

Joint symposium
EUGMS SIG Falls Prevention and Fracture
Femoral Fracture network

Falls prevention and rehabilitation after hip fracture

Hubert Blain
on behalf EUGMS
Falls and Fracture Prevention Interest Group

No conflict of interest declared

Effets of HF on lean mass

- Significant decreases from 10 days to 2 months post-fracture
 - lean mass (-1.73 kg, $P < 0.001$),
- Total lean body mass decreases by 6% by 1 year after HF

Fox KM et al. Loss of bone density and lean body mass after hip fracture. Osteoporos Int. 2000;11:31-5.

D'Adamo CR et al. Short-term changes in body composition after surgical repair of hip fracture. Age Ageing. 2014;43:275-80.

Muscle strength after HF

- Decline in
 - grip strength
 - ankle, knee extensor, knee flexor, hip abductor muscles strength **even higher than decline in lean mass**

Visser M, et al. Change in muscle mass and muscle strength after a hip fracture: relationship to mobility recovery. *J Gerontol A Biol Sci Med Sci.* 2000;55:M434-40.

Madsen OR et al. Knee extensor and flexor strength in elderly women after recent hip fracture: assessment by the Cybex 6000 dynamometer of intra-rater inter-test reliability. *Scand J Rehabil Med.* 1995;27:219-26.

Barnes B, Dunovan K. Functional outcomes after hip fracture. *Phys Ther.* 1987;67:1675-9.

Mobility after HF

- Women who lose grip, ankle, hip abductor muscles strength (that depends on the type of surgical technique), have **a worse mobility recovery** compared with those who gain strength
- Only 17.8% of the women had returned to their prefracture level of mobility function
- only **1% of recommended physical activity** levels 7 months post injury

Visser M, et al. Change in muscle mass and muscle strength after a hip fracture: relationship to mobility recovery. J Gerontol A Biol Sci Med Sci. 2000;55:M434-40.

Ekegren CL, et al. Physical Activity and Sedentary Behavior Subsequent to Serious Orthopedic Injury: A Systematic Review. Arch Phys Med Rehabil. 2017 Jun 16.

Recovery

- Recuperation times seem specific to area of function, ranging from
 - approximately 4 months for depressive symptoms, upper extremity function, and cognition
 - to almost a year for lower extremity function

Magaziner J et al. Recovery from hip fracture in eight areas of function.

J Gerontol A Biol Sci Med Sci. 2000;55:M498-507.

Healee DJ, McCallin A, Jones M. Older adults' recovery from hip fracture: a literature review. Int J Orthop Trauma Nurs 2011;15:18–28.

- Rehabilitation has the potential to maximise recovery, enhance quality of life and maintain independence, but **what is the evidence in HF patients ?**

Multidisciplinary rehabilitation for hip fractured inpatients

- Substantial **clinical heterogeneity** in the trial populations and the trial **interventions**.
 - **Inpatient rehabilitation (11 RCTs)**
 - 6 RCT : **geriatric orthopaedic rehabilitation** unit vs usual care from the orthopaedic team
 - 4 RCTs : **intensive rehabilitation programme** vs usual rehabilitation care.
 - 1 RCT : **multidisciplinary rehabilitation in a geriatric ward** vs care in local community hospitals supervised by general practitioners (GPs).

Handoll HHG, Cameron ID, Mak JCS, Finnegan TP. Multidisciplinary rehabilitation for older people with hip fractures. Cochrane Database Syst Rev 2009;4:CD007125.

Meta-analysis

- **Combined death and 'poor outcome'**: non-statistically significant tendency in favour of the intervention at long-term follow-up [risk ratio 0.89, 95% confidence interval (CI) 0.78 to 1.01].
- **ADL** : Better in the intervention group than the control group for Individual RCTs found better results
- No significant effect on death, hospital readmissions, length of hospital admission, and costs.

Handoll HHG, Cameron ID, Mak JCS, Finnegan TP. Multidisciplinary rehabilitation for older people with hip fractures. Cochrane Database Syst Rev 2009;4:CD007125.

Home based rehabilitation

- 2 RCT
 - Discharge home after 48 hours and home-based interdisciplinary rehabilitation vs usual hospital-based interdisciplinary rehabilitation. The home-based intervention concentrated on early resumption of self-care and domestic activities.
 - Marginal improvement in function for patients with home-based rehabilitation
 - The other RCT compared intensive home-based rehabilitation (six weekly visits) with less intensive home-based rehabilitation (three or fewer weekly visits) : no difference between groups.
- Overall, results inconclusive

Handoll HHG, Cameron ID, Mak JCS, Finnegan TP. Multidisciplinary rehabilitation for older people with hip fractures. Cochrane Database Syst Rev 2009;4:CD007125.

Mobilisation strategies

- 19 RCTs (1589 participants)
 - 12 RCTs : **early mobilisation strategies following surgery.**
 - Improvements in **mobility** from an **early weight-bearing programme, quadriceps muscle strengthening and pain-relieving electrical stimulation.**
 - **No significant improvement** in mobility following **treadmill gait retraining, a 12-week resistance training programme and a 16-week programme of weight-bearing exercise.**
 - 2 RCTs **more intensive** physiotherapy, with **no differences** between the intervention group and the control group and **higher dropout rate** in the intervention group.
 - 2 RCTs tested electrical stimulation of the quadriceps : **poorly tolerated and ineffective** (1 RCT)/well tolerated and improved mobility (1 RCT)

Overall, results inconclusive

Handoll HHG, Sherrington C, Mak Jenson CS. Interventions for improving mobility after hip fracture surgery in adults. Cochrane Database Syst Rev 2011;3:CD001704.

Adapted ?

Too
challenging ?

7 RCT : community interventions following hospital discharge

- 2 RCT : **Exercise interventions started soon after discharge are effective**
 - 1 RCT : 12 weeks of **intensive physical training** with placebo motor activities
 - 1 RCT : **home-based physical therapy programme** vs unsupervised home exercises.
- 5 RCTs : usual physical therapy care + an extra physical training intervention vs no or a low-intensity intervention.
 - Mixed results :
 - 1 RCT : **increased activity levels** after 1 year of exercises (led by a personal trainer).
 - 1 RCT : **improved outcome** after 6 months of intensive physical training,
 - 1 RCT : **no significant effects** of 12 weeks of home-based resistance or **aerobic training**
 - 1 RCT : **improved outcome** after practice of home-based exercises after 22 weeks
 - 1 RCT : **ineffectiveness when home-based weight-bearing exercises start at 7 months**
- In conclusion, it is **possible to enhance mobility after hip fracture**

Handoll HHG, Sherrington C, Mak Jenson CS. Interventions for improving mobility after hip fracture surgery in adults. Cochrane Database Syst Rev 2011;3:CD001704.

Psychological functioning

- 9 RCT (1400 patients)
 - 3 RCTs in **inpatients**; interventions: reorientation measures, intensive occupational therapy and cognitive–behavioural therapy. **No significant differences** in outcomes between the intervention group and the control group.
 - Two RCTs : nurse specialist care carried out **after hospital discharge**
 - 1 RCT : **reduction** in ‘poor outcome’
 - 1 RCT **no differences** between the groups.
- 2 RCTs : educational and motivational coaching.
 - 1 RCT in hospital : **educational and motivational coaching** had **no effect on function or mortality at 6 months**
 - 1 RCT : **coaching at home** after discharge from rehabilitation : improvement in **self-efficacy at 6 months**, but not when combined with exercise.
- Two RCTs starting several weeks after hip fracture : **no effect on outcomes** of home rehabilitation and a group learning programme.
- Further research on psychosocial interventions is to be recommended :
- **Soon after discharge ?**

Crotty M, Unroe K, Cameron I, Miller M, Ramirez G, Couzner L. Rehabilitation interventions for improving physical and psychosocial functioning after hip fracture in older people. Cochrane Database Syst Rev 2010;1:CD007624.

Cost-effectiveness of multidisciplinary rehabilitation for hip fracture

- Lack of cost-effectiveness evidence

Handoll HHG, Cameron ID, Mak JCS, Finnegan TP. Multidisciplinary rehabilitation for older people with hip fractures. Cochrane Database Syst Rev 2009;4:CD007125.

Summary of Cochrane Reviews

- Multidisciplinary rehabilitation for hip fractured **inpatients** may improve ADLs, tends to reduce poor outcome but has no effect on mortality, hospital readmission and evidence of cost-effectiveness lacks.
- Home-based rehabilitation and coaching may improve mobility (started soon after discharge ?)
- Limits : RCTs only



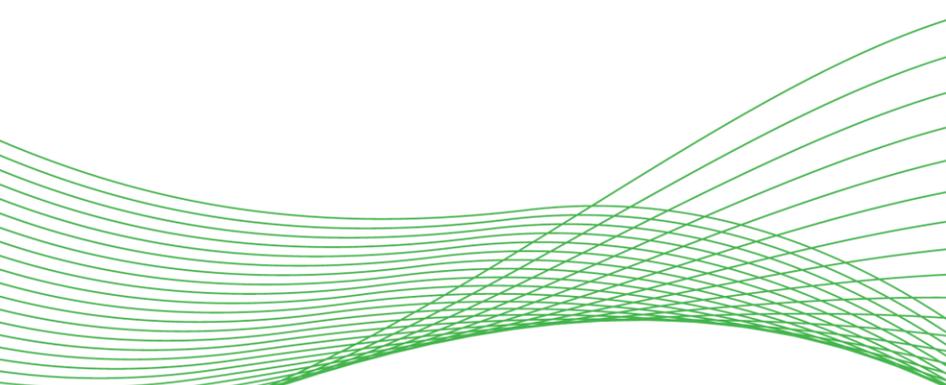
Developing a multidisciplinary rehabilitation package following hip fracture and testing in a randomised feasibility study: Fracture in the Elderly Multidisciplinary Rehabilitation (FEMuR)

Nefyn H Williams, Jessica L Roberts, Nafees Ud Din, Joanna M Charles, Nicola Totton, Michelle Williams, Kevin Mawdesley, Claire A Hawkes, Val Morrison, Andrew Lemmey, Rhiannon T Edwards, Zoe Hoare, Aaron W Pritchard, Robert T Woods, Swapna Alexander, Catherine Sa Pip Logan, Clare Wilkinson and Jo Rycroft-Malone



FIGURE 2 Realist and economic review flow chart.

Including RCTs and non-RCTs ,
observational, economic and qualitative
studies, with out any language restrictions
134 papers



The importance of timing of different interventions

- Better outcomes produced when
 - supervised physical training and earlier mobilisation during the acute hospital stay (4 papers)
 - strength and progressive resistance training may begin later in the programmes, either during or after discharge and not during hospital stay :
 - earlier commencement of intensive physical therapy may lead to **disengagement of patients** if the task are too challenging (risk of drop out of programmes)(6 papers) :
tailored program +++

Williams NH^{et} al. Health Technol Assess. 2017;21(44):1-528.

Diong J et al. Br J Sports Med. 2016 Mar;50(6):346-55.

The importance of timing/settings of different interventions

- Better outcomes produced when
 - Coaching started in the community soon after discharge (and not at hospital)(enhance patients' self-efficacy, skills and mastery to perform exercises independently)(7 papers)
 - Falls prevention programme training combined with supervised exercise to improve self-efficacy and regain confidence, but only after patients have restarted walking (3 papers)(frailer people)
 - Occupational therapy and interventions for fear of falling provided at patients' usual place of residence but not in the acute hospital (3 papers): when ambulating either independently or with help, to make the environment safe for them to practise exercises and ADLs (6 papers)

Williams NH^{et} al. Health Technol Assess. 2017;21(44):1-528.

Importance of multidisciplinary collaborative decision-making

- with patients, their carers and health-care providers to determine psychological and physical needs and preferences, in order to improve patient engagement (9 papers) : define appropriate outcomes
 - returning home ? regaining or maintaining pre-fracture function and independence, ambulation without assistance ? improved physical functioning ?
 - to design rehabilitation activities and define setting that best suit individual needs, rather than using an untailored generic programme

Williams NH^{et al.} Health Technol Assess. 2017;21(44):1-528.

Geriatric orthopaedic rehabilitation units

- Likely not to be cost-effective in all patients
- Can be beneficial **for frailer patients to reduce complication rates**, readmissions, nursing home placements and in-hospital deaths (4 papers)
- **Little effect on the rate of death post discharge**, in both the short term and the long term. (5 papers)

Williams NH^{et al.} Health Technol Assess. 2017;21(44):1-528.

Early supported discharge

- Early supported discharge effective only if **offered to suitable patients** : medically fit patients who understand that that they would be better cared for at home (preference); a good level of support from family and friends; **less possible in rural areas ?** (a lot of time was spent travelling for health professionals; rehab at home not necessarily cheaper (3 papers) : Rehab objectives :
 - Reducing **fear of falling** and improving **self-efficacy to exercise and perform ADLs** through increased quality and frequency of the practice of exercises and **daily tasks under supervision**

Williams NH^{et al.} Health Technol Assess. 2017;21(44):1-528.

Provision of enhanced formal (professional/social services) and informal (family/friends/carers) social support

- Support and verbal encouragement from family, friends and provision of **coaching as soon as home discharge** by health professionals, carers as being essential to recovery
 - to **motivate patients** and provide **sense of security**
 - facilitate the **regular practice** of **exercises** and **ADLs**,

Williams NH^{et al.} Health Technol Assess. 2017;21(44):1-528.

Rehabilitation and HF patients with dementia

- Dementia in 19% of all older individuals with HF
- In 40%, dementia, delirium, mild cognitive impairment or other **post-operative cognitive decline**
- More complications (multiple chronic medical conditions), increased risks of long term care admissions and higher mortality.
- Most rehabilitation services for individuals post-hip fracture are **not designed to meet the complex needs of those with dementia.**
- These individuals are **not as likely to be exposed to intensive rehabilitation** when compared with similar individuals without dementia

Seitz D, et al. Effects of dementia on postoperative outcomes of older adults with hip fractures: a population-based study. J Am Med Direct Assoc. 2014; 15(5):334–41.

Cochrane review

- Five small studies
- Insufficient evidence to determine the best ways to care for people with dementia following a hip fracture.

Smith, T.; Hameed, Y.; Cross, J.; Henderson, C.; Sahota, O.; Fox, C. Enhanced rehabilitation and care models for adults with dementia following hip fracture surgery: Cochrane Review. 2015.

Review of the literature

J Am Med Dir Assoc. 2016 March 1; 17(3): 200–205. doi:10.1016/j.jamda.2015.10.004.

Rehabilitation Interventions for Older Individuals with Cognitive Impairment Post Hip Fracture: A Systematic Review

Barbara Resnick, PhD, CRNP, FAAN, FAANP [Professor],

- Details of the different types of interventions
- In long-term care, post-acute and rehabilitation settings and the effectiveness of those interventions.

Rehab in DP after HF

- Feasible in post-acute care settings; no falls and no exacerbation of medical problems reported
- Intensive rehabilitation and exercise activities are beneficial,
- Functional tasks/activities (e.g., bathing and dressing) incorporated into the rehabilitation programs
- Need for training and skill development and support for staff as an integral part of the implementation success of the program
- Useful to incorporate the preferences of the individual, family/caregiver participation, and to use an interdisciplinary approach

Resnick B et al. J Am Med Dir Assoc. 2016;17(3):200-5.

Conclusion

- Cochrane reviews have not found sufficient evidence that multidisciplinary rehabilitation programmes have demonstrated overall effectiveness or cost-effectiveness.
- Systematic reviews tend however to support the NICE guidelines.

The National Institute for Health and Care Excellence (NICE) guidelines for the management of hip fracture

- The guidelines recommend
 - Mobilisation on the day after surgery unless medically or surgically contraindicated.
 - Mobilisation at least once a day
 - Regular physiotherapy

NICE. Hip Fracture: Management. Clinical Guideline CG124. London: Royal College of Physicians; 2011.

Practical guidelines

- Avoid early challenging muscle strengthening (progressive, tailored)
- Collaborative decision-making with patients, their carers and health-care providers to determine **psychological and physical needs and preferences**, in order to improve patient **engagement**: define **appropriate outcomes** in order to design rehabilitation activities and setting that best suit individual needs
- Early supported home discharge only in medically fit patients with a good level of support from family, friends, health care professionals
- Physiotherapy/coaching in geriatric wards and as soon as possible at home
 - to enhance patients' self-efficacy, skills and mastery to perform exercises and daily tasks independently and reduce fear of falling
 - **Prevent falls in frailer patients who gain mobility and ability to walk by themselves**
 - **Occupational therapy and interventions for fear of falling** provided **at patients' usual place of residence**, when ambulating either independently or with help, to make the environment safe for them to practise exercises and ADL

In patients with dementia

- Same recommendations as patients without dementia
(Tailored program with functional tasks/activities (e.g., bathing and dressing)(task-orientated) taking into account preferences of the individual, family/caregiver participation, interdisciplinary approach with skilled staff; useful to incorporate innovative approaches to engage individuals with cognitive impairment, to regain strength and functional ability

Thank you for your attention !

h-blain@chu-montpellier.fr

Theory of Self-efficacy

- a behavior change theory suggesting that the stronger the individual's self-efficacy and outcome expectations, the more likely it is that he or she will initiate and persist with a given activity.
- Enhanced by :
 - successful performance of the activity
 - verbal encouragement
 - elimination of unpleasant physiological and affective states associated with the activity (fear of falling,...).

O'Halloran PD, Shields N, Blackstock F, Wintle E, Taylor NF. Motivational interviewing increases physical activity and self-efficacy in people living in the community after hip fracture: a randomized controlled trial. Clin Rehabil. 2016 Nov;30(11):1108-1119.

- A telephone call by an occupational therapist to reinforce the targeted recommendations for fall prevention at a median of 18 days after discharge does not reduce falls incidence at a 6-month follow-up.

Di Monaco M, et al. Eur J Phys Rehabil Med. 2015;51(1):15-22.

Importance of motivation

- Theory of Self-efficacy : the stronger the individual's self-efficacy and outcome expectations, the more likely it is that he or she will initiate and persist with a given activity.

O'Halloran PD, Shields N, Blackstock F, Wintle E, Taylor NF. Motivational interviewing increases physical activity and self-efficacy in people living in the community after hip fracture: a randomized controlled trial. Clin Rehabil. 2016 Nov;30(11):1108-1119.

Towards 12-month individualized multicomponent rehabilitation program

- Modification of environmental hazards
- Guidance for safe walking
- Nonpharmacologic pain management
- Progressive home exercise program
- PA counseling, and standard care
- **Increase PA, especially in** participants with a baseline SPPB score of ≥ 7

Turunen K et al.. Physical Activity After a Hip Fracture: Effect of a Multicomponent Home-Based Rehabilitation Program-A Secondary Analysis of a Randomized Controlled Trial. Arch Phys Med Rehabil. 2017 May;98(5):981-988.