

# Et søk etter litteratur om effekt av tidlig fysioterapi etter innsetting av hofteprotese

Notat fra Kunnskapssenteret  
Systematisk litteratursøk med  
sortering  
Desember 2011

 kunnskapssenteret

**Bakgrunn:** Nasjonalt kunnskapssenter for helsetjenesten fikk i oppdrag fra Sykehuset Innlandet Helseforetak å utføre et systematisk søk etter publikasjoner om effekt av tidlige fysioterapiintervensjoner (postoperativ dag 1 til 7) for pasienter som fortsatt er innlagt på sykehus etter innsetting av hofteprotese. • Vi søkte etter litteratur i MEDLINE, EMBASE, Amed, PEDro, OT-Seeker og Cochrane Library (Cochrane Database of Systematic Reviews, CENTRAL, DARE, HTA) • Søkene genererte 966 treff • Etter gjennomgang av titler og sammendrag ble 43 referanser vurdert som mulig relevante for problemstillingen • 18 av de 43 referansene var systematiske oversikter • 25 av de 43 referansene var randomiserte kontrollerte studier.

Nasjonalt kunnskapssenter for helsetjenesten  
Postboks 7004, St. Olavs plass  
N-0130 Oslo  
(+47) 23 25 50 00  
[www.kunnskapssenteret.no](http://www.kunnskapssenteret.no)  
Notat: ISBN 978-82-8121-442-2

**Desember 2011**

 kunnskapssenteret

*(fortsettelsen fra forsiden)*

|                         |   |
|-------------------------|---|
| <b>Tittel</b>           | Et søk etter litteratur om effekt av tidlig fysioterapi etter innsetting av hofteprotese  |
| <b>English title</b>    | A search after litterature about the effectiveness of early physiotherapy after hip arthroplasty  |
| <b>Institusjon</b>      | Nasjonalt kunnskapssenter for helsetjenesten  |
| <b>Ansvarlig</b>        | Magne Nylenna, direktør   |
| <b>Forfattere</b>       | Brurberg, Kjetil Gundro, prosjektleder<br>Kirkehei, Ingvild, forskningsbibliotekar  |
| <b>ISBN</b>             | 978-82-8121-442-2   |
| <b>Notat</b>            | 2011  |
| <b>Prosjektnummer</b>   | 927   |
| <b>Publikasjonstype</b> | Notat – Systematisk litteratursøk med sortering   |
| <b>Antall sider</b>     | 15 (46 inklusiv vedlegg)  |
| <b>Oppdragsgiver</b>    | Sykehuset Innlandet HF ved Nina Haarseth  |
| <b>Nøkkelord</b>        | Hofteleddsprotese, tidlig fysioterapi   |
| <b>Sitering</b>         | Brurberg, KG, Kirkehei I. Et søk etter litteratur om effekt av tidlig fysioterapi etter innsetting av hofteprotese. Notat – 2011. Oslo: Nasjonalt Kunnskapssenter for helsetjenesten, 2011. |

Nasjonalt kunnskapssenter for helsetjenesten fremskaffer og formidler kunnskap om effekt av metoder, virkemidler og tiltak og om kvalitet innen alle deler av helsetjenesten. Målet er å bidra til gode beslutninger slik at brukerne får best mulig helsetjenester. Kunnskapssenteret er formelt et forvaltningsorgan under Helse- direktoratet, men har ingen myndighetsfunksjoner og kan ikke instrueres i faglige spørsmål.

Nasjonalt kunnskapssenter for helsetjenesten  
Oslo, desember 2011

# Hovedfunn

Nasjonalt kunnskapssenter for helsetjenesten fikk i oppdrag fra Sykehuset Innlandet Helseforetak å utføre et systematisk søk etter publikasjoner om effekt av tidlige fysioterapiintervensjoner (postoperativ dag 1 til 7) for pasienter som fortsatt er innlagt på sykehus etter innsetting av hofteprotese

- Vi søkte etter litteratur i MEDLINE, EMBASE, Amed, PEDro, OT-Seeker og Cochrane Library (Cochrane Database of Systematic Reviews, CENTRAL, DARE, HTA)
- Søkene genererte 966 treff
- Etter gjennomgang av titler og sammendrag ble 43 referanser vurdert som mulig relevante for problemstillingen,
- 18 av de 43 referansene var systematiske oversikter
- 25 av de 43 referansene var randomiserte kontrollerte studier

## Tittel:

Et søk etter litteratur om effekt av tidlige fysioterapiintervensjoner etter innsetting av hofteprotese

## Publikasjonstype:

### Systematisk litteraturliste

En systematisk litteraturliste er resultatet av å

- søke etter relevant litteratur ifølge en søkestrategi og
- eventuelt sortere denne litteraturen i grupper presentert med referanser og vanligvis sammendrag

## Svarer ikke på alt:

- Ingen kritisk vurdering av studienes kvalitet
- Ingen analyse eller sammenfatning av studiene
- Ingen anbefalinger

## Hvem står bak denne publikasjonen?

Kunnskapssenteret har gjennomført oppdraget etter forespørsel fra Sykehuset Innlandet Helseforetak

## Når ble litteratursøket utført?

Søk etter studier ble avsluttet november 2011.

# Key messages (English)

The Norwegian Knowledge Centre for Health Services (NOKC) was commissioned by Sykehuset Innlandet HF to do a systematic search for studies reporting on the effect of early (1 to 7 days postoperative) physiotherapy following hip arthroplasty.

- Systematic searches were performed in MEDLINE, EMBASE, Amed, PEDro, OT-Seeker and the Cochrane Library (Cochrane Database of Systematic Reviews, CENTRAL, DARE, HTA)
- A total of 966 references were identified
- 43 references were considered relevant following screening of titles and abstract
- 18 of the 43 references were systematic reviews
- 25 of the 43 references were randomized controlled studies

## Title:

A search for literature about the effectiveness of early physiotherapy after hip arthroplasty

## Type of publication:

### Systematic reference list

A systematic reference list is the result of a search for relevant literature according to a specific search strategy. The references resulting from the search are then grouped and presented with their abstracts.

## Doesn't answer everything:

- No critical evaluation of study quality
- No analysis or synthesis of the studies
- No recommendations

## Publisher:

Norwegian Knowledge Centre for the Health Services

## Updated:

Last search for studies:  
November 2011

---

# Innhold

|  |           |
|--|-----------|
| <b>HOVEDFUNN</b>   | <b>2</b>  |
| <b>KEY MESSAGES (ENGLISH)</b>                                      | <b>3</b>  |
| <b>INNHold</b>   | <b>4</b>  |
| <b>FORORD</b>  | <b>5</b>  |
| <b>INNLEDNING</b>  | <b>6</b>  |
| <b>METODE</b>  | <b>7</b>  |
| Litteratursøk  | 7         |
| Inklusjonskriterier  | 7         |
| Artikkelutvelgelse og sortering                                    | 7         |
| <b>RESULTAT</b>  | <b>9</b>  |
| Resultat av søk  | 9         |
| Gjennomgang av titler og sammendrag                                | 9         |
| Identifiserte og mulig relevante systematiske oversikter           | 9         |
| Identifiserte og mulig relevante randomiserte kontrollerte studier | 12        |
| <b>DISKUSJON</b>   | <b>15</b> |
| Styrker og svakheter ved systematisk litteratursøk med sortering   | 15        |
| <b>REFERANSER</b>  | <b>16</b> |
| <b>VEDLEGG</b>   | <b>17</b> |
| Vedlegg 1: Søkestrategi  | 17        |
| Vedlegg 2: Sammendrag for inkluderte systematiske oversikter       | 20        |
| Vedlegg 3: Sammendrag for inkluderte RCT                           | 32        |

---

# Forord

Nasjonalt kunnskapssenter for helsetjenesten mottok for 2010 en forespørsel fra Nina Haarseth ved Sykehuset Innlandet om å oppsummere tilgjengelig forskning om effekt av tidlige fysioterapiintervensjoner, postoperativ dag 1-7, til pasienter som har fått innsatt hofteprotese. Bakgrunnen for bestillingen er pågående arbeid med kunnskapsbaserte fagprosedyrer om fysioterapi etter innsetting av hofteprotese. Prosedyrearbeidet er i en sen fase, og vi bestemte oss derfor for å besvare bestillingen i form av en systematisk litteraturliste med sortering som kan benyttes for å sikre at flest mulig relevante forskningsartikler blir fanget opp og vurdert for inklusjon i fagprosedyrene.

Det systematiske litteratursøket som ligger til grunn for dette notatet er begrenset til søk etter systematiske oversikter og randomiserte kontrollerte studier.

Prosjektgruppen har bestått av:

- Kjetil G. Brurberg, seniorforsker, Kunnskapssenteret
- Ingvild Kirkehei, forskningsbibliotekar, Kunnskapssenteret

Gro Jamtvedt  
*Avdelingsdirektør*

Liv Merete Reinar  
*Seksjonsleder*

Kjetil G. Brurberg  
*Prosjektleder*

---

# Innledning

Skader og slitasjer i hoftelrådet kan føre til smerter samt redusert bevegelse og funksjon, og det kan da bli aktuelt å operere inn et nytt hoftelråd eller hofteproteser. Forekomsten av primære hofteproteseoperasjoner har økt siden 1989, og i 2006-2008 var årlig forekomst 140 per 100 000 innbygger (1).

Etter operasjon er det nødvendig med aktivitet og øvelser med henblikk på å gjenvinne funksjon i ledd og muskler. I dette notatet har vi søkt vi etter systematiske oversikter og randomiserte kontrollerte studier om effekt av fysioterapiintervensjoner til pasienter som er inneliggende på somatisk sykehus etter innsettelse av total- eller hemiprotese i hoftelrådet. Det omfatter fysioterapiintervensjoner som gis fra 1. til og med 7. postoperative dag, det vil si før pasientene sendes videre til fysioterapi ved opptreningsentre, fysikalsk institutt eller til kommunefysioterapeut.



---

# Metode

---

## Litteratursøk

---

Vi søkte systematisk etter litteratur i følgende databaser:

- MEDLINE
- EMBASE
- Amed
- OT-seeker
- PEDro
- Cochrane Database of Systematic Reviews
- Database of Abstracts of Reviews of Effect (DARE)
- Health Technology Assessment Database (HTA)
- Cochrane CENTRAL

Forskningsbibliotekar Ingvild Kirkehei planla og utførte samtlige søk. Den fullstendige søkestrategien er gitt ut i vedlegg 1. Søk etter studier ble avsluttet i november 2011.

---

## Inklusjonskriterier

---

**Studiedesign:** Systematiske oversikter og randomiserte kontrollerte studier

**Populasjon:** Inneliggende pasienter med innsatt total-/hemiprotese i hoften

**Intervensjon:** Fysioterapi utført fra første til sjuende postoperative dag

**Sammenligning 1:** Ingen fysioterapi 1. til 7. postoperative dag

**Sammenligning 2:** Ulike fysioterapiintervensjoner

**Utfall:** Muskulær kontroll og bevegelse i operert hofteldd, funksjonsnivå, liggetid og forebygging av postoperative komplikasjoner

---

## Artikkelutvelgelse og sortering

---

Titler og sammendrag for søketreffene ble gjennomgått, og mulig relevante artikler valgt ut. Utvelgelse og sortering av litteratur ble bare gjort basert på tittel og sammendrag, og bare av én person. Ingen artikler ble vurdert, bestilt eller lastet ned i fulltekst.



---

# Resultat

---

## Resultat av søk

---

Søket etter litteratur ga 754 unike treff i basene MEDLINE, EMBASE, Amed og Cochrane Library, mens søkene i PEDro og OT Seeker genererte henholdsvis 165 og 47 treff.

---

## Gjennomgang av titler og sammendrag

---

En person gikk gjennom titler og sammendrag for alle søketreff, og vi satt igjen med en liste på 43 referanser til publikasjoner. Av disse 43 referansene henviste 18 til systematiske oversikter og 25 til randomiserte kontrollerte studier. I det følgende lister vi opp de 43 referansene med sammendrag sammen med informasjon om forfattere, publikasjonstittel, tidsskrift og årstall for publikasjon.

---

## Identifiserte og mulig relevante systematiske oversikter

---

Vi lister identifiserte systematiske oversikter kronologisk etter publikasjonsår med de nyeste oversiktene først. Sammendragene for de ulike studiene er gjengitt i vedlegg 2. Vi har ikke gjennomført noen kvalitetsvurdering av de listede oversiktene, og presiserer at en kvalitetsvurdering er nødvendig med tanke på å avgjøre om resultatene i de ulike oversiktene er til å stole på:

### 2011

- Handoll Helen HG, Sherrington C, Mak Jenson CS. Interventions for improving mobility after hip fracture surgery in adults. Cochrane Database of Systematic Reviews 2011;(3):CD001704.
- Peiris CL, Taylor NF, Shields N. Extra physical therapy reduces patient length of stay and improves functional outcomes and quality of life in people with acute or subacute conditions: A systematic review. Arch Phys Med Rehabil 2011;92(9):1490-500.

## **2010**

- Hol AM, Van GS, Lucas C, Van Susante JLC, Van Loon CJM. Partial versus unrestricted weight bearing after an uncemented femoral stem in total hip arthroplasty: Recommendation of a concise rehabilitation protocol from a systematic review of the literature. *Arch Orthop Trauma Surg* 2010;130(4):547-55.
- Laube W. Training und Rehabilitation nach Totalendoprothese. *Zeitschrift für Physiotherapeuten Krankengymnastik* 2010;62(4):6-16.

## **2009**

- Bai X. Clinical effects of comprehensive rehabilitation after minimally invasive total hip arthroplasty. *Zhongguo gu shang = China journal of orthopaedics and traumatology* 2009;22(6):417-20.
- Di MM, Vallero F, Tappero R, Cavanna A. Rehabilitation after total hip arthroplasty: A systematic review of controlled trials on physical exercise programs. *European Journal of Physical and Rehabilitation Medicine* 2009;45(3):303-17.
- Handoll HHG, Cameron ID, Mak JCS, Finnegan TP. Multidisciplinary rehabilitation for older people with hip fractures. *Cochrane Database of Systematic Reviews* 2009;(4):CD007125.
- Kuijer PP, de Beer MJ, Houdijk JH, Frings-Dresen MH. Beneficial and limiting factors affecting return to work after total knee and hip arthroplasty: A systematic review. *Journal of Occupational Rehabilitation* 2009;19(4):375-81.
- Muller E, Mittag O, Gulich M, Uhlmann A, Jackel WH. Systematic literature analysis on therapies applied in rehabilitation of hip and knee arthroplasty: methods, results and challenges. *Die Rehabilitation* 2009;48(2):62-72.

## **2008**

- Froehlig P, Le MS, Coudeyre E, Revel M, Rannou F. What is the interest of early mobilization after total hip arthroplasty? Development of French guidelines for clinical practice. *Annales de Readaptation et de Medecine Physique* 2008;51(3):212-7.
- Khan F, Ng L, Gonzalez S, Hale T, Turner-Stokes L. Multidisciplinary rehabilitation programmes following joint replacement at the hip and knee in chronic arthropathy. *Cochrane database of systematic reviews (Online)* 2008;(2):CD004957.

## **2007**

- Barrois B, Gouin F, Ribinik P, Revel M, Rannou F. What is the interest of rehabilitation in physical medicine and functional rehabilitation ward after total hip arthroplasty? Elaboration of french clinical practice guidelines. *Annales de readaptation et de medecine physique : revue scientifique de la Societe francaise de reeducation fonctionnelle de readaptation et de medecine physique* 2007;50(8):700-699.
- Dauty M, Genty M, Ribinik P. Physical training in rehabilitation programs before and after total hip and knee arthroplasty. *Annales de readaptation et*

de medecine physique : revue scientifique de la Societe francaise de reeducation fonctionnelle de readaptation et de medecine physique 2007;50(6):462-1.

## **2005**

- Medical Advisory Secretariat Ontario Ministry of Health and Long-Term Care (MAS). Physiotherapy rehabilitation after total knee or hip replacement: an evidence-based analysis.: Medical Advisory Secretariat, Ontario Ministry of Health and Long-Term Care (MAS); 2005.
- Meyer A. Pre- and post-operative physio- and training therapy in total hip replacement (THR): a search of the literature. *Kranken Gymnastik* 2005;57(8):1210-24.

## **2004**

- Chen W-H, Wang Q, Su J-C. [Postoperative rehabilitation exercise for the recovery of limb function after total hip replacement]. *Zhongguo Linchuang Kangfu* 2004;8(20):3926-8.

## **2003**

- Danish Centre for Evaluation and Health Technology Assessment (DACEHTA). Multimodal perioperative rehabilitation after total hip replacement (project) - Primary research (Project record). 2003.

## **2002**

- Brander VA, Mullarkey CF. Rehabilitation after total hip replacement for osteoarthritis. *Phys Med Rehabil State of the Art Reviews* 2002;16(3):415-30.

---

## Identifiserte og mulig relevante randomiserte kontrollerte studier

---

Vi lister identifiserte randomiserte kontrollerte studier kronologisk etter førsteforfatters etternavn. Sammendrag for de ulike studiene er gjengitt i vedlegg 3. Vi har ikke gjennomført noen kvalitetsvurdering eller vurdering av risiko for skjevheter i de listede enkeltstudiene, og presiserer at det er viktig at dette gjøres med henblikk på å avgjøre om resultatene i de ulike studiene er til å stole på.

Sortert alfabetisk etter førsteforfatterens etternavn:

- (1) Boden H, Adolphson P. No adverse effects of early weight bearing after uncemented total hip arthroplasty: A randomized study of 20 patients. *Acta Orthop Scand* 2004;75(1):21-9.
- (2) Du X-L, Fang H-P, Fang Z, Li F. Preventive effect of comprehensive rehabilitation nursing on early complications of total hip arthroplasty. *Journal of Clinical Rehabilitative Tissue Engineering Research* 2011;15(26):4923-6.
- (3) Gilbey HJ, Ackland TR, Tapper J, Wang AW. Perioperative exercise improves function following total hip arthroplasty: A randomized controlled trial. *Journal of Musculoskeletal Research* 2003;7(2):111-23.
- (4) Gilbey HJ, Ackland TR, Wang AW, Morton AR, Trouchet T, Tapper J. Exercise improves early functional recovery after total hip arthroplasty. *Clin Orthop* 2003;(408):193-200.
- (5) Huang L-H, Liu Y, Xue S-F, Luo X-Y, Liu W-H. Comparison of different intervention time of systematic rehabilitation following total hip replacement. *Journal of Clinical Rehabilitative Tissue Engineering Research* 2009;13(9):1755-8.
- (6) Jesudason C, Stiller K. Are bed exercises necessary following hip arthroplasty? *Australian Journal of Physiotherapy* 2002;48(2):73-81.
- (7) Larsen K, Sorensen OG, Hansen TB, Thomsen PB, Soballe K. Accelerated perioperative care and rehabilitation intervention for hip and knee replacement is effective: A randomized clinical trial involving 87 patients with 3 months of follow-up. *Acta Orthop* 2008;79(2):149-59.
- (8) Liu Z, Huang D, Zhuo D. Research on early inpatient rehabilitation after cementless total hip arthroplasty. *Chinese Journal of Rehabilitation Medicine* 2006;21(3-4):314-7+321.
- (9) Munin MC, Rudy TE, Glynn NW, Crossett LS, Rubash HE. Early inpatient rehabilitation after elective hip and knee arthroplasty. *Journal of the American Medical Association* 1998;279(11):847-52.
- (10) Peak EL, Parvizi J, Ciminiello M, Purtill JJ, Sharkey PF, Hozack WJ, et al. The role of patient restrictions in reducing the prevalence of early dislocation following total hip arthroplasty. A randomized, prospective study. *The Journal of bone and joint surgery American volume* 2005;87(2):247-53.
- (11) Petersen MK, Madsen C, Andersen NT, Soballe K. Efficacy of multimodal optimization of mobilization and nutrition in patients undergoing hip replace-

- ment: a randomized clinical trial. *Acta Anaesthesiologica Scandinavica* 2006;50(6):712-7.
- (12) Smith TO, Mann CJV, Clark A, Donell ST. Bed exercises following total hip replacement: a randomised controlled trial. *Physiotherapy* 2008;94(4):286-91.
  - (13) Smith TO, Mann CJ, Clark A, Donell ST. Bed exercises following total hip replacement: 1 year follow-up of a single-blinded randomised controlled trial. *Hip international : the journal of clinical and experimental research on hip pathology and therapy* 2009;19(3):268-73.
  - (14) Stockton KA, Mengersen KA. Effect of multiple physiotherapy sessions on functional outcomes in the initial postoperative period after primary total hip replacement: a randomized controlled trial. *Arch Phys Med Rehabil* 2009;90(10):1652-7.
  - (15) Ström H, Nilsson O, Milbrink J, Mallmin H, Larsson S. Early migration pattern of the uncemented CLS stem in total hip arthroplasties. *Clin Orthop* 2007;454:127-32.
  - (16) Ström H, Nilsson O, Milbrink J, Mallmin H, Larsson S. The effect of early weight bearing on migration pattern of the uncemented CLS stem in total hip arthroplasty. *The Journal of arthroplasty* 2007;22(8):1122-9.
  - (17) Suetta C, Magnusson SP, Rosted A, Aagaard P, Jakobsen AK, Larsen LH, et al. Resistance training in the early postoperative phase reduces hospitalization and leads to muscle hypertrophy in elderly hip surgery patients--a controlled, randomized study. *J Am Geriatr Soc* 2004;52(12):2016-22.
  - (18) Suetta C, Andersen JL, Dalgas U, Berget J, Koskinen S, Aagaard P, et al. Resistance training induces qualitative changes in muscle morphology, muscle architecture, and muscle function in elderly postoperative patients. *Journal of Applied Physiology* 2008;105(1):180-6.
  - (19) Temfemo A, Doutrelot PL, Ahmaidi S. [Early muscular strengthening after total hip arthroplasty: association of two models of rehabilitation]. *Ann Readapt Med Phys* 2008;51(1):38-45.
  - (20) Thien TM, Ahnfelt L, Eriksson M, Stromberg C, Karrholm J. Immediate weight bearing after uncemented total hip arthroplasty with an anteverted stem: A prospective randomized comparison using radiostereometry. *Acta Orthop* 2007;78(6):730-8.
  - (21) Unver B, Karatosum V, Gunal I, Angin S. Comparison of two different rehabilitation programmes for thrust plate prosthesis: A randomized controlled study. *Clinical rehabilitation* 2004;18(1):84-91.
  - (22) Ververeli PA, Lebby EB, Tyler C, Fouad C. Evaluation of reducing postoperative hip precautions in total hip replacement: A randomized prospective study. *Orthopedics* 2009;32(12):889.
  - (23) Wang AW, Gilbey HJ, Ackland TR. Perioperative exercise programs improve early return of ambulatory function after total hip arthroplasty: A randomized, controlled trial. *American Journal of Physical Medicine and Rehabilitation* 2002;81(11):801-6.

- (24) Whitney JD, Parkman S. The effect of early postoperative physical activity on tissue oxygen and wound healing. *Biological research for nursing* 2004;6(2):79-89.
- (25) Yan B-P. Effects of early rehabilitation training and psychological intervention on physical and mental health of patients undergoing replacement of total hip. *Chinese Journal of Clinical Rehabilitation* 2005;9(48):46-8.



---

# Diskusjon

---

## **Styrker og svakheter ved systematisk litteratursøk med sortering**

---

Ved systematisk litteratursøk med sortering gjennomfører vi systematiske søk etter litteratur for forskningsspørsmål etter PICO-modellen, det vil si at litteratursøket baserer seg på et søk etter pasienter tilhørende en spesifisert populasjon (P) der effekten av et spesifisert tiltak (I) er sammenlignet med et kontrolltiltak (C). O refererer til hvilke utfallsmål som er interessante.

Etter at søket er utført, går vi gjennom resultatene fra søket og sorterer ut referanser som ansees som irrelevante i henhold til våre inklusjonskriterier. Ideelt bør sorteringen gjøres av to eller flere personer uavhengig av hverandre, men i dette oppdraget er titler og sammendrag bare gått gjennom av én person. Videre er litteratursøket utelukkende basert på søk i databaser. Vi har ikke benyttet andre søkestrategier, som for eksempel søk i referanselister, kontakt med eksperter på fagfeltet eller lett etter upublisert litteratur i forbindelse med dette oppdraget, og det kan derfor finnes relevante publikasjoner som vi ikke har fanget opp i dette notatet. Siden ingen artikler er hentet inn og lest i fulltekst er det også sannsynlig at vi har inkludert referanser som viser seg å være irrelevante.

Vi har ikke gjennomført noen form for kvalitetsvurdering av publikasjonene som refereres, og vi vet derfor ikke om resultatene i refererte publikasjoner er til å stole på.

---

# Referanser

1. Espehaug B, Furnes O, Engesaeter LB, Havelin LI. Hip arthroplasty in Norway 1989-2008. Tidsskr Nor Laegeforen 2011;131(16):1543-8.

---

# Vedlegg

---

## Vedlegg 1: Søkestrategi

---

Dato: 18.11.2011

### **Ovid MEDLINE, EMBASE, Amed**

Søketreff: 728

AMED (Allied and Complementary Medicine) 1985 to November 2011: 18 søketreff  
Embase 1980 to 2011 Week 44: 577 søketreff  
Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1948 to Present: 133 søketreff

1. Hip Prosthesis/ use prmz or Arthroplasty, Replacement, Hip/ use prmz
2. exp hip arthroplasty/ use emez
3. arthroplasty replacement hip/ use amed or hip prosthesis/ use amed
4. (hip adj4 (arthroplast\* or replacement\*)).tw.
5. ((joint replacement\* and hip) or ((regeneration or prosthet\* or prothes\* or implant\*) adj10 hip)).tw.
6. or/1-5
7. (hip adj2 surgery).mp.
8. or/1-5,7
9. exp Physical Therapy Modalities/ use prmz or exp Motor Activity/ use prmz or "Physical Therapy (Specialty)"/ use prmz or rehabilitation/ use prmz or exp exercise therapy/ use prmz or Physical Fitness/ use prmz or early ambulation/ use prmz or exp movement/ use prmz or rehabilitation centers/ use prmz
10. exp physiotherapy/ use emez or physiotherapy practice/ use emez or rehabilitation/ use emez or exp muscle training/ use emez or exp exercise/ use emez or exp physical activity/ use emez or mobilization/ use emez or exp motor activity/ use emez or exp movement/ use emez or rehabilitation center/ use emez
11. rehabilitation/ use amed or exp physical therapy modalities/ use amed or physiotherapists/ use amed or exp exercise/ use amed or physical fitness/ use amed or motor activity/ use amed or exp movement/ use amed or early ambulation/ use amed or rehabilitation centers/ use amed
12. (Exercise\* or training or physical therap\* or physiotherap\* or physio therap\* or rehabilitation or physical activit\* or motor activit\* or mobili?ation or ambulation or retraining or muscle stimulat\* or movement technique\*).tw.

13. rehabilitation.fs.
14. ((skill\* or adl or activities of daily living) adj2 (learn\* or teach\* or educat\*)).tw.
15. ((patient\* adj3 (educat\* or instruct\*)) or ((educat\* or instructional) adj3 inter-vent\*)).tw.
16. Patient Education as Topic/ use prmz or patient education/ use emez or patient education/ use amed
17. ((strength or balance or postular or posture or walking or movement) adj3 inter-vent\*).tw.
18. or/9-17
19. ((systematic\* adj2 review\*) or meta-anal\*).mp,pt. or (review.mp,pt. and (pubmed or medline or embase or pedro or (database adj2 search\*) or (systematic\* adj2 search\*)).tw.)
20. random\*.mp,pt. or quasirandom\*.mp.
21. controlled clinical trial\*.mp,pt.
22. 20 or 21
23. 8 and 18 and 19 [SR]
24. remove duplicates from 23
25. 6 and 18 and 22 [RCT]
26. remove duplicates from 25
27. 24 or 26

## **Cochrane Library**

Cochrane Reviews: 17

Other Reviews (DARE): 7

Clinical Trials (CENTRAL): 320

Technology Assessments (HTA): 3

- #1 MeSH descriptor Hip Prosthesis explode all trees
- #2 MeSH descriptor Arthroplasty, Replacement, Hip explode all trees
- #3 (hip near/4 (arthroplast\* or replacement\*))
- #4 ((joint replacement\* and hip) or ((regeneration or prostheth\* or prosthes\* or implant\*) near/10 hip)):ti,ab,kw
- #5 (#1 OR #2 OR #3 OR #4)
- #6 MeSH descriptor Physical Therapy Modalities explode all trees
- #7 MeSH descriptor Motor Activity explode all trees
- #8 MeSH descriptor Physical Therapy (Specialty) explode all trees
- #9 MeSH descriptor Rehabilitation, this term only
- #10 MeSH descriptor Early Ambulation explode all trees
- #11 MeSH descriptor Exercise Therapy explode all trees
- #12 MeSH descriptor Movement explode all trees
- #13 MeSH descriptor Physical Fitness explode all trees
- #14 (Exercise\* or training or (physical next therap\*) or physiotherap\* or (physio

next therap\*) or rehabilitation or (physical next activit\*) or (motor next activit\*) or mobilisation mobilization or ambulation or retraining or "muscle stimulation" or (movement next tech-nique\*)):ti,ab,kw

#15 MeSH descriptor Rehabilitation Centers, this term only

#16 (#6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15)

#17 (#5 AND #16)

#18 (hip near/2 surgery):ti,ab,kw

#19 (#5 OR #18)

#20 (#16 AND #19)

### **PEDro**

Søk 1: hip replacement (83)

Søk2: hip arthroplasty (82)

### **OT Seeker**

Søk 1: hip replacement (25)

Søk2: hip arthroplasty (22)

---

## Vedlegg 2: Sammendrag for inkluderte systematiske oversikter

---

Sortert alfabetisk etter førsteforfatterens etternavn:

- (1) *Bai X. Clinical effects of comprehensive rehabilitation after minimally invasive total hip arthroplasty. Zhongguo gu shang = China journal of orthopaedics and traumatology 2009;22(6):417-20.*

Abstract: OBJECTIVE: To explore clinical effects of comprehensive rehabilitation therapy for function restore of hip joint after minimally invasive total hip arthroplasty. METHODS: From March 2006 to February 2008, 100 patients were randomly divided into the treatment group and the control group. Fifty patients in the treatment group, including 21 males and 29 females, ranging in age from 56 to 78 years, with an average of (67.2 +/- 11.0) years. Fifty patients in the control group, including 26 males and 24 females, ranging in age from 54 to 79 years, with an average of (65.5 +/- 11.5) years. The course of disease of the two groups were 10 to 15 years. The comprehensive rehabilitations such as joint range of motion, the activities of daily living and restoring muscle strength were performed step-by-step in the treatment group under the guidance of the therapist at the 2nd day after hip arthroplasty. Above rehabilitations were not performed in the control group. The postoperative functional recovery of hip joint, the Harris scores and X-ray were analyzed and compared between the two groups. RESULTS: All the patients were followed and the duration averaged 13 months (12 to 14 months). The therapeutic effects of the two groups had statistical differences,  $Z_c = 12.72$ ,  $P < 0.001$ . In the treatment group, the average Harris score was (94.50 +/- 29.87), 32 patients got an excellent result, 12 good, 4 poor and 2 bad. While in the control group, above data were (63.50 +/- 19.97), 12, 15, 7 and 16 respectively. The therapeutic effects of treatment group were better than those of control group. The X-ray showed that there were no hip prosthesis loosening, femoral neck fractures and other complications. CONCLUSION: The early comprehensive rehabilitation after minimally invasive total hip replacement is the key to decrease postoperative complications and to decide the success or failure of surgery

- (2) *Barrois B, Gouin F, Ribinik P, Revel M, Rannou F. What is the interest of rehabilitation in physical medicine and functional rehabilitation ward after total hip arthroplasty? Elaboration of french clinical practice guidelines. Annales de readaptation et de medecine physique : revue scientifique de la Societe francaise de reeducation fonctionnelle de readaptation et de medecine physique 2007;50(8):700-699.*

Abstract: OBJECTIVES: To develop clinical practice guidelines concerning the interest of post-operative rehabilitation in a physical medicine and functional rehabilita-

tion (PMR) ward after total hip arthroplasty (THA). METHOD: The SOFMER (French Physical Medicine and Rehabilitation Society) methodology, associating a systematic literature review, collection of everyday clinical practice, and external review by a multidisciplinary expert panel, was used. Main outcomes were impairment, disability, medico-economic implications and postoperative complications. RESULTS: Post-operative rehabilitation in a PMR ward after THA is recommended for frail patients because of their functional status, and/or associated co-morbidities, and/or post-operative complications. For patients in whom sustained rehabilitation is not necessary, but who cannot return home, a stay in a non-specific (non-PMR) post-operative center could be recommended. Post-operative rehabilitation in a PMR ward after THA could reduce the length of stay in a surgical ward and increase the functional status of patients. The total cost of the different modalities of post-operative rehabilitation after THA needs evaluation. CONCLUSION: This study suggests a value of rehabilitation in a PMR ward after THA, but good methodological quality studies are needed to evaluate the cost/benefit ratio of rehabilitation in a PMR ward after THA in the French health care system

- (3) *Brander VA, Mullarkey CF. Rehabilitation after total hip replacement for osteoarthritis. Phys Med Rehabil State of the Art Reviews 2002;16(3):415-30.*

Abstract: Arthritis is considered the leading cause of disability in the United States. Total hip arthroplasty (THA) has emerged as one of the most common and successful orthopedic surgeries, eliminating the pain and impairments from disabling hip arthritis. Rehabilitation protocols are widely used after THA. However, these prescriptions are typically based on clinical experience and orthopedic preferences and not on valid evidence-based clinical research and management. This article presents a comprehensive review of current literature describing rehabilitation interventions before and after THA. Approximately 120 articles were reviewed and evaluated based on accuracy of methodology, statistical analysis and validity of conclusions. Studies evaluating preoperative exercise and education are described. Standard postoperative protocols, such as weight bearing and range of motion restrictions, are presented in terms of their clinical and scientific rationale. Although there are no prospective, randomized trials determining the most efficacious exercise protocols after surgery, in vivo hip instrumentation studies provide some valuable guidance. The current literature evaluating the standard use of inpatient rehabilitation after THA are described. Much more evidence-based research is needed to determine the most cost-effective, safe, and efficacious rehabilitation strategies after THA

- (4) *Chen W-H, Wang Q, Su J-C. [Postoperative rehabilitation exercise for the recovery of limb function after total hip replacement]. Zhongguo Linchuang Kangfu 2004;8(20):3926-8.*

Abstract: Aim: To analyze early rehabilitation training to the functional restoration of limbs after the replacement operation of coax and study the methods of improving the quality of rehabilitation, shortening the rehabilitation time and reducing the correlated complication. Methods: Forty-five patients with replacement of total hip were randomly divided into routine treatment group with 22 cases (control group) and recovery group with 23 cases. The quality of functional restoration of limbs was evaluated by the comparison of Harris integral calculus and Barthel index (BI) between the two groups. Results: The Harris integral calculus and BI were 91.58 +/- 9.20 and 79.32 +/- 18.25 in the recovery group and 72.19 +/- 11.24 and 68.08 +/- 12.25 in the control group, respectively, which were better in the former group. Conclusion: Early rehabilitation training can improve the long-term and recent effect of total hip replacement, thus improving the patients' quality of life, shortening the rehabilitation time and reducing the correlated complication. Copyright © 2011 Elsevier B. V., Amsterdam. All Rights Reserved

- (5) *Danish Centre for Evaluation and Health Technology Assessment (DACEHTA). Multimodal perioperative rehabilitation after total hip replacement (project) - Primary research (Project record). 2003.*
- (6) *Dauty M, Genty M, Ribinik P. Physical training in rehabilitation programs before and after total hip and knee arthroplasty. Annales de readaptation et de medecine physique : revue scientifique de la Societe francaise de reeducation fonctionnelle de readaptation et de medecine physique 2007;50(6):462-1.*

Abstract: OBJECTIVE: A review of the literature to investigate physical training in rehabilitation programs before and after hip and knee arthroplasty. METHODS: We performed a literature search of the MedLINE and Cochrane databases since 1966 to 2006 using 8 keywords for articles of literature reviews or randomized controlled trials investigating physical training before and after hip and knee arthroplasty. RESULTS AND DISCUSSION: The search resulted in 14 articles: 2 reviews of the literature and 7 articles of studies concerning total hip arthroplasty and 5 knee arthroplasty. Results were difficult to analyze because of the low number of patients included, a high number of dropouts, no matched control populations, different physical training protocols, and the use of functional scores or inadequate parameters. We found no randomized controlled trial concerning physical training after knee arthroplasty. CONCLUSION: Physical training does not seem benefit patients before hip or knee arthroplasty. However, the training may have benefit immediately after, and particularly well after, total hip arthroplasty

- (7) *Di MM, Vallerio F, Tappero R, Cavanna A. Rehabilitation after total hip arthroplasty: A systematic review of controlled trials on physical exercise programs. European Journal of Physical and Rehabilitation Medicine 2009;45(3):303-17.*



Abstract: Total hip arthroplasty (THA) has revolutionized the care of patients with end-stage joint disease, leading to pain relief, functional recovery, and substantial improvement in quality of life. However, long-term studies indicate persistence of impairment and functional limitation after THA, and the optimal rehabilitation protocols are largely unknown. The aim of this paper was to systematically review the controlled trials published on the effectiveness of physical exercise programs after THA. Nine studies were retrieved from MEDLINE and reviewed. Results show that the physical exercise protocols most frequently used after THA in the early postoperative phase are neither supported nor denied by clinical controlled trials. Convincing evidence for the effectiveness of single interventions in addition to usual exercise programs exists for each of the three following options: treadmill training with partial body-weight support, unilateral resistance training of the quadriceps muscle (operated side), and arm-interval exercises with an arm ergometer. In the late postoperative phase (operation interval > 8 weeks) exercise programs consistently improve both impairment and ability to function. Weight-bearing exercises with hip-abductor eccentric strengthening may be the crucial component of the late-phase protocols. Substantial limitations were found in the nine studies, including small sample size, patient selection, heterogeneity of outcome assessments, and potential sources of variability not investigated. Despite limitations, we conclude that three main suggestions emerge from controlled trials on physical exercise after THA: early postoperative protocols should include additive interventions whose effectiveness has been shown. Late postoperative programs are useful and should comprise weight-bearing exercises with hip-abductor eccentric strengthening

- (8) *Froehlig P, Le MS, Coudeyre E, Revel M, Rannou F. What is the interest of early mobilization after total hip arthroplasty? Development of French guidelines for clinical practice. Annales de Readaptation et de Medecine Physique 2008;51(3):212-7.*

Abstract: Aims: To develop clinical practice guidelines for early mobilisation after total hip replacement (THR). Method: We used the French Society of Physical and Rehabilitation Medicine (Sofmer) methodology, which associates a systematic review of the literature, the collection of information regarding current clinical practice and external review by a multidisciplinary expert panel. Results: Recommending early mobilisation after THR is not established by a review of the literature. A survey of French clinical practice allows for recommending early mobilisation in the context of complex hip issues. Trials with good methodology must be developed to evaluate the interest of early functional mobilisation corresponding to when patients first stand and take their first steps after surgery. These trials should focus mainly on the final pain, functional status, and reduction of handicap. 2008 Elsevier Masson SAS. All rights reserved

- (9) *Handoll Helen HG, Sherrington C, Mak Jenson CS. Interventions for improving mobility after hip fracture surgery in adults. Cochrane Database of Systematic Reviews 2011; (3):CD001704.*

Abstract: **BACKGROUND:** Hip fracture mainly occurs in older people. Strategies to improve mobility include gait retraining, various forms of exercise and muscle stimulation. **OBJECTIVES:** To evaluate the effects of different interventions for improving mobility after hip fracture surgery in adults. **SEARCH STRATEGY:** We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register, the Cochrane Central Register of Controlled Trials, MEDLINE and other databases, and reference lists of articles, up to April 2010. **SELECTION CRITERIA:** All randomised or quasi-randomised trials comparing different mobilisation strategies after hip fracture surgery. **DATA COLLECTION AND ANALYSIS:** The authors independently selected trials, assessed risk of bias and extracted data. There was no data pooling. **MAIN RESULTS:** The 19 included trials (involving 1589 older adults) were small, often with methodological flaws. Just two pairs of trials tested similar interventions. Twelve trials evaluated mobilisation strategies started soon after hip fracture surgery. Single trials found improved mobility from, respectively, a two-week weight-bearing programme, a quadriceps muscle strengthening exercise programme and electrical stimulation aimed at alleviating pain. Single trials found no significant improvement in mobility from, respectively, a treadmill gait retraining programme, 12 weeks of resistance training, and 16 weeks of weight-bearing exercise. One trial testing ambulation started within 48 hours of surgery found contradictory results. One historic trial found no significant difference in unfavourable outcomes for weight bearing started at two versus 12 weeks. Of two trials evaluating more intensive physiotherapy regimens, one found no difference in recovery, the other reported a higher level of drop-out in the more intensive group. Two trials tested electrical stimulation of the quadriceps: one found no benefit and poor tolerance of the intervention; the other found improved mobility and good tolerance. Seven trials evaluated strategies started after hospital discharge. Started soon after discharge, two trials found improved outcome after 12 weeks of intensive physical training and a home-based physical therapy programme respectively. Begun after completion of standard physical therapy, one trial found improved outcome after six months of intensive physical training, one trial found increased activity levels from a one year exercise programme, and one trial found no significant effects of home-based resistance or aerobic training. One trial found improved outcome after home-based exercises started around 22 weeks from injury. One trial found home-based weight-bearing exercises starting at seven months produced no significant improvement in mobility. **AUTHORS' CONCLUSIONS:** There is insufficient evidence from randomised trials to establish the best strategies for enhancing mobility after hip fracture surgery. **INTERVENTIONS AIMED AT IMPROVING AND RESTORING MOBILITY**

**AFTER HIP FRACTURE SURGERY IN ADULTS:** The aim of care after surgery for hip fracture is to get people safely back on their feet and walking again. Initially, people may be asked to rest in bed and restrict weight bearing. Then various strategies to improve mobility, including gait retraining and exercise programmes, are used during hospital stay and often after discharge from hospital. This review includes evidence from 19 trials involving 1589 participants, generally aged over 65 years. Many of the trials had weak methods, including inadequate follow-up. There was no pooling of data because no two trials were sufficiently alike. Twelve trials evaluated interventions started soon after hip fracture surgery. Single trials found improved mobility from, respectively, a two-week weight-bearing programme, a quadriceps muscle strengthening exercise programme and electrical stimulation aimed at alleviating pain. Single trials found no significant improvement in mobility from, respectively, a treadmill gait retraining programme, 12 weeks of resistance training, and 16 weeks of weight-bearing exercise. One trial testing ambulation started within 48 hours of surgery found contradictory results. One historic trial found no significant difference in unfavourable outcomes for weight bearing started at two versus 12 weeks. Of two trials evaluating more intensive physiotherapy regimens, one found no difference in recovery, the other reported a higher level of drop-out in the more intensive group. Two trials tested electrical stimulation of the quadriceps: one found no benefit and poor tolerance of the intervention; the other found improved mobility and good tolerance. Seven trials evaluated interventions started after hospital discharge. Started soon after discharge, two trials found improved outcome after 12 weeks of intensive physical training and a home-based physical therapy programme respectively. Begun after completion of standard physical therapy, one trial found improved outcome after six months of intensive physical training, one trial found increased activity levels from a one year exercise programme, and one trial found no significant effects of home-based resistance or aerobic training. One trial found improved outcome after home-based exercises started around 22 weeks from injury. One trial found home-based weight-bearing exercises starting at seven months produced no significant improvement in mobility. In summary, the review found there was not enough evidence to determine which are the best strategies, started in hospital or after discharge from hospital, for helping people walk and continue walking after hip fracture surgery

- (10) *Handoll HHG, Cameron ID, Mak JCS, Finnegan TP. Multidisciplinary rehabilitation for older people with hip fractures. Cochrane Database of Systematic Reviews 2009;(4):CD007125.*

Abstract: Background: Hip fracture is a major cause of morbidity and mortality in older people and its impact on society is substantial. Objectives: To examine the effects of multidisciplinary rehabilitation, in either inpatient or ambulatory care settings, for older patients with hip fracture. Search strategy: We searched the Cochrane

Bone, Joint and Muscle Trauma Group Specialised Register (April 2009), The Cochrane Library (2009, Issue 2), MEDLINE and EMBASE (both to April 2009). Selection criteria: Randomised and quasi-randomised trials of post-surgical care using multidisciplinary rehabilitation of older patients (aged 65 years or over) with hip fracture. The primary outcome, 'poor outcome' was a composite of mortality and decline in residential status at long-term (generally one year) follow-up. Data collection and analysis: Trial selection was by consensus. Two review authors independently assessed trial quality and extracted data. Data were pooled where appropriate. Main results: The 13 included trials involved 2498 older, usually female, patients who had undergone hip fracture surgery. Though generally well conducted, some trials were at risk of bias such as from imbalances in key baseline characteristics. There was substantial clinical heterogeneity in the trial interventions and populations. Multidisciplinary rehabilitation was provided primarily in an inpatient setting in 11 trials. Pooled results showed no statistically significant difference between intervention and control groups for poor outcome (risk ratio 0.89; 95% confidence interval 0.78 to 1.01), mortality (risk ratio 0.90, 95% confidence interval 0.76 to 1.07) or hospital readmission. Individual trials found better results, often short-term only, in the intervention group for activities of daily living and mobility. There was considerable heterogeneity in length of stay and cost data. Three trials reporting carer burden showed no evidence of detrimental effect from the intervention. Overall, the evidence indicates that multidisciplinary rehabilitation is not harmful. The trial comparing primarily home-based multidisciplinary rehabilitation with usual inpatient care found marginally improved function and a clinically significantly lower burden for carers in the intervention group. Participants of this group had shorter hospital stays, but longer periods of rehabilitation. One trial found no significant effect from doubling the number of weekly contacts at the patient's home from a multidisciplinary rehabilitation team. Authors' conclusions: While there was a tendency to a better overall result in patients receiving multidisciplinary inpatient rehabilitation, these results were not statistically significant. Future trials of multidisciplinary rehabilitation should aim to establish both effectiveness and cost effectiveness of multidisciplinary rehabilitation overall, rather than evaluate its components. Copyright 2009 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd

- (11) *Hol AM, Van GS, Lucas C, Van Susante JLC, Van Loon CJM. Partial versus unrestricted weight bearing after an uncemented femoral stem in total hip arthroplasty: Recommendation of a concise rehabilitation protocol from a systematic review of the literature. Arch Orthop Trauma Surg 2010;130(4):547-55.*

Abstract: The aim of this systematic review was to find evidence-based support in the literature to allow immediate unrestricted weight bearing after primary uncemented total hip arthroplasty (THA). Accelerated rehabilitation programs for THA are becoming increasingly popular to shorten hospital stay and to facilitate rapid res-

toration of function. The goals of these rehabilitation programs could be more easily achieved if immediate unrestricted weight bearing (UWB) could be allowed after a THA. So far, however, immediate weight bearing is frequently contraindicated in widely accepted protocols for uncemented THA due to fear for subsidence and absence of osseous integration of the femoral stem. Thus, frequently protected weight bearing and restricted activities are still advocated for at least 6 weeks after surgery. In addition, we analyzed the literature to come to a recommendation on gait pattern and walking aid. From a systematic search in several electronic databases 13 studies met the inclusion criteria. These studies were reviewed according to the Cochrane methodology. We found moderate to strong evidence that no adverse effects on subsidence and osseous integration of the femoral stem after uncemented THA occur after immediate UWB. Based on this literature review, we recommend early rehabilitation after uncemented THA with a reciprocally gait pattern using crutches, one cane for independency in ADL in case patients walk limp-free and walking without crutches as soon as possible. During the first weeks after surgery only stair climbing should be performed with protected weight bearing because of high torsion loads on the hip

- (12) *Khan F, Ng L, Gonzalez S, Hale T, Turner-Stokes L. Multidisciplinary rehabilitation programmes following joint replacement at the hip and knee in chronic arthropathy. Cochrane database of systematic reviews (Online) 2008; (2):CD004957.*

**Abstract:** **BACKGROUND:** Joint replacements are common procedures and treatment of choice for those with intractable joint pain and disability arising from arthropathy of the hip or knee. Multidisciplinary rehabilitation is considered integral to the outcome of joint replacement. **OBJECTIVES:** To assess the evidence for effectiveness of multidisciplinary rehabilitation on activity and participation in adults following hip or knee joint replacement for chronic arthropathy. **SEARCH STRATEGY:** We searched the Cochrane Musculoskeletal Group Trials Register, the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE and CINAHL up to September 2006. **SELECTION CRITERIA:** Randomised controlled trials (RCTs) that compared organised multidisciplinary rehabilitation with routine services following hip or knee replacement, and included outcome measures of activity and participation in accordance with the International Classification of Functioning, Health and Disability (ICF). **DATA COLLECTION AND ANALYSIS:** Four authors independently extracted data and assessed methodological quality of included trials. **MAIN RESULTS:** Five trials (619 participants) met the inclusion criteria; two addressed inpatient rehabilitation (261 participants) and three (358 participants) home-based settings. There were no trials addressing outpatient centre-based programmes. Pooling of data was not possible due to differences in study design and outcomes used. Methodological assessment showed all trials were of low quality. For inpatient settings early commencement of rehabilitation and clinical pathways led to more rapid at-

tainment of functional milestones (disability) (Functional Independence Measure (FIM) transfer WMD 0.5, 95% CI 0.15, 0.85, number needed to treat to benefit (NNTB) = 6, FIM ambulation WMD 1.55 (95%CI 0.96, 2.14), NNTB = 3), shorter hospital stay, fewer post-operative complications and reduced costs in the first three to four months. Home-based multidisciplinary care improved functional gain (Oxford Hip Score (OHS) WMD at 6 months -7.00 (95%CI -10.36, -3.64), NNT = 2 and quality of life (QoL) and reduced hospital stay in the medium term (six months). No trials addressed longer-term outcomes following hip replacement only. AUTHORS' CONCLUSIONS: Based on the heterogeneity and the low quality of the included trials that precluded pooled meta-analysis, there is silver level evidence that following hip or knee joint replacement, early multidisciplinary rehabilitation can improve outcomes at the level of activity and participation. The optimal intensity, frequency and effects of rehabilitation over a longer period and associated social costs need further study. Future research should focus on improving methodological and scientific rigour of clinical trials, and use of standardised outcome measures, so that results can be pooled for statistical analysis

- (13) *Kuijjer PP, de Beer MJ, Houdijk JH, Frings-Dresen MH. Beneficial and limiting factors affecting return to work after total knee and hip arthroplasty: A systematic review. Journal of Occupational Rehabilitation 2009;19(4):375-81.*

Abstract: Introduction: A large number of patients undergoing total knee (TKA) and hip (THA) arthroplasties are of working age at the time these procedures are performed. The objective of this study was to systematically review literature on the beneficial and limiting factors affecting return to work in patients undergoing TKA or THA. Method: PubMed and Embase were systematically searched to find studies that described factors that influence return to work (RTW) after surgery. The following inclusion criteria had to be met: (1) inclusion of patients with primary or revision TKA or THA; (2) description of return to work after surgery or employment status; and (3) description of a beneficial or restricting factor affecting return to work. Results: Only three studies were found that fulfilled the three inclusion criteria. Three factors were discussed: (1) the mini-posterior approach compared to the two-incision approach; (2) patient movement restrictions after surgery compared to no restrictions; and (3) patient discharge based on guidelines compared to discharge without guidelines. Conclusions: This systematic review revealed that knowledge is sparse regarding beneficial or limiting factors affecting return to work after TKA or THA. Despite that, the results suggests that the two-incision approach is beneficial, patient movement restrictions are limiting, and patient discharge guidelines have no effect on the time patients take to RTW

- (14) *Laube W. Training und Rehabilitation nach Totalendoprothese. Zeitschrift fur Physiotherapeuten Krankengymnastik 2010;62(4):6-16.*

Abstract: Introduction: The process of sensomotoric learning is important for rehabilitation of patients with total hip or knee replacement. Method: Randomised controlled trials (RCTs) and systematic reviews (SRs) evaluating the effectiveness of coordination, strength and endurance training were searched in Medline. Results: Literature search revealed 40 RCTs and 18 SRs, whose full text were reviewed. Representative studies were selected for this article. Conclusion: Active physiotherapy interventions are effective, but there are no recommendations for type, extent and intensity of loading.

- (15) *Medical Advisory Secretariat Ontario Ministry of Health and Long-Term Care (MAS). Physiotherapy rehabilitation after total knee or hip replacement: an evidence-based analysis.: Medical Advisory Secretariat, Ontario Ministry of Health and Long-Term Care (MAS); 2005.*
- (16) *Meyer A. Pre- and post-operative physio- and training therapy in total hip replacement (THR): a search of the literature. Kranken Gymnastik 2005;57(8):1210-24.*

Abstract: A systematic search of the literature was carried out in order to find high-quality studies and reviews on the subject of pre- and post-operative treatment of patients with total hip replacements. Our efforts revealed 196 potentially relevant studies as well as 119 review articles. Of these, 10 studies and 2 review articles met the selection criteria and requirement standards for a high degree of evidence. The results of our evaluation were: a) Treadmill training with partial weight-bearing can significantly improve the Harris score for patients with THR; b) bed exercises in the acute phase do not lead to a significant improvement in the ILOA score; c) venous return is improved for 30 minutes following one minute of active foot motions; d) it is uncertain whether additional physiotherapy two months after a THR or e) pre-operative physiotherapy significantly influences the patient's post-operative status. Additionally, it was shown that pre-operative patient instruction made no significant improvement in the following post-operative outcome parameters: fears, length of hospital stay, mobility, pain, or patient satisfaction. [English Summary]

- (17) *Muller E, Mittag O, Gulich M, Uhlmann A, Jackel WH. Systematic literature analysis on therapies applied in rehabilitation of hip and knee arthroplasty: methods, results and challenges. Die Rehabilitation 2009;48(2):62-72.*

Abstract: Evidence-based medicine is a central issue in medical practice. This also applies to rehabilitation services. The German Statutory Pension Insurance meets this need in its guideline programme. Amongst others a guideline for rehabilitation

following hip or knee arthroplasty is currently being developed. In this context a hierarchical, systematic literature analysis was conducted summarising the current state of evidence with reference to the effects and the treatment requirements (frequency and duration) of different rehabilitative therapies following total hip or knee replacement. In the first step, a search for evidence-based guidelines, systematic reviews and health technology assessments was conducted. Secondly, search strategies for primary literature in the following databases were designed: Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, and PsychINFO (01/1997-09/2007). Additionally, a handsearch of several German journals not listed in the databases was conducted. Randomized trials were preferred, however, non-randomized trials were included if the intervention and control groups were comparable with regard to the baseline parameters. Results can be classified into three categories: (1) therapies for which evidence for (positive) effects was found, (2) therapies for which evidence was found, however, their transferability onto rehabilitation in Germany should be discussed (e. g., studies on immediate post-surgery interventions), and (3) therapies for which no methodologically appropriate trials could be found. The literature reviewed does not allow for final conclusions as to frequency and duration of different therapeutic interventions within the rehabilitation time frame in Germany (usually the first three weeks post discharge from hospital). Overall, there is a need for further research

- (18) *Peiris CL, Taylor NF, Shields N. Extra physical therapy reduces patient length of stay and improves functional outcomes and quality of life in people with acute or subacute conditions: A systematic review. Arch Phys Med Rehabil 2011;92(9):1490-500.*

Abstract: Objectives: To investigate whether extra physical therapy intervention reduces length of stay and improves patient outcomes in people with acute or subacute conditions. Data Sources: Electronic databases CINAHL, MEDLINE, AMED, PEDro, PubMed, and EMBASE were searched from the earliest date possible through May 2010. Additional trials were identified by scanning reference lists and citation tracking. Study Selection: Randomized controlled trials evaluating the effect of extra physical therapy on patient outcomes were included for review. Two reviewers independently applied the inclusion and exclusion criteria, and any disagreements were discussed until consensus could be reached. Searching identified 2826 potentially relevant articles, of which 16 randomized controlled trials with 1699 participants met inclusion criteria. Data Extraction: Data were extracted using a predefined data extraction form by 1 reviewer and checked for accuracy by another. Methodological quality of trials was assessed independently by 2 reviewers using the PEDro scale. Data Synthesis: Pooled analyses with random effects model to calculate standardized mean differences (SMDs) and 95% confidence intervals (CIs) were used in meta-analyses. When compared with standard physical therapy, extra physical therapy re-



duced length of stay (SMD=-.22; 95% CI, -.39 to -.05) (mean difference of 1d [95% CI, 01] in acute settings and mean difference of 4d [95% CI, 07] in rehabilitation settings) and improved mobility (SMD=.37; 95% CI,.05.69), activity (SMD=.22; 95% CI,.07.37), and quality of life (SMD=.48; 95% CI,.29.68). There were no significant changes in self-care (SMD=.35; 95% CI, -.06.77). Conclusions: Extra physical therapy decreases length of stay and significantly improves mobility, activity, and quality of life. Future research could address the possible benefits of providing extra services from other allied health disciplines in addition to physical therapy. 2011 American Congress of Rehabilitation Medicine

---

### Vedlegg 3: Sammendrag for inkluderte RCT

---

Sortert alfabetisk etter førsteforfatterens etternavn:

- (1) *Boden H, Adolphson P. No adverse effects of early weight bearing after uncemented total hip arthroplasty: A randomized study of 20 patients. Acta Orthop Scand 2004;75(1):21-9.*

Abstract: Background: Few guidelines are available whether early weight-bearing after an uncemented total hip arthroplasty (THA) can be recommended or not. Stability and ingrowth may be jeopardized by immediate loading of the implant while functional recovery may be promoted and periprosthetic demineralization reduced. Patients and methods: We did a prospective study of 20 patients who were operated on with a hydroxy-apatite-coated (HA), uncemented total hip arthroplasty with a tapered stem because of unilateral arthrosis, and randomized the patients to the immediate (I) or late (L) weight-bearing (after 3 months) group. The shoe on the operated side was equipped with an auditory device signaling when the patient placed a load on the extremity. The clinical assessment was done with the Harris hip score at the time of the operation and after 12 and 24 months. Radiographs and dual-energy x-ray absorptiometry (DEXA) were evaluated for migration, femoral remodeling and bone mineral density (BMD) after 3, 6, 12 and 24 months. Tc-scintigraphy was done after 6, 12 and 24 months. Results: Postoperatively, the Harris hip score showed no group difference. After 3 months, we noted a large reduction in BMD around the stem prosthesis. This was most marked in the proximal regions and the bone loss was significantly larger in zone 1, 4 and 5 in the L group. Distally, the BMD normalized with time, but the loss of bone persisted in the proximal zones after 24 months. An initial increase in the scintigraphic uptake ratio in all zones in both groups declined with time, but it was still increased on the operated side after 24 months. Several radiographic signs of bone remodeling were seen, but the patterns were similar in both groups. Interpretation: We found no adverse effect of immediate weight bearing with this prosthesis

- (2) *Du X-L, Fang H-P, Fang Z, Li F. Preventive effect of comprehensive rehabilitation nursing on early complications of total hip arthroplasty. Journal of Clinical Rehabilitative Tissue Engineering Research 2011;15(26):4923-6.*

Abstract: BACKGROUND: Although the early postoperative functional rehabilitation can effectively guarantee the results of operations, incidence rate of complications following total hip replacement is still high. OBJECTIVE: To evaluate preventive effect of comprehensive rehabilitation care of early complications of total hip arthroplasty. METHODS: Totally 90 total hip arthroplasty patients were randomly divided into control group and study groups equally. Both groups were given conventional

treatment and care, of which the study group underwent comprehensive postoperative rehabilitation care. The control group received general procedure of rehabilitation care. RESULTS AND CONCLUSION: There was no difference in postoperative Harris score at 1, 2, 12 and 20 weeks after surgery between study group and control group ( $P > 0.05$ ). Compared with control group, the incidence of joint dislocation, infection, deep vein thrombosis of study group post-surgery 2 and 12 weeks, and the heterotopic ossification at 12 weeks after surgery were significantly lower ( $P < 0.01$ ). These suggest that comprehensive rehabilitation care significantly reduces early complications of total hip replacement surgery, and effectively promotes the functional recovery of hip joint

- (3) *Gilbey HJ, Ackland TR, Tapper J, Wang AW. Perioperative exercise improves function following total hip arthroplasty: A randomized controlled trial. Journal of Musculoskeletal Research 2003;7(2):111-23.*

Abstract: Until recently, limited evidence existed to support the efficacy of exercise programs for patients scheduled for total hip arthroplasty (THA), and no evidence-based guidelines were available regarding the length or intensity of exercise programs and their effect on patient recovery. The purpose of this randomized controlled trial was to determine the impact of an eight-week pre-surgery and 20 week post-surgery customized exercise program on the strength and function of subjects scheduled for THA. A series of physical tests and quality of life questionnaires were completed by patients ( $n = 57$ ) pre-surgery and on three occasions post-surgery. In the week prior to surgery, the exercise group exhibited significant improvements ( $p < 0.05$ ) in composite hip strength score and WOMAC total score in comparison to control subjects. By week 24, post-surgery scores for WOMAC total score, Harris Hip score, composite strength score, hip flexion range of motion of the operated hip and the distance walked in 6 minutes were significantly ( $p < 0.05$ ) better in exercise group patients. A detailed description of the exercise intervention is presented in this paper

- (4) *Gilbey HJ, Ackland TR, Wang AW, Morton AR, Troughet T, Tapper J. Exercise improves early functional recovery after total hip arthroplasty. Clin Orthop 2003;(408):193-200.*

Abstract: The purpose of this prospective, randomized study was to apply an 8-week customized exercise program to patients (Group E) scheduled for total hip arthroplasty, followed by a postsurgery exercise program, and show the effect on functional recovery compared with control subjects (Group C) who received no additional exercise apart from routine in-hospital physical therapy. Strength, range of motion, and physical function tests were completed by 57 patients at Week 8 and Week I before surgery and at Weeks 3, 12, and 24 postoperatively. No differences between the exer-

cise and control groups were observed at baseline. By 1 week before surgery, patients in Group E had shown significant improvements for Western Ontario and McMaster Universities Osteoarthritis Index (total score, stiffness, and physical function components), and combined hip strength. Patients in Group E had improved hip flexion range of motion in the diseased hip compared with patients in Group C. Significant differences in outcome measures between Group E and Group C were observed throughout the postoperative phase from Weeks 3 to 24. The current study showed that customized perioperative exercise programs are well tolerated by patients with end-stage hip arthritis, and are effective in improving early recovery of physical function after total hip arthroplasty

- (5) *Huang L-H, Liu Y, Xue S-F, Luo X-Y, Liu W-H. Comparison of different intervention time of systematic rehabilitation following total hip replacement. Journal of Clinical Rehabilitative Tissue Engineering Research 2009;13(9):1755-8.*

**Abstract:** Objective: To explore the effect of time of prospective intervention for systematic rehabilitation in the patients undergoing total hip replacement. Methods: 165 patients with total hip replacement were selected from Department of Orthopaedics, Affiliated Hospital of Xiangnan University between July 2000 and May 2008, and randomly divided into 3 groups: early rehabilitation group (n=56), including 27 male and 29 female, aged 44-79 years, with preoperative Harris scores of (47.4+/-1.3), who underwent rehabilitation therapy 3 days after total hip replacement; middle-stage rehabilitation group (n=63), including 37 male and 26 females, aged 48-80 years, with preoperative Harris scores of (45.6+/-2.1), who underwent rehabilitation protocol from 4 d to 21d postoperatively; late rehabilitation group (n=46), including 24 male and 22 females, aged 47-81 years, with preoperative Harris scores of (46.3+/-1.5), who underwent rehabilitation protocol since 21d postoperatively. The three groups did the functional exercise according to unified plans. Harris score system was used to evaluate the hip joint functions of the patients before operation and 1, 2 and 3 months after operation respectively. Results: 165 patients were included in the final analysis. The preoperative average Harris score showed no significant difference among the three groups ( $P > 0.05$ ). After systematic rehabilitation protocol, the average Harris score was 89.1+/-6.3 in early group, 60.1+/-3.7 in middle-stage group and 54.6+/-3.5 in late group 1 month after operation. The early group was significantly greater than the other groups ( $P < 0.05$ ). The average Harris score was 90.1+/-4.3 in early group, 85.7+/-5.3 in middle-stage group and 69.8+/-3.8 in late group 2 months after operation. The early and middle-stage groups showed significant differences compared with late group ( $P < 0.05$ ). The average Harris score was 94.8+/-2.3 in early group, 92.2+/-3.2 in middle-stage group and 90.5+/-3.1 in late group 3 months after operation. No significant difference was found among the three groups ( $P > 0.05$ ). Conclusion: Early intervention of systematic rehabilitation benefits functional recovery of the patients undergoing total hip replacement

- (6) *Jesudason C, Stiller K. Are bed exercises necessary following hip arthroplasty? Australian Journal of Physiotherapy 2002;48(2):73-81.*

Abstract: This study investigated whether a program of bed exercises increased the effectiveness of a mobility regimen during the acute period of hospitalisation, for patients who had undergone primary hip arthroplasty. Forty-two patients were randomly allocated, using a concealed allocation procedure, to one of two groups. Patients in the control group were mobilised according to a standard post-operative protocol. Patients in the exercise group were also mobilised using this protocol but in addition received a program of bed exercises. Severity of pain, range of active hip flexion and hip abduction, and a functional assessment were measured by a blinded assessor on the third or fourth post-operative day and again on the seventh or eighth post-operative day. Significant improvements were found in all outcome measures from the third or fourth post-operative day to the seventh or eighth post-operative day. No significant differences were seen between groups for any outcome measures at either measurement time. Bed exercises do not appear to be of additional benefit to a mobility regimen during the period of acute hospitalisation after primary hip arthroplasty

- (7) *Larsen K, Sorensen OG, Hansen TB, Thomsen PB, Soballe K. Accelerated perioperative care and rehabilitation intervention for hip and knee replacement is effective: A randomized clinical trial involving 87 patients with 3 months of follow-up. Acta Orthop 2008;79(2):149-59.*

Abstract: Background: Approximately 12,000 hip and knee replacements were performed in Denmark in 2005. Accelerated perioperative interventions are currently implemented, but there is conflicting evidence regarding the effect. We therefore performed an efficacy study of an accelerated perioperative care and rehabilitation intervention in patients receiving primary total hip replacement, and both total and unicompartmental knee replacement. Methods: A randomized clinical trial was undertaken in which 87 patients were randomized to either a control group receiving the current perioperative procedure, or an intervention group receiving a new accelerated perioperative care and rehabilitation procedure. Outcome measures were length of stay (LOS) in hospital, and gain in quality of life (QOL) using EQ-5D from baseline to 3-month follow-up. Results: Mean LOS was reduced ( $p < 0.001$ ) from 8 days (95% CI: 7.1-8.4) in the control group to 5 days (95% CI: 4.2-5.6) in the intervention group. This was accompanied by a greater gain in QOL of 0.08 (95% CI: 0.004-0.16) in the intervention group ( $p = 0.03$ ). Interpretation: An accelerated perioperative care and rehabilitation intervention in patients undergoing primary total hip replacement, and total or unicompartmental knee replacement is indeed effective - and of advantage to both the hospital and the patient. Copyright Taylor & Francis 2007. all rights reserved

- (8) *Liu Z, Huang D, Zhuo D. Research on early inpatient rehabilitation after cementless total hip arthroplasty. Chinese Journal of Rehabilitation Medicine 2006;21(3-4):314-7+321.*

Abstract: Objective: To study the early rehabilitation by comparing the outcomes in two matched groups of patients after cementless total hip arthroplasty, according to International Classification of Functioning, Disability and Health. Method: Thirty patients with 32 hips received cementless total hip arthroplasty. The patients were randomly divided into early full weight-bearing group and late full weight-bearing group. The preoperative and postoperative rehabilitation of the patients was similar except weight-bearing. The patients were evaluated clinically and radiographically before, and after surgery at 12 week. Result: At 12 week after surgery the patients in early full weight-bearing group gained the ability to walk faster than those in late full weight-bearing group ( $P < 0.001$ ), and got better scores and improvement both in the Harris hip scores and WOMAC scores ( $P < 0.001$ ). For the SF-36 scores at 12 week, the patients in early full weight-bearing group got higher scores in physical function, social function, and social role ( $P < 0.001$ ). Early full weight-bearing after cementless total hip arthroplasty under some conditions was safe without showing the signs of implant instability or failure to roentgenography at 12 week. Conclusion: The patients in early full weight-bearing group got better activities of daily living, social function and quality of life. Early full weight-bearing rehabilitation after cementless total hip arthroplasty can be carried out in patients under certain situations

- (9) *Munin MC, Rudy TE, Glynn NW, Crossett LS, Rubash HE. Early inpatient rehabilitation after elective hip and knee arthroplasty. Journal of the American Medical Association 1998;279(11):847-52.*

Abstract: Context. - Inpatient rehabilitation after elective hip and knee arthroplasty is often necessary for patients who cannot function at home soon after surgery, but how soon after surgery inpatient rehabilitation can be initiated has not been studied. Objective. - To test the hypothesis that high-risk patients undergoing elective hip and knee arthroplasty would incur less total cost and experience more rapid functional improvement if inpatient rehabilitation began on postoperative day 3 rather than day 7, without adverse consequences to the patients. Design. - Randomized controlled trial conducted from 1994 to 1996. Setting. - Tertiary care center. Participants. - A total of 86 patients undergoing elective hip or knee arthroplasty and who met the following criteria for being high risk: 70 years of age or older and living alone, 70 years of age or older with 2 or more comorbid conditions, or any age with 3 or more comorbid conditions. Of the 86 patients, 71 completed the study. Interventions. - Random assignment to begin inpatient rehabilitation on postoperative day 3 vs postoperative day 7. Main Outcome Measures. - Total length of stay and cost from orthopedic and rehabilitation hospital admissions, functional performance in hos-

pitals using a subset of the functional independence measure, and 4-month follow-up assessment using the RAND 36-item health survey 1 and the functional status index. Results. - Patients who completed the study and began inpatient rehabilitation on postoperative day 3 exhibited shorter mean (+/-SD) total length of stay (11.7+/-2.3 days vs 14.5+/-1.9, P<.001), lower mean (+/-SD) total cost (\$25 891+/- \$3648 vs \$27 762+/- \$3626, P<.03), more rapid attainment of short-term functional milestones between days 6 and 10 (36.2+/-14.4 m ambulated vs 21.4+/-13.3 m, P<.001; 4.8+/-0.8 mean transfer functional Independence measure score vs 4.3+/-0.7, P<.01), and equivalent functional outcome at 4-month follow-up. Conclusion. - These data showed that high-risk individuals were able to tolerate early intensive rehabilitation, and this intervention yielded faster attainment of short-term functional milestones in fewer days using less total cost

- (10) *Peak EL, Parvizi J, Ciminiello M, Purtill JJ, Sharkey PF, Hozack WJ, et al. The role of patient restrictions in reducing the prevalence of early dislocation following total hip arthroplasty. A randomized, prospective study. The Journal of bone and joint surgery American volume 2005;87(2):247-53.*

Abstract: BACKGROUND: It is currently unknown whether functional restrictions following total hip arthroplasty can reduce the prevalence of early postoperative dislocation. Our hypothesis was that dislocation was more likely to occur in patients who were not placed on these restrictions.METHODS: We performed a prospective, randomized study to evaluate the role of postoperative functional restrictions on the prevalence of dislocation following uncemented total hip arthroplasty through an anterolateral approach. Of the 630 eligible consecutive patients, 265 patients (303 hips) consented to be randomized into one of two groups (the "restricted" group or the "unrestricted" group). The patients in both groups were asked to limit the range of motion of the hip to <90 degrees of flexion and 45 degrees of external and internal rotation and to avoid adduction for the first six weeks after the procedure. The patients in the restricted group were instructed to comply with additional hip precautions during the first six weeks postoperatively. Specifically, these patients were managed with the placement of an abduction pillow in the operating room before bed transfer and used pillows to maintain abduction while in bed; used elevated toilet seats and elevated chairs in the hospital, in the rehabilitation facility, and at home; and were prevented from sleeping on the side, from driving, and from being a passenger in an automobile. All patients were followed for a minimum of six months postoperatively.RESULTS: There was one dislocation in the entire cohort (prevalence, 0.33%). This dislocation occurred in a patient in the restricted group during transfer from the operating table to a bed with an abduction pillow in place. Patients in the unrestricted group were found to return to side-sleeping sooner (p < 0.001), to ride in automobiles more often (p < 0.026), to drive automobiles more often (p < 0.001), to return to work sooner (p < 0.001), and to have a higher level of satisfac-

tion with the pace of their recovery ( $p < 0.001$ ) than those in the restricted group. There was an additional expenditure of approximately \$655 per patient in the restricted group. CONCLUSIONS: Total hip arthroplasty through an anterolateral approach is likely to be associated with a low dislocation rate. Removal of several restrictions did not increase the prevalence of dislocation following primary hip arthroplasty at our institution. However, it did promote substantially lower costs and was associated with a higher level of patient satisfaction as patients achieved a faster return to daily functions in the early postoperative period

- (11) *Petersen MK, Madsen C, Andersen NT, Soballe K. Efficacy of multimodal optimization of mobilization and nutrition in patients undergoing hip replacement: a randomized clinical trial. Acta Anaesthesiologica Scandinavica 2006;50(6):712-7.*

Abstract: BACKGROUND: The aim of this trial was to assess the effects of optimization of mobilization and nutrition on patients undergoing primary total hip replacement (THR). METHODS: Seventy-nine patients undergoing elective primary THR were recruited prospectively. After randomization, one group received optimized pre-operative information and enforced mobilization and nutrition, another group received conventional peri-operative care. Epidural anaesthesia and post-operative epidural analgesia with local anaesthetics and opioids were used in all cases. Outcome related to length of stay, complications, pain, mobilization, energy intake, and physical activities of daily living (PADL). RESULTS: Although mobilization and nutrition were highly significantly increased in the intervention group, the reduction in length of stay was moderate (7.0 vs. 8.0 days  $P = 0.019$ ). We found no differences between groups in relation to complications or pain. In the intervention group, the median day of independence in PADL was the third post-operative day (2 : 6 day) and the fourth post-operative day (2 : 7 day) in the control group. The difference was not significant. CONCLUSION: Compared with conventional care, optimal and aggressive nutrition and mobilization resulted in a very moderate reduction in length of stay. There were no differences regarding pain, complications or time until independence in PADL

- (12) *Smith TO, Mann CJV, Clark A, Donnell ST. Bed exercises following total hip replacement: a randomised controlled trial. Physiotherapy 2008;94(4):286-91.*

Abstract: Objectives: To determine whether the addition of bed exercises after primary total hip replacement (THR) improves functional outcomes and quality of life, in adult patients, during the first six postoperative weeks. Design: Single-blind randomised controlled trial. Setting: Inpatient and outpatient orthopaedic departments at a National Health Service hospital. Participants: Sixty primary elective THR patients. Intervention: Patients were assigned at random to receive either a standard gait re-education programme and bed exercises, or the standard gait re-education



programme without bed exercises after THR. The bed exercises consisted of active ankle dorsiflexion/plantarflexion, active knee flexion, and static quadriceps and gluteal exercises. Main outcome measures: Iowa Level of Assistance Scale (ILOA), the Short Form-12 Health Survey (SF-12), duration of hospital admission and postoperative complications were assessed at baseline, and 3 days and 6 weeks postoperatively. Results: There was no statistically significant difference in ILOA scores between the two groups on the third postoperative day [gait re-education and bed exercise group median 40.5, interquartile range (IQR) 17.5 to 44.5; gait re-education alone group median 38, IQR 22.0 to 44.5;  $P = 0.70$ ]. Although there was a small difference between the median ILOA scores at Week 6 between the two groups (3.5, IQR 0 to 6.4 and 5.0, IQR 3.5 to 12.5;  $P = 0.05$ ), this difference was not statistically or clinically significant. There was no difference between the groups in duration of hospital admission, SF-12 scores or postoperative complications at Week 6. Conclusion: This study suggests that during the first six postoperative weeks, the addition of bed exercises to a standard gait re-education programme following THR does not significantly improve patient function or quality of life. 2008 Chartered Society of Physiotherapy

- (13) *Smith TO, Mann CJ, Clark A, Donell ST. Bed exercises following total hip replacement: 1 year follow-up of a single-blinded randomised controlled trial. Hip international : the journal of clinical and experimental research on hip pathology and therapy 2009;19(3):268-73.*

Abstract: This paper presents the results of a study assessing whether bed exercises after primary THR (total hip replacement) improves function or quality of life, during the first post-operative year. Sixty patients undergoing primary THR were randomised to receive either a gait re-education programme and bed exercises (Group A) or a gait re-education programme without bed exercises (Group B) post-operatively. The Iowa Level of Assistance Scale (ILOA) and Short Form-12 Health Survey (SF-12) were assessed at baseline, 3 days, 6 weeks and 1 year post-operatively. There was no statistically significant difference in either ILOA or SF-12 after 1 year between Group A or B. There was no evidence of a subgroup effect by either the surgical approach or prosthesis fixation in either ILOA or SF-12

- (14) *Stockton KA, Mengersen KA. Effect of multiple physiotherapy sessions on functional outcomes in the initial postoperative period after primary total hip replacement: a randomized controlled trial. Arch Phys Med Rehabil 2009;90(10):1652-7.*

Abstract: UNLABELLED: Stockton KA, Mengersen KA. Effect of multiple physiotherapy sessions on functional outcomes in the initial postoperative period after primary total hip replacement: a randomized controlled trial. OBJECTIVE: To determine whether increasing physiotherapy input from once to twice per day will result in ear-

lier achievement of functional milestones (ie, independence in mobility and transfers) and decreased length of stay (LOS) in patients undergoing a primary total hip replacement. DESIGN: Randomized controlled trial. SETTING: Metropolitan private hospital. PARTICIPANTS: Patients (N=57) with primary total hip replacement were randomly assigned to the twice daily (treatment, n=30) and once daily (control, n=27) groups. Patients who chose to attend hydrotherapy were excluded from the randomization process; however, they gave consent for outcome measures to be collected for comparison with the randomized groups. INTERVENTIONS: The control group received usual care, and the treatment group received twice-daily physiotherapy from day 1 after surgery to discharge. MAIN OUTCOME MEASURES: The Iowa Level of Assistance at postoperative days 3 and 6 and LOS. RESULTS: This study demonstrates that patients who received twice-daily land-based physiotherapy after primary total hip replacement attained earlier achievement of functional milestones than patients that received once-daily physiotherapy. A statistically significant (P=.041) but not clinically significant difference was evident in the Iowa Level of Assistance score at day 3. There was no difference between the groups in Iowa Level of Assistance measures on day 6 or on LOS. CONCLUSIONS: Patients who received twice-daily physiotherapy showed a trend toward earlier achievement of functional milestones; however, this finding did not translate to decreased LOS

- (15) *Ström H, Nilsson O, Milbrink J, Mallmin H, Larsson S. Early migration pattern of the uncemented CLS stem in total hip arthroplasties. Clin Orthop 2007;454:127-32.*

Abstract: We performed this investigation to determine the possible migration starting immediately after surgery and the effect of different weightbearing regimens on the migration pattern of an uncemented hip stem (CLS). Stem migration was determined with radiostereometry analysis with baseline when the patients still were anesthetized. Subsequent examinations were done up to 1 year. Twenty-nine patients (mean age, 55 years; range, 26-63 years) were randomized to either unrestricted weightbearing combined with intensive physiotherapy from the first day after surgery or to partial weightbearing and a conservative training regimen for the first 3 months after surgery. At 1 week, subsidence was -0.03 mm in the unrestricted weightbearing group and 0.01 mm in the partial weightbearing group. At 1 year, subsidence was 1.01 mm in the unrestricted weightbearing group and 0.51 mm in the partial weightbearing group. One patient in the unrestricted weightbearing group had revision surgery because of aseptic loosening at 1.5 years after surgery. The CLS stem did not have any migration from the end the surgery until 1 week, but there was small migration from 1 week to 3 months after which the stem remained stable. The degree of early weightbearing did not affect the migration pattern

- (16) *Ström H, Nilsson O, Milbrink J, Mallmin H, Larsson S. The effect of early weight bearing on migration pattern of the uncemented CLS stem in total hip arthroplasty.*

Abstract: Forty-two patients (younger than 65 years) with osteoarthritis were operated on with an uncemented CLS stem and randomized to early unrestricted weight bearing combined with intensive physiotherapy or to partial weight bearing combined with self-training. Radiostereometric analysis showed 1.2 (+0.11 to -6.76) mm subsidence of the stem at 24 months in both groups. There was no significant difference in the migration pattern between the unrestricted and partial weight bearing groups. Actual loading on the operated leg, measured with the F-scan system, did not influence the migration of the stem. There was a strong correlation between the average subsidence at 3 and 24 months ( $r = 0.96$ ). Early full weight bearing and active rehabilitation can be used for the uncemented CLS stem without increased risk of early loosening

- (17) *Suetta C, Magnusson SP, Rosted A, Aagaard P, Jakobsen AK, Larsen LH, et al. Resistance training in the early postoperative phase reduces hospitalization and leads to muscle hypertrophy in elderly hip surgery patients--a controlled, randomized study. J Am Geriatr Soc 2004;52(12):2016-22.*

Abstract: OBJECTIVES: To better understand how immobilization and surgery affect muscle size and function in the elderly and to identify effective training regimes. DESIGN: A prospective randomized, controlled study. SETTING: Bispebjerg University Hospital, Copenhagen, Denmark. PARTICIPANTS: Thirty-six patients (aged 60-86) scheduled for unilateral hip replacement due to primary hip osteoarthritis. INTERVENTION: Patients were randomized to standard home-based rehabilitation (1 h/d x 12 weeks), unilateral neuromuscular electrical stimulation of the operated side (1 h/d x 12 weeks), or unilateral resistance training of the operated side (3/wk x 12 weeks). MEASUREMENTS: Hospital length of stay (LOS), quadriceps muscle cross-sectional area (CSA), isokinetic muscle strength, and functional performance. Patients were tested presurgery and 5 and 12 weeks postsurgery. RESULTS: Mean +/- standard error LOS was shorter for the resistance training group (10.0 +/- 2.4 days,  $P < .05$ ) than for the standard rehabilitation group (16.0 +/- 7.2 days). Resistance training, but not electrical stimulation or standard rehabilitation, resulted in increased CSA (12%,  $P < .05$ ) and muscle strength (22-28%,  $P < .05$ ). Functional muscle performance increased after resistance training (30%,  $P < .001$ ) and electrical stimulation (15%,  $P < .05$ ) but not after standard rehabilitation. CONCLUSION: Postoperative resistance training effectively increased maximal muscle strength, muscle mass, and muscle function more than a standard rehabilitation regime. Furthermore, it markedly reduced LOS in elderly postoperative patients

- (18) *Suetta C, Andersen JL, Dalgas U, Berget J, Koskinen S, Aagaard P, et al. Resistance training induces qualitative changes in muscle morphology, muscle architecture,*

*and muscle function in elderly postoperative patients. Journal of Applied Physiology 2008;105(1):180-6.*

Abstract: Although the negative effects of bed rest on muscle strength and muscle mass are well established, it still remains a challenge to identify effective methods to restore physical capacity of elderly patients recovering from hospitalization. The present study compared different training regimes with respect to muscle strength, muscle fiber size, muscle architecture, and stair walking power in elderly postoperative patients. Thirty-six patients (60-86 yr) scheduled for unilateral hip replacement surgery due to hip osteoarthritis were randomized to either 1) resistance training (RT: 3/wk x 12 wk), 2) electrical stimulation (ES: 1 h/day x 12 wk), or 3) standard rehabilitation (SR: 1 h/day x 12 wk). All measurements were performed at baseline, at 5 wk and 12 wk postsurgery. After 12 wk of resistance training, maximal dynamic muscle strength increased by 30% at 60degree/s ( $P < 0.05$ ) and by 29% at 180degree/s ( $P < 0.05$ ); muscle fiber area increased for type I (+17%,  $P < 0.05$ ), type IIa (+37%,  $P < 0.05$ ), and type IIx muscle fibers (+51%,  $P < 0.05$ ); and muscle fiber pennation angle increased by 22% and muscle thickness increased by 15% ( $P < 0.05$ ). Furthermore, stair walking power increased by 35% ( $P < 0.05$ ) and was related to the increase in type II fiber area ( $r = 0.729$ ,  $P < 0.05$ ). In contrast, there was no increase in any measurement outcomes with electrical stimulation and standard rehabilitation. The present study is the first to demonstrate the effectiveness of resistance training to induce beneficial qualitative changes in muscle fiber morphology and muscle architecture in elderly postoperative patients. In contrast, rehabilitation regimes based on functional exercises and neuromuscular electrical stimulation had no effect. The present data emphasize the importance of resistance training in future rehabilitation programs for elderly individuals. Copyright 2008 the American Physiological Society

- (19) *Temfemo A, Doutrelot PL, Ahmaidi S. [Early muscular strengthening after total hip arthroplasty: association of two models of rehabilitation]. Ann Readapt Med Phys 2008;51(1):38-45.*

Abstract: OBJECTIVE: To assess the effect of combining two rehabilitation models during early-stage muscle reinforcement in patients having undergone total hip arthroplasty (THA). METHODOLOGY: Our study was carried out on a total of 81 unilateral THA patients aged between 61 and 84. Forty-one control group (CG) patients participated in a standard rehabilitation (SR) program, whereas the 40 patients in the test group (TG) performed both SR and isometric exercises with electromyographic feedback. We performed three tests in each group, on the day before surgery (T(1)) and then three days (T(2)) and seven days (T(3)) after surgery. These tests enabled measurement of the integrated electromyographic peak (EMG(ipeak)) for the gluteus medius, the peak voluntary isometric strength (VIS(peak)) of each leg

(i.e., both the operated and nonoperated sides) and the operated gluteus medius' maintenance time at 50% of the EMG(ipeak) during isometric exercises with electromyographic feedback. RESULTS: For the operated gluteus medius, the TG's EMG(ipeak) values were similar to those measured in the CG ( $P > 0.05$ ) at T(1) and T(2). Likewise, the VIS(peak) values for the corresponding legs at T(1) and T(2) did not differ significantly. However, at T(3), the EMG(ipeak) of the gluteus medius and the leg VIS(peak) on the operated side increased in both groups and were higher in the TG than in the CG ( $P < 0.001$ ). Compared with the CG, the TG also displayed a longer maintenance time at 50% of the EMG(ipeak) for the operated gluteus medius during isometric exercises with electromyographic feedback. CONCLUSION: This preliminary study showed that a combination of two rehabilitation models leads to faster post-THA recovery than the application of SR alone

- (20) *Thien TM, Ahnfelt L, Eriksson M, Stromberg C, Karrholm J. Immediate weight bearing after uncemented total hip arthroplasty with an anteverted stem: A prospective randomized comparison using radiostereometry. Acta Orthop 2007; 78(6):730-8.*

Abstract: Background: In uncemented total hip arthroplasty with hydroxyapatite coating, early weight bearing is frequently practiced but there is still not much evidence to support this recommendation. Method: In a prospective randomized study we evaluated the effect of partial and full weight bearing after cementless total hip arthroplasty (ABG; Stryker-Howmedica) using radiostereometric analysis (RSA). Between February 1996 and February 2000, 43 consecutive patients (mean age 53 (41-63) years, 23 women) with hip osteoarthritis received an uncemented and hydroxyapatite-coated prosthesis with an anteverted stem. All patients were operated in a standardized way by three experienced surgeons and they were randomized to partial (P) or full (F) weight bearing during the first 6 weeks after surgery. The patients in the partial weight bearing group were equipped with a pressuresensitive insole signaling when their load exceeded the prescribed weight limit. Results: At 3-month follow-up, the mean proximal (+)/ distal (-) migration of the stem was -0.14 mm (-1.93- 0.11) in group P and -0.31 mm (-4.30-0.16) in group F ( $p = 0.6$ ). At 1-year follow-up, the mean migration was -0.17 mm (-2.18-0.21) and -0.28 mm (-4.31-0.11), respectively ( $p = 0.9$ ). There was no significant difference in stem rotations either ( $p > 0.2$ ). The cup translations, rotations, and femoral head penetration were similar in the two groups ( $p > 0.1$ ). There were no re-operations during the first year. Interpretation: We did not find any adverse effect of full weight bearing immediately after operation, which justifies use of this regimen after uncemented total hip arthroplasty of the ABG type. Copyright Taylor & Francis 2007. all rights reserved

- (21) *Unver B, Karatosum V, Gunal I, Angin S. Comparison of two different rehabilitation programmes for thrust plate prosthesis: A randomized controlled study. Clini-*

**Abstract:** Objective: Weight bearing after total hip arthroplasty is postponed in order to prevent early loosening, but this negatively affects the rehabilitation programme. For the force transfer characteristics of thrust plate prosthesis (TPP), a new type of hip prosthesis used without cement is similar to the normal hip. We evaluated the possibilities of early weight bearing after TPP by comparing early partial with early full weight bearing. Design: Randomized controlled study. Setting: Department of orthopaedics and traumatology in a university hospital. Subjects: Sixty hips of 51 patients who underwent total hip arthroplasty with TPP were randomly assigned into two groups. Interventions: Both groups received accelerated rehabilitation programmes: group 1 with early partial weight bearing and group 2 with early full weight bearing. Main outcome measures: Patients were evaluated by a blind observer preoperatively, at three months after surgery by clinical (measurement of range of hip motion (universal goniometry), muscle strength (Manual Muscle Test), functional test (6-minute walk test), hip function (Harris Hip Scoring System)) and radiographical parameters and one year after surgery by clinical (Harris Hip Scoring System) and radiographical parameters. Results: Group 2 performed transfer activities earlier, had more walking distance at the time of discharge and shorter hospital stay than group 1. At three months, Harris Hip Score, muscle strength, 6-minute walk test, and duration of crutch use were significantly ( $p < 0.05$ ) in favour of group 2. None of the patients in either group showed signs of loosening one year after the operation. Conclusions: These results suggest that patients with TPP can tolerate an accelerated rehabilitation programme with early weight bearing and will gain the goals of rehabilitation earlier

- (22) *Ververeli PA, Lebbly EB, Tyler C, Fouad C. Evaluation of reducing postoperative hip precautions in total hip replacement: A randomized prospective study. Orthopedics 2009;32(12):889.*

**Abstract:** Currently, many rehabilitation protocols for total hip replacements (THR) include activity restrictions to prevent postoperative dislocation. There is increasing demand for more efficient and safe rehabilitation protocols. This randomized prospective study evaluates the need for hip restrictions following a modified anterolateral procedure. From 2004 to 2008, 81 patients seeking elective THR were randomly assigned into a standard rehabilitation group or an early rehabilitation group. The standard group included restrictions to avoid hip flexion  $>90$  degree and avoidance of riding in a car for the first postoperative month. The early group had no flexion or car riding restrictions. Forty-three patients were in the standard group and 38 patients were in the early group. There were no significant demographic differences between the 2 groups. All patients completed the Short Form 12-question Health Survey and Harris Hip Score preoperatively and at 4 weeks, 1 month, 3 months, and

1 year postoperatively. The time-points at which the patient first drove and ambulated with a cane, without a cane, and without a limp were also collected. No incidents of dislocation occurred. Patients in the early group were faster to ambulate with only a cane ( $P=.03$ ), without a cane ( $P<.001$ ), and without a limp ( $P=.003$ ). They also drove earlier ( $P=.02$ ). Pace of recovery was the only significant difference between the 2 groups. The early rehabilitation protocol increases the pace of recovery compared to a pathway with hip precautions without increasing complications. Copyright 2009 SLACK Incorporated. All rights reserved

- (23) *Wang AW, Gilbey HJ, Ackland TR. Perioperative exercise programs improve early return of ambulatory function after total hip arthroplasty: A randomized, controlled trial. American Journal of Physical Medicine and Rehabilitation 2002;81(11):801-6.*

Abstract: Objective: Patients with endstage hip arthritis have poor ambulatory function. The aim of this study was to determine if perioperative exercise programs are well tolerated by these elderly patients and if a customized program can achieve an earlier recovery of normal ambulatory function after total hip arthroplasty. Design: Twenty-eight subjects scheduled for total hip arthroplasty were randomized to either the exercise group and received a perioperative customized exercise program or the control group and received the routine perioperative care. Ambulatory function was assessed by measurement of gait parameters during a 25-m walk test, and walking endurance was assessed by a 6-min walk test. Results: Exercise group subjects attended 97.3% of scheduled exercise sessions with no training injuries. Exercise group subjects demonstrated greater stride length and gait velocity at 3 wk postsurgery. At 12 and 24 wk postsurgery, gait velocity was greater, and the 6-min walking distance was significantly greater than the control group. Conclusion: The study indicates that perioperative customized exercise program are well tolerated in the elderly patient with endstage hip arthritis and are effective in improving the rate of recovery in ambulatory function in the first 6 mo after total hip arthroplasty

- (24) *Whitney JD, Parkman S. The effect of early postoperative physical activity on tissue oxygen and wound healing. Biological research for nursing 2004;6(2): 79-89.*

Abstract: BACKGROUND: Supplemented postoperative activity was compared to standard activity for effects on wound healing, subcutaneous tissue perfusion, and oxygen ( $PscO_2$ ) following hip replacement (THR). METHODS: 58 patients were randomized to standard post-THR activity ( $N = 27$ ) or supplemental activity ( $N = 31$ ) (arm and leg exercises, walking protocol).  $PscO_2$  was measured with a microelectrode/tonometer system and perfusion determined by oxygen response. Healing was evaluated by (1) tissue cellularity, (2) mRNA for pro collagen, (3) hydroxyproline, and (4) DNA content obtained from a subcutaneous implant removed on the 7th

postoperative day. RESULTS: Activity significantly increased DNA levels, but did not increase PscO<sub>2</sub>, perfusion, cellularity, or collagen measures. CONCLUSIONS: Healing measures were not improved with increased activity levels. However, activity did not reduce PscO<sub>2</sub> or wound healing. The majority of patients adhered to additional activity and tolerated the protocol well. Increased activity was associated with earlier discharge, suggesting other recovery-related benefits. Copyright 2004 Sage Publications

- (25) *Yan B-P. Effects of early rehabilitation training and psychological intervention on physical and mental health of patients undergoing replacement of total hip. Chinese Journal of Clinical Rehabilitation 2005;9(48):46-8.*

Abstract: Aim: To observe the influence of early rehabilitation training and mental intervention on the mental state and functional recover of patients following replacement of total hip. Methods: Sixty-six patients who had received replacement of total hip in the Department of Orthopedics, the Second Branch Hospital of the Central Hospital of Jiaozuo Coal Group from January 2003 to June 2004 were enrolled in the study, and assigned randomly into control and rehabilitation groups with 33 cases in each group. After routine therapy and nursing were performed, self-rating depression scale (SDS) and self-rating anxiety scale (SAS) were conducted in the rehabilitation group to assay patients' mental state for formulation of physical and mental rehabilitative measures in cooperation with early rehabilitation training. In the control group, routine nursing was performed following the same questionnaire for mental examination. Various indexes including the finding of mental state, pain degree, walking function, and motion of joint were analyzed statistically. Results: There were no difference in the findings of SDS and SAS between the two groups ( $P > 0.05$ ); however, there were significant changes in the scores on SDS and SAS of the rehabilitation group before and after mental intervention [SDS: (53.6+/-11.8) vs.(42.8+/-8.5)points,  $t=4.49, P < 0.01$ ; SAS: (50.2+/-9.2) vs.(42.0+/-6.3)points,  $t=3.52, P < 0.01$ ]. There was significant difference in the pain degree between the two groups, which was milder in the rehabilitation group ( $\chi^2=8.16, P < 0.05$ ). Very significant differences in the walking function and motion of joint was found between the two groups ( $\chi^2=13.33, P < 0.01$ ;  $\chi^2=36.64, P < 0.001$ ), and the rehabilitation group was superior to the control group. Conclusion: Early rehabilitation training plus mental intervention is effective in promoting the rehabilitation effect and improving the physical and mental health of patients