Geriatric rehabilitation following fractures in older people: a systematic review


Authors' objectives
To identify, critically appraise and synthesise the published evidence for the effectiveness and cost effectiveness of programmes of care following the acute management of fractures in older people. The principal focus of the study was to study the rehabilitative care after proximal femoral fracture.

Searching
MEDLINE from 1976 to Aug 1998, EMBASE from 1980 to July 1998 and CINAHL from 1982 to April 1998 were searched and search terms provided. Other sources included the bibliographies of all studies considered for the review, personal communication with experts in the field, searching of reference collections of group members including that of the Cochrane Musculoskeletal Injuries Group specialist database. No language restrictions were applied.

Study selection
Study designs of evaluations included in the review
Systematic review, randomised controlled trial (RCT), quasi-randomised controlled clinical trial, and cohort study designs were included. Audit data were included only if based on current practice in the UK (reported in the last 5 years). Economic evaluations were only included if based on studies meeting the inclusion criteria.

Specific interventions included in the review
Interventions included were those designed to improve function (mobility and self-care) and/or reduce hospital stay. These fell into three broad categories:

1. Packages of care: Geriatric orthopaedic rehabilitation unit (GORU), geriatric hip fracture programme (GHFP), early supported discharge (ESD) programme and application of a clinical pathway.
2. The consequences of the introduction of prospective payment system (PPS).
3. Specific rehabilitative interventions by nurses, therapists, other health or social care workers and carers designed to improve particular aspects of mobility or self-care.

Interventions starting after the primary rehabilitation period were excluded.

Participants included in the review
Patients aged 65 years or more with any fracture of the lower limbs, pelvis, upper limbs or spine which required hospital care either as an inpatient or in ambulatory care. Studies that included a small proportion of younger patients (less than 10%) were also included. Reports of programmes of care in which less than 30% of the participants had sustained a lower limb fracture were excluded. Studies whose main focus was fractures sustained from high energy transfer and trials of rehabilitation following fractures of the ribs or facial skeleton were also excluded.

Outcomes assessed in the review
The principal outcomes assessed were: length of hospital stay, readmission to hospital (to an acute care facility), residence following discharge (immediate and longer term), all cause mortality, morbidity (including post-operative complications and episodes of treated co-morbidity), mobility, ability to perform activities of daily living, health-related quality of life measures (HRQL).

Secondary outcome measures were: carer burden and stress, cognitive function, any cost data. Compliance with intervention was necessary. Papers reporting the outcomes of PPS implementation were included if they provided comparative data for at least one principal outcome of interest for older people after hip fracture.
How were decisions on the relevance of primary studies made?
The studies were assessed for inclusion by two investigators. The studies were graded into three categories (highly, possibly and not relevant). All studies in the first category were obtained. Those that were possibly relevant were referred to a third reviewer for a final decision to be made. All disagreements were resolved through consensus.

Assessment of study quality
The following items were considered in the assessment: type of randomisation, concealment of allocation, comparability of the study groups on baseline characteristics, blinding of outcome assessors, losses during study, use of an intention-to-treat analysis, study population representation, length of follow up if greater than one year. A nine-item methodological quality score was used for assessing the studies for both internal and external validity. Each item on the checklist was given a quality score. The maximum possible score was 14. Studies were assessed for validity independently by two reviewers. Any differences were resolved by consensus or a final decision made by the third principal reviewer. Reviewers were not allocated their own studies.

Data extraction
Data were extracted independently by two different reviewers. Reviewers were not allocated their own studies. Any disagreements were resolved by consensus and, if needed, a final decision was made by the principal reviewer. Data were extracted under the following broad categories: type of study, inclusion/exclusion criteria for the participants, intervention details, baseline characteristics of the study population, participant flow in the study and the outcomes assessed.

Methods of synthesis
How were the studies combined?
Individual studies were grouped by the type of intervention programme into seven categories. Where similarity of interventions and outcomes allowed, the data were pooled using the random-effects model. Data from RCTs and cohort comparisons were analysed as separate subgroups. Odds ratio (OR) with 95% CI for dichotomous outcomes and weighted mean differences (WMD) with 95% CI for continuous outcomes were reported. No formal assessment of publication bias was reported.

How were differences between studies investigated?
Statistical heterogeneity within and between subgroups was calculated and chi-squared statistics reported. Variations in the studies were found in the reporting of outcomes, the details of the control interventions and the case mix.

Results of the review
A total of 41 studies were included in the review. Fourteen randomised trials, two quasi-randomised, twenty-five cohort studies.

From a maximum possible score of 14, the included studies scored in a range from 2 to 11. The mean score overall was 6.2. Lack of randomisation was a major cause of a lower quality score.

GORUs: No evidence of difference in total hospital stay between programmes with access to a GORU and those without, result reported in text: (WMD 1.5 days, 95% CI: -16.0, +19.1) result given in the figure: (WMD 1.6 95% CI: -28.0, +31.2). For residential status as outcome, RCTs showed a non-significant tendency to improved return to previous residence (OR 1.36, 95% CI: 0.86, 2.13). This trend was not apparent in the cohort studies, (OR 0.85, 95% CI: 0.24, 2.98).

GHFPs: This programme showed a crude average reduction of 9 days in the length of hospital stay. There was a significantly increased return to home in GHFP group for which the results from the two RCTs (OR 2.06, 95% CI 1.08, 3.93) and two cohort studies (OR 1.89 95% CI: 1.10, 3.24) were consistent.

ESD: There was a reduction in the length of hospital stay (crude average reduction of 6.9 days) in acute hospital stay...
and 2 days in total duration of care. There was a statistically non-significant increase in readmission to hospital (OR 1.74 95% CI 0.79, 3.82). A significantly higher return to previous residential status was achieved under this intervention (OR 2.62 95% CI 1.27, 5.37).

Introduction of clinical pathways: This was associated with a shorter length of hospital stay (mean reduction of 5.3 days). No evidence of significant reduction in morbidity (OR 0.79 95% CI: 0.28, 2.26).

Introduction of PPSs: Five out of six studies found a shorter length of acute hospital stay (mean reduction of 3.2 days). There was increased but non-significant frequency of residence in a nursing home after introduction of a PPS (OR 1.75 95% CI: 0.96, 3.16). The given data did not suggest that any of the programmes evaluated, nor the introduction of PPS, were associated with changes in mortality. Data were insufficient to assess the impact of any programme on level of function, morbidity, quality of life or impact on carers.

Cost information
Estimates of the costs and benefits accruing from the interventions, from the perspective of the funders and providers of hospital services, and from a broader health and social services perspective, were reported. There were no data relating to the patient or carers perspective. Relative risk was used as the measure of effectiveness and some sensitivity analyses were also performed. From a health and social services perspective, GHFP and ESD were likely to be cost saving. The economic implications of GORU were less clear. Cost saving associated with these programmes was achieved largely through the increased rate of return to previous residential status.

Authors’ conclusions
The authors state that geriatric service interventions after hip fracture are complex: their form and outcomes are strongly influenced by local conditions. Comparative studies are of poor to moderate quality, allowing only tentative conclusions. As an overall strategy for rehabilitation after hip and other lower limb fractures, GORUs are unlikely to be cost effective, but some frailer patients may benefit in respect of reduced readmission rates and need for nursing home replacement. GHFPs and ESD are probably cost effective since they appear to shorten the average length of hospital stay, and are associated with significantly increased rates of return to previous residential status. As ESD is suitable only for a subset of less disabled patients, an alternative programme for more disable patients is needed.

CRD commentary
This is, on the whole, a well reported review. The review question was clearly stated and well supported by study inclusion criteria. The literature search was comprehensive. Process of validity assessment was performed adequately. Study details were also reported adequately.

There was a discrepancy in the reporting of the results for the intervention of GORU, where the results reported for total hospital stay in the text (WMD 1.5 days 95% CI: -16.0, +19.1) did not correspond to the result reported in the actual figure of pooled analysis (WMD 1.6 95% CI: -28.0, +31.2). Otherwise, the results were well presented.

The potential for any publication bias and its affect on the meta-analyses was not discussed. Overall, the studies included did not score very highly on the quality assessment. Some of the studies pooled together had significant heterogeneity. Given these limitations, the results of the review need to be interpreted cautiously. The authors acknowledge some of these limitations and the conclusions made are reasonable and follow from the results.

Implications of the review for practice and research
Practice: The authors suggest the following.

1. ESD should be a component of GHFP to maximise opportunities for suitable individuals to return to their own homes as soon as possible.

2. New GORUs should not be established unless their superiority over mixed assessment and rehabilitation units (MARUs) is demonstrated. However, acute units managing hip fractures should retain access to assessment and
rehabilitation services in GORUs or MARUs for the more disabled but previously community dwelling patients.

3. There are insufficient data to recommend the introduction of formal clinical pathways in association with these practices, although there is weak evidence that they may be advantageous.

Research: The authors state the following.

1. A study comparing the outcome of transfer of people previously living in the community unsuitable for ESD to a GORU or to a MARU should be considered. This should include an economic evaluation.

2. Further studies of ESD and GHFPs to establish the evidence for best practice should be conducted. These should include evaluation of individual elements of care packages with particular attention to methodological quality.

3. The adoption of an agreed outcome data set for research into and audit of rehabilitation after lower limb fractures in the elderly should be a priority, ideally before any new trials or new audit programmes are funded. Such a data set should include assessment of function, health-related quality of life, carer burden, and information allowing an economic analysis that takes a societal perspective and establishes the costs and savings of different models of care in relation to primary care services.

4. Adopted data sets or frameworks should be reviewed at least every 5 years.

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