(1) Målt med rejse/sættes sig test (30 sek)
(2) Målt med Sit-to-stand test (5 reps, antal sek).
(3) Målt med 6 MWT (m).

Risk of bias legend
(A) Blinding of participants and personnel
(B) Selective outcome reporting
(C) Incomplete outcome data
(D) Other sources of bias
(E) Blinding of outcome assessors
(F) Sequence Generation
(G) Allocation concealment

Forest plot of comparison: 1 Intervention vs Control, outcome: 1.2 Præstationsbaseret funktionsevne, efter endt behandling.

Figure 3 (Analysis 1.3)

Study or Subgroup	Styrketræning Mean	SD	Total	Ingen styrketræning Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Mikkelsen 2014 (1)	-88.7	12	31	-86.3	16	29	53.0%	-0.17 [-0.68, 0.34]
Winther 2018 (2)	0.8	1.85576872	27	1.4	1.32554909	27	47.0%	-0.37 [-0.90, 0.17]
Total (95% CI)			58			56	100.0%	-0.26 [-0.63, 0.11]

Heterogeneity: Tau² = 0.00; Chi² = 0.28, df = 1 (P = 0.60); I² = 0%
Test for overall effect: Z = 1.39 (P = 0.16)
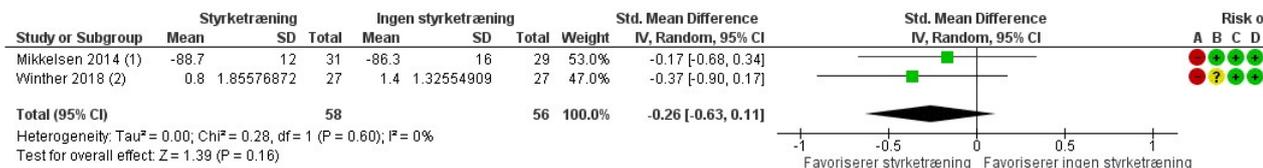
Footnotes
(1) Målt med HOOS Pain (0-100)
(2) Målt med NRS (0-10)

Risk of bias legend
(A) Blinding of participants and personnel
(B) Selective outcome reporting
(C) Incomplete outcome data
(D) Other sources of bias
(E) Blinding of outcome assessors
(F) Sequence Generation
(G) Allocation concealment

Forest plot of comparison: 1 Intervention vs Control, outcome: 1.3 Smerte (relateret til hofteregionen), efter endt behandling).

Figure 4 (Analysis 1.4)

Study or Subgroup	Styrketræning Mean	SD	Total	Ingen styrketræning Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Mikkelsen 2014 (1)	-93.4	8	31	-91.1	12	30	50.3%	-0.22 [-0.73, 0.28]
Winther 2018 (2)	8	10	31	8	10	29	49.7%	0.00 [-0.51, 0.51]
Total (95% CI)			62			59	100.0%	-0.11 [-0.47, 0.24]

Heterogeneity: Tau² = 0.00; Chi² = 0.38, df = 1 (P = 0.54); I² = 0%
Test for overall effect: Z = 0.62 (P = 0.54)
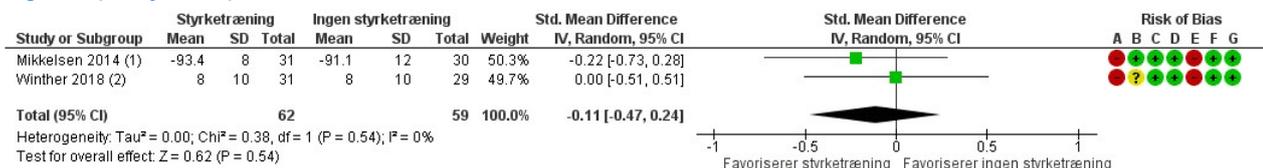
Footnotes
(1) Målt med HOOS ADL (0-100), 1-års follow-up
(2) Målt med HOOS-PS (0-100), 1-års follow-up

Risk of bias legend
(A) Blinding of participants and personnel
(B) Selective outcome reporting
(C) Incomplete outcome data
(D) Other sources of bias
(E) Blinding of outcome assessors
(F) Sequence Generation
(G) Allocation concealment

Forest plot of comparison: 1 Intervention vs Control, outcome: 1.4 Patientrapporeret funktionsevne, langtidseffekt, længste follow-up (6-12 måneder efter endt behandling).

Figure 5 (Analysis 1.5)

Study or Subgroup	Styrketræning Mean	SD	Total	Ingen styrketræning Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Husby 2009 (1)	-37	8	12	-38	5	12	28.6%	0.14 [-0.66, 0.95]
Mikkelsen 2014 (2)	-79	16	31	-75.6	20	29	71.4%	-0.19 [-0.69, 0.32]
Total (95% CI)			43			41	100.0%	-0.09 [-0.52, 0.34]

Heterogeneity: Tau² = 0.00; Chi² = 0.47, df = 1 (P = 0.49); I² = 0%
Test for overall effect: Z = 0.42 (P = 0.68)
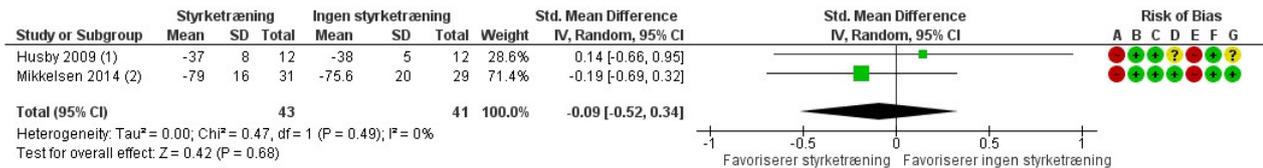
Footnotes
(1) Målt med SF-36 Physical Component Score (0-100)
(2) Målt med HOOS QOL (0-100)

Std. Mean Difference IV, Random, 95% CI
Favoriserer styrketræning   Favoriserer ingen styrketræning

Risk of Bias
A B C D E F G

Risk of bias legend
(A) Blinding of participants and personnel
(B) Selective outcome reporting
(C) Incomplete outcome data
(D) Other sources of bias
(E) Blinding of outcome assessors
(F) Sequence Generation
(G) Allocation concealment

Forest plot of comparison: 1 Intervention vs Control, outcome: 1.5 Helbredsrelateret livskvalitet, efter endt behandling.

Figure 6 (Analysis 1.6)

Study or Subgroup	Favoriserer styrketræning Events	Total	Ingen styrketræning Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Mikkelsen 2014 (1)	1	32	0	30	100.0%	2.82 [0.12, 66.62]
Suetta 2004	0	11	0	9		Not estimable
Total (95% CI)		43		39	100.0%	2.82 [0.12, 66.62]
Total events	1		0			

Heterogeneity: Not applicable
Test for overall effect: Z = 0.64 (P = 0.52)
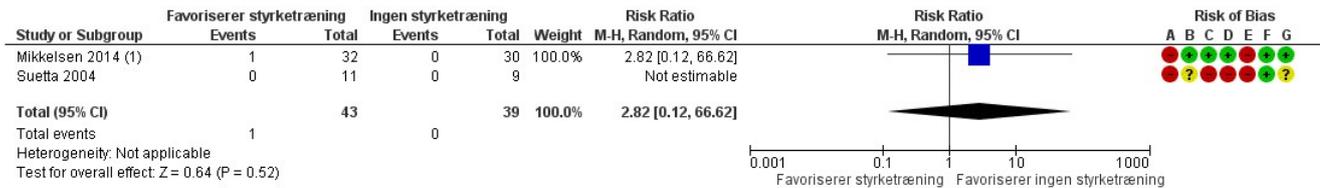
Footnotes
(1) Knee pain in contra-lateral knee.

Risk Ratio M-H, Random, 95% CI
Favoriserer styrketræning   Favoriserer ingen styrketræning

Risk of Bias
A B C D E F G

Risk of bias legend
(A) Blinding of participants and personnel
(B) Selective outcome reporting
(C) Incomplete outcome data
(D) Other sources of bias
(E) Blinding of outcome assessors
(F) Sequence Generation
(G) Allocation concealment

Forest plot of comparison: 1 Superviseret styrketræning vs standard behandling, outcome: 1.6 Træningsinducerede skader i bevægeapparatet, i interventionsperioden.

Figure 7 (Analysis 1.7)
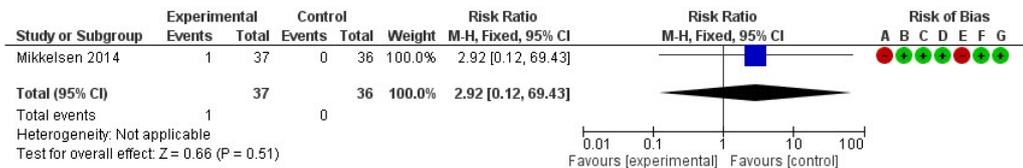
Study or Subgroup	Experimental Events	Total	Control Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Mikkelsen 2014	1	37	0	36	100.0%	2.92 [0.12, 69.43]
Total (95% CI)		37		36	100.0%	2.92 [0.12, 69.43]
Total events	1		0			

Heterogeneity: Not applicable
Test for overall effect: Z = 0.66 (P = 0.51)

Risk Ratio M-H, Fixed, 95% CI
Favours [experimental]   Favours [control]

Risk of Bias
A B C D E F G

Risk of bias legend
(A) Blinding of participants and personnel
(B) Selective outcome reporting
(C) Incomplete outcome data
(D) Other sources of bias
(E) Blinding of outcome assessors
(F) Sequence Generation
(G) Allocation concealment

Forest plot of comparison: 1 Styrketræning vs standard behandling, outcome: 1.7 Smerte der ikke er hofterelateret, i interventionsperioden.

Figure 8 (Analysis 1.8)
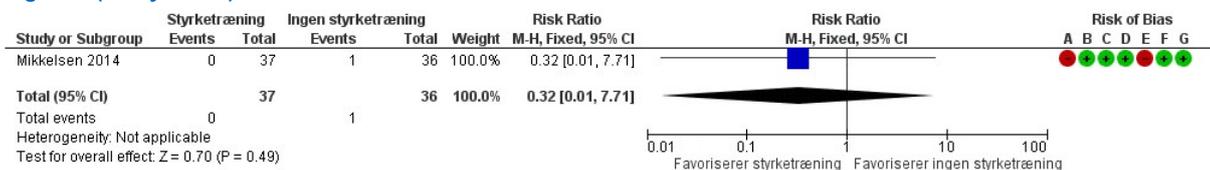
Study or Subgroup	Styrketræning Events	Total	Ingen styrketræning Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Mikkelsen 2014	0	37	1	36	100.0%	0.32 [0.01, 7.71]
Total (95% CI)		37		36	100.0%	0.32 [0.01, 7.71]
Total events	0		1			

Heterogeneity: Not applicable
Test for overall effect: Z = 0.70 (P = 0.49)

Risk Ratio M-H, Fixed, 95% CI
Favoriserer styrketræning   Favoriserer ingen styrketræning

Risk of Bias
A B C D E F G

Risk of bias legend
(A) Blinding of participants and personnel
(B) Selective outcome reporting
(C) Incomplete outcome data
(D) Other sources of bias
(E) Blinding of outcome assessors
(F) Sequence Generation
(G) Allocation concealment

Forest plot of comparison: 1 Styrketræning vs standard behandling, outcome: 1.8 Hofteluksation, i interventionsperioden.

Figure 9 (Analysis 1.9)

Study or Subgroup	Styrketræning Events	Total	Ingen styrketræning Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Mikkelsen 2014 (1)	0	37	1	36	100.0%	0.32 [0.01, 7.71]
Total (95% CI)		37		36	100.0%	0.32 [0.01, 7.71]
Total events	0		1			

Heterogeneity: Not applicable
Test for overall effect: Z = 0.70 (P = 0.49)

Risk Ratio M-H, Fixed, 95% CI

0.001   0.1   1   10   1000
Favoriserer styrketræning   Favoriserer ingen styrketræning

Risk of Bias
A B C D E F G

Footnotes
(1) Reoperation due to hip-fracture

Risk of bias legend
(A) Blinding of participants and personnel
(B) Selective outcome reporting
(C) Incomplete outcome data
(D) Other sources of bias
(E) Blinding of outcome assessors
(F) Sequence Generation
(G) Allocation concealment

Forest plot of comparison: 1 Styrketræning vs standard behandling, outcome: 1.9 Reoperation, i interventionsperioden.

Figure 10
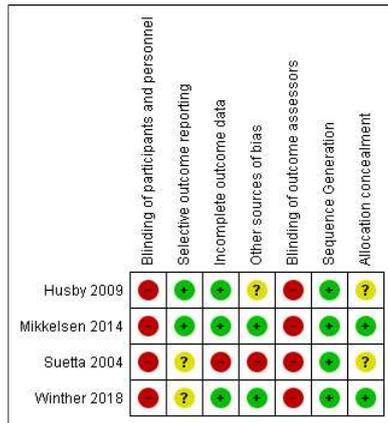
Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

Figure 11
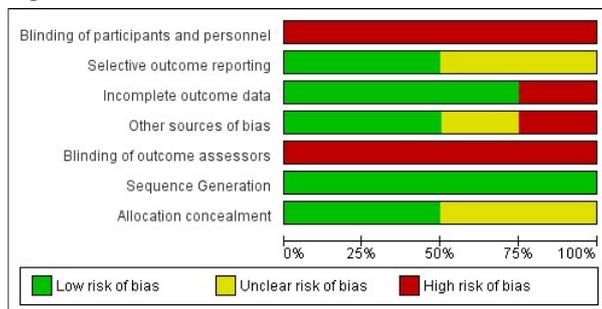
Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.