The efficacy of Community Rehabilitation for aged clients after orthopaedic surgery - a review of the literature

Prepared by

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Executive Summary

This literature review explored the evidence in relation to the effectiveness of community rehabilitation (CR) post orthopaedic surgery for aged clients when compared with rehabilitation carried out in a hospital setting. For the purpose of this review CR was defined as delivery of rehabilitation in home and community settings. The efficacy of different models of delivery of CR was also explored.

Overall, there are a limited number of studies that compare CR with hospital-based rehabilitation for these groups but these studies generally conclude that CR is as effective as hospital-based rehabilitation in terms of patient outcomes. However, these studies primarily exclude patients with co-morbidities, cognitive deficit and those that live alone, all potentially common characteristics of this ortho-geriatric clinical population. Some studies indicate a client preference for CR rather than hospital-based rehabilitation.

A number of models of CR service delivery were identified by the review. These include interdisciplinary care post discharge, early discharge support services, slow stream rehabilitation in aged care facilities and pre-operative education programs. The limited evidence provided by these studies does not, in general, support one model over another.

There is little research investigating the impact on unpaid carers such as family and friends, of early discharge to CR settings. Existing research also fails to elucidate issues such as the role of psychosocial intervention in the outcome of CR for this client group.
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1. Context and Aim of the Literature Review

This review has been undertaken as part of the Community Rehabilitation Workforce (CRW) Project, funded through the Commonwealth Pathways Home Programme. The aim of the CRW Project is to optimise the capability of the current and future workforce to develop, implement and evaluate CR programmes to meet the current and emerging health needs of the Queensland community.

This review will assist the CRW Project to determine the level of existing evidence supporting rehabilitation of aged clients in community settings, after orthopaedic surgery. The specific questions that will be addressed by this review, in relation to this aim are:

1. How does CR compare with institutional rehabilitation with respect to delivering best outcomes for people aged 65 and over, following:
   a) hip fracture
   b) total hip replacement
   c) total knee joint replacement.

2. What type of CR delivers the best outcome for people aged 65 and over, following:
   a) hip fracture
   b) total hip replacement
   c) total knee joint replacement.

The scope of the review has been limited to hip fracture, knee replacement and hip replacement as these are the major orthopaedic diagnostic groups for patients over 65 who are hospitalised in Queensland.

CR – definition

For the purposes of this review, CR is defined as the delivery of rehabilitation services in home and community settings rather than in centre-based settings, whether that be a hospital or clinic environment. Within this definition there are a variety of ways in which CR is delivered.

CR – models of care

There are a number of models of CR described in the literature, which cater for this client group. These include elements of interdisciplinary care, early discharge services and slow stream rehabilitation in aged care facilities.

Brandis et al (1) describe an interdisciplinary model of care providing co-ordinated services in the community, accident and emergency, pre-admission clinic and in orthopaedic wards as a way of reducing length of stay (LOS) in hospital by 24% for patients with joint replacement and hip fracture. Woo et al (2) also emphasise the importance of co-ordination of services between hospitals and community agencies to enable efficient and effective care delivery and describe a similar care pathway aimed at early discharge to CR services for patients with joint replacement.
Internationally, numerous CR services have been set up to cater for patient needs following early discharge from hospital (1, 3-6). Sikorski et al (7) describe an early discharge from hospital to home support and rehabilitation including physiotherapy, occupational therapy and nursing following hip fracture. An Australian study investigating the reasons for differences in acute length of stay following hip fracture across five hospitals reported that the hospital with the lowest incidence of delayed discharge had an early discharge from hospital scheme where patients were able to be discharged directly to their homes (8). Authors have identified that early discharge from acute hospitals may be shifting the costs to rehabilitation units (9), to the patient and his or her family at home (10), and to residential care facilities (11).

Carlisle (12) described a trial of 17 patients discharged from hospital following joint replacement to post-discharge rehabilitation provided in a nursing home environment as successful in freeing up acute hospital beds at a reduced ‘bed’ cost. Residential care facilities and residential facilities have been suggested as an alternative rehabilitation environment to hospital and home settings however a Cochrane review (13) looking at outcomes post hip fracture for rehabilitation in residential care facilities, residential homes and nursing facilities versus hospital and own home environments concluded that there was insufficient evidence to compare the effects of the two environments. Russell et al (14) describe internet-based tele-rehabilitation as an alternative to face-to-face rehabilitation consultations following TKR.

Pre-arthroplasty intervention and education is commonly reported as a service component for patients undergoing hip and knee replacement. Pre-joint replacement surgery home visits by physiotherapy and nursing services have been reported as successful in reducing the number of postoperative in-home care visits (15). Crowe and Henderson (16) reported an individualised multi-disciplinary pre-arthroplasty assessment and necessary provision of pre-arthroplasty intervention including home assessment, prescription of equipment, physiotherapy or multi-disciplinary day hospital rehabilitation as more effective than a single pre-operative clinic visit in reducing length of hospital stay post arthroplasty. Rivard et al (17) reported that pre-operative education for 208 patients with total hip replacement whether provided at home or in a hospital pre-admission clinic, was equally effective in terms of discharging patients to home and in achieving the same hospital length of stay.

2. Method

A systematic search strategy (outlined in Appendix 1) was employed to select relevant literature in accordance with set criteria to address the review questions. Validity of selected literature was critically evaluated using a tool developed by the McMaster University Occupational Therapy Evidence-Based Practice Research Group (outlined in Appendix 2). Studies were designated a level of evidence in accordance with the NHMRC guidelines (outlined in Appendix 3) and results summarised (refer to summary tables in Appendices 5-10).

3. Results/Discussion

_Hip fracture - Studies comparing CR to institutional rehabilitation_
A summary of the studies comparing CR with institutional rehabilitation is presented in Appendix 5.

Two studies report that functional outcomes are equivalent or better in terms of community ambulation for those receiving regular CR compared to those receiving hospital inpatient rehabilitation (4, 5). However both studies failed to examine implications for carers. In addition, those with cognitive deficits, living alone and with serious co-morbidities were excluded from one of the studies (4).

The third study reported better physical and ADL functional outcomes for those participating in a six month clinic-based physiotherapy group, focussing on progressive resistance exercise compared with those doing a self directed physiotherapy home program focusing on low intensity exercise (18). However as the types of exercise were different in each setting, the findings of this study may be interpreted as supporting the use of resistance exercise as opposed to isometric range of motion exercise in rehabilitation programs rather than rehabilitation venue. Findings also demonstrate the potential for people with hip fracture undergoing rehabilitation programs to make functional gains in the longer term (18).

**Hip Fracture - Studies comparing or investigating different types of CR**

A summary of the studies comparing or investigating the efficacy of types of CR after hip fracture are presented in Appendix 6.

One randomised controlled trial (RCT) was identified that compared types of CR after hip fracture and this study found no differences in outcomes between multi-component functional rehabilitation compared with traditional rehabilitation (19). This multi-component, individualised approach to rehabilitation post hip fracture, is described by Tinetti et al (20). It’s main features were a systematic assessment and intervention protocol delivered by a team comprising of an occupational therapist, physiotherapist, home care nurse, rehabilitation nurse and a physician, which targeted impairments and specific ADL tasks that were identified as unsafe or inefficient. Although the RCT did not find this approach to be superior to traditional rehabilitation (19), the earlier pre-post test study demonstrated improvements in upper and lower extremity conditioning, balance, transfers, stair climbing, outdoor gait and overall ADL performance for a group of participants undergoing this functional rehabilitation protocol (20).

**Total Hip Replacement - Studies comparing CR to institutional rehabilitation**

Two studies comparing outcomes across rehabilitation settings were identified and are summarised in appendix 7.

One randomised controlled trial demonstrated no differences in outcomes in terms of health status, physical function and carer strain across the settings however participants in the CR group had significantly higher scores on quality of life measures and mostly showed a preference for CR (21).
Moller and colleagues (22) in a pilot study which time tracked care and rehabilitation activities post hip replacement surgery, suggested that rehabilitation after hip replacement is only a very small portion of daily activity (less than ½ hour) and that by day 5 or 6 post surgery, time in hospital is mostly devoted to rehabilitation activities that could be provided at home. Their pilot study concluded that it was feasible and potentially cost reductive to provide post-operative rehabilitation in the home environment compared to the hospital environment.

**Total Hip Replacement - Studies comparing or investigating different types of CR**

Three studies were identified which examined the efficacy of different types of CR and are summarised in appendix 8. All three involved late phase (4 months to 2 years post total hip replacement) home exercise programs with a focus on hip muscle strengthening. All showed significant improvement in hip muscle strength (23, 24) and functional activity (24, 25) when compared against control groups. High compliance rates lead to achievement of better outcomes (25).

**Total Knee Replacement - Studies comparing CR to institutional rehabilitation**

Appendix nine provides a summary of evidence from four studies identified which compared outcomes across rehabilitation settings. No differences were found on outcome in terms of knee function across settings (6, 21, 26) and those studies assessing knee ROM as an outcome measure found no differences across settings (26, 27). One study measured and reported no differences in carer strain across treatment settings (21). Higher satisfaction levels were reported in CR groups (6, 21). Sheppherd et al (21) questioned the appropriateness for early discharge and hospital at home post TKR due to the high reported level of complication rates which precluded early discharge for 1/3 of their sample allocated to hospital at home condition. This suggestion however was not supported by the other early discharge versus hospital trial, which reported higher levels of infection in the hospital stay group (6).

**Total Knee Replacement - Studies comparing or investigating different types of CR**

Appendix 10 provides a summary of evidence of two studies which compared the outcomes of different types of CR after TKR.

One study used a randomised controlled design to comparing the use of a CPM machine with a physiotherapy led CR program for a group of 82 patients after TKR (28). The study found no statistically significant difference between groups on measures of knee range of motion (ROM) and contracture six weeks and six months post knee surgery (28). The reported satisfaction levels of participants allocated to the CPM machine group were high (87%) and the cost of the CPM was reported as lower than the home physiotherapy option, however the authors felt that in order to use the CPM machine the patient would need to be able to understand its use and ideally have a helper at home (28).

A further study comparing functional exercise with traditional exercise after knee arthroplasty found no significant differences in outcomes up to 12 months post surgery however there was a trend for the functional exercise group to benefit in terms of walking speed (29).
4. Conclusion

This literature review aimed to assess the effectiveness of CR for management of people post hip fracture, TKR and THR over the age of 65 in the community.

The studies reviewed in this review represent a limited scope of CR practice. There is minimal mention of multidisciplinary teams and limited emphasis on psychosocial needs.

Of the available studies comparing CR with hospital-based rehabilitation, which primarily exclude patients with co-morbidities, cognitive deficits and those that live alone, the outcomes generally indicate that CR is as effective as hospital-based rehabilitation. There is little research investigating the impact of early discharge to CR on unpaid carers such as family and friends.

5. Reference List

Appendix 1: Search Strategy

1. Identified published literature in research journals by searching electronic databases using the following broad key search terms (number of hits):

   Hip arthroplasty rehabilitation (277)
   Knee arthroplasty rehabilitation (257)
   Hip replacement rehabilitation (290)
   Knee replacement rehabilitation (344)
   Proximal femoral fracture rehabilitation (32)
   Proximal femoral fracture (269)
   Fractured Femur (577)
   Fractured neck of femur (443)
   CR and fracture (23)

   Searches were carried out between 10/08/2005 and 18/08/2005 on the following electronic databases:
   - Silverplatter Medline
   - Rehabilitation and Physical Medicine
   - Cochrane Database register of controlled trials
   - Cochrane Database SR
   - Allied Health and Complementary Medicine
   - CINAHL and Pre CINAHL
   - Psychlit

2. Titles and abstracts of the articles retrieved were reviewed. Those not meeting the inclusion criteria were excluded. A full report was retrieved for those meeting the inclusion criteria.

3. Reference lists of included articles were reviewed. A full report was obtained for relevant articles after analysis of the title and if the article met the inclusion criteria on further review.

Inclusion/Exclusion criteria:

   • All levels of evidence were reviewed
   • Studies reviewed only included participants who were 65 years of age and over and had undergone orthopaedic surgery post proximal femoral fracture or had had a total knee replacement or total hip replacement.
   • Studies reviewed involved post surgical/hip fracture rehabilitation interventions carried out in hospitals, day centres and the participant’s home setting, studies reporting outcomes post hospital discharge following hip fracture, THR and TKR
   • English language full text published literature from 1990 to 2005.
   • Outcomes across studies were compared on the range of measures used in the studies reviewed.
Appendix 2: Procedure for Assessing Validity of Studies

Each study included was critically evaluated using a tool developed by the McMaster University Occupational Therapy Evidence-Based Practice Research Group (refer appendices) (Law et al., 1998). A score of 0 or 1 was given for each of the 14 subsections of the McMaster tool where 1 indicated that the issue was adequately addressed and 0 indicated that it was not observed or addressed adequately (refer table 2). The validity score is displayed in the summary of evidence tables (refer table 3).

Table 2: Critical appraisal checklists (quantitative and qualitative)

<table>
<thead>
<tr>
<th>Score</th>
<th>Quantitative Publications</th>
<th>Qualitative Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 or 1</td>
<td>Study purpose clearly stated</td>
<td>Purpose clearly stated</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Relevant background literature reviewed</td>
<td>Relevant literature reviewed</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Sample described in detail</td>
<td>Theoretical perspective justified</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Sample size justified</td>
<td>Purposeful sample selection described</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Outcome measures reliable</td>
<td>Sampling until redundancy in data reached</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Outcome measures valid</td>
<td>Informed consent obtained</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Details of intervention described</td>
<td>Procedural rigour used in data collection</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Contamination avoided</td>
<td>Analytical preciseness</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Co-intervention avoided</td>
<td>Findings consistent with and reflective of data</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Results reported in terms of statistical significance</td>
<td>Auditability (decision trail developed and rules reported)</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Analysis methods appropriate</td>
<td>Transformation of data described</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Education importance reported</td>
<td>Theoretical connections described</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Drop outs reported</td>
<td>Trustworthiness (triangulation reported for methods)</td>
</tr>
<tr>
<td>0 or 1</td>
<td>Conclusions appropriate</td>
<td>Conclusions appropriate</td>
</tr>
<tr>
<td><strong>Maximum total</strong></td>
<td><strong>14 points</strong></td>
<td><strong>14 points</strong></td>
</tr>
</tbody>
</table>
Appendix 3: NHMRC Levels of Evidence

NHMRC designations of levels of evidence for research questions regarding interventions:

I  Evidence obtained from a systematic review of all relevant randomised controlled trials

II Evidence obtained from at least one properly designed randomised controlled trial

III-1 Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method)

III-2 Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case-control studies, or interrupted time series with a control group

III-3 Evidence obtained from comparative studies with historical control, two or more single-arm studies, or interrupted time series without a parallel control group

IV  Evidence obtained from case series, either post-test, or pre- and post-test

V  Expert opinion, descriptive studies, individual case studies

Detailed at:  
Appendix 4: List Of Abbreviations Used In Tables

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
<td>Early Discharge</td>
</tr>
<tr>
<td>MD</td>
<td>Multidisciplinary</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomised Controlled Trial</td>
</tr>
<tr>
<td>IP</td>
<td>Inpatient</td>
</tr>
<tr>
<td>PT</td>
<td>patient</td>
</tr>
<tr>
<td>OP</td>
<td>operation/operative</td>
</tr>
<tr>
<td>FX</td>
<td>function</td>
</tr>
<tr>
<td>PTY</td>
<td>Physiotherapy</td>
</tr>
<tr>
<td>HAH</td>
<td>Hospital at home</td>
</tr>
<tr>
<td>AX</td>
<td>assessment</td>
</tr>
<tr>
<td>THR</td>
<td>Total hip replacement</td>
</tr>
<tr>
<td>AROM</td>
<td>Active Range of Motion</td>
</tr>
<tr>
<td>ADL</td>
<td>Activities of Daily Living</td>
</tr>
<tr>
<td>ROM</td>
<td>Range of motion</td>
</tr>
<tr>
<td>CPM</td>
<td>Continuous Passive Motion</td>
</tr>
<tr>
<td>GRP</td>
<td>Group</td>
</tr>
<tr>
<td>MTHS</td>
<td>Months</td>
</tr>
</tbody>
</table>
## Appendix 5: Studies comparing CR to institutional rehabilitation after hip fracture (summary of evidence)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Level of Evidence Rating</th>
<th>Validity Rating</th>
<th>Intervention and Outcome Measure/s</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuisma R., 2001</td>
<td>RCT</td>
<td>II</td>
<td>10</td>
<td>Discharge from acute hospital to home based PTY (n=40) compared to discharge from acute to inpatient rehabilitation with daily PTY (n=41). Outcome = ambulation ability (community ambulation, flat surface ambulation, household ambulation, transfers).</td>
<td>Home based group equivalent overall to IP rehab group and superior to IP rehab group on flat surface ambulation at acute hospital discharge, discharge from PTY and at all follow-ups (4, 8 and 12 months) in community ambulation. All achieved independent walking but neither group reached pre-injury ambulation level.</td>
</tr>
<tr>
<td>O’Cathain, 1994</td>
<td>Cohort Study</td>
<td>III</td>
<td>10</td>
<td>Comparison of ED and HAH (n=76) with acute IP stay (n=34). Outcomes = reported satisfaction levels, mental test score, Nottingham health profile, LOS, complications, mortality and hospital readmission rates, cost data and function (moving around the home, outside the house and doing shopping).</td>
<td>HAH group discharged home 7 days earlier than comparison group. No differences in levels of satisfaction and health outcomes at discharge. Significantly higher reported levels of emotional distress in IP group. Readmission rates for HAH tended to be slightly higher than IP group.</td>
</tr>
<tr>
<td>Binder et al, 2004</td>
<td>RCT</td>
<td>II</td>
<td>12</td>
<td>Experimental group (n=46) attended a six month group exercise program with progressive resistance training (n=44) compared with control doing a home program of low intensity exercise designed to mimic standard post surgical rehabilitation. Outcomes = physical function, ADLs, muscle strength, gait, speed, balance, QOL and body composition.</td>
<td>Experimental group participants had greater improvement in physical performance, reduced self reported disability and less difficulty with ADLs compared to control.</td>
</tr>
</tbody>
</table>

- NHMRC designations of levels of evidence for research questions regarding interventions
Appendix 6: Studies comparing or investigating different types of community rehabilitation after hip femoral fracture (summary of evidence)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Level of Evidence</th>
<th>Validity Rating</th>
<th>Intervention and Outcome Measure/s</th>
<th>Conclusions</th>
<th>Limitations (critical appraisal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tinetti et al., 1999</td>
<td>RCT</td>
<td>II</td>
<td>12</td>
<td>Usual care home based PTY program (n=156) vs multicomponent physical and functional home-based rehabilitation program (n=148). Outcomes = self report of ADL function, established population for epidemiological studies of the elderly interview, timed sit to stand, walk, stair climb, Berg balance scale, falls, pain, injuries, performance oriented mobility ax, qualitative ax of physical functioning</td>
<td>No significant differences in functional outcomes, falls or hospitalisations. Multicomponent rehabilitation group reported higher pain levels on exercise and had slightly more home care visits. Higher proportion of usual care group reported more independence in home ADL at 6 months.</td>
<td>Excluded those with cognitive impairments.</td>
</tr>
<tr>
<td>Tinetti et al., 1997</td>
<td>Pre-Post test</td>
<td>IV</td>
<td>12</td>
<td>Implementation of multicomponent physical and functional home based rehabilitation program (n=148) and assessment at baseline, 2 months and 6 months post hip fracture. Outcomes = % assessed as needing to participate in program components, strength, balance, transfers, gait, self care and instrumental ADL function.</td>
<td>Majority assessed required muscle conditioning, balance, transfers and gait interventions with high percentage needing ADL transfer training. Self-care interventions needed more for complex ADLs such as dressing and bathing. Lesser need for instrumental ADLs such as shopping and laundry as many deemed unsafe due to co-morbidities and many implemented alternative strategies (ie. family help, buy in services). Improvements noted at all assessment points on balance, upper and lower extremity conditioning, gait and total ADL scores.</td>
<td></td>
</tr>
</tbody>
</table>

* NHMRC designations of levels of evidence for research questions regarding interventions
### Appendix 7: Studies comparing CR to institutional rehabilitation after THR (summary of evidence)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Level of Evidence</th>
<th>Validity Rating</th>
<th>Intervention and Outcome Measure/s</th>
<th>Conclusions</th>
<th>Limitations (critical appraisal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheppherd et al., 1998</td>
<td>RCT</td>
<td>II</td>
<td>12</td>
<td>ED and HAH (n=37) vs IP hospital care (n=49). Outcomes = Dartmouth COOP chart (general health status) SF 36, modified mini mental status exam, oxford hip, carer strain index, hospital readmission rates, mortality rates.</td>
<td>HAH reported higher QOL levels however no other significant difference between groups on measures. No differences in carer strain. More pts in HAH group preferred to be in HAH group. 14% allocated to HAH stayed in hospital secondary to post OP complications.</td>
<td>Duration of intervention received by participants not detailed (?did some receive more therapy than others) and issues of co-intervention not addressed.</td>
</tr>
<tr>
<td>Moller et al., 1992</td>
<td>Time-motion study</td>
<td>III</td>
<td>5</td>
<td>Pilot feasibility study time tracking 12 patients post surgery to determine time and type of care and rehabilitation activities carried out in hospital and feasibility of these being performed at home and discharge early.</td>
<td>Limited time devoted to rehabilitation activities in hospital, feasible that services could be provided at home, potential cost savings of home-based services and family support associated with allowing earlier discharge from hospital.</td>
<td>Pilot feasibility study with preliminary findings based on a small sample size. Follow up RCT planned.</td>
</tr>
</tbody>
</table>

- NHMRC designations of levels of evidence for research questions regarding interventions
## Appendix 8: Studies comparing or investigating different types of CR after THR (summary of evidence)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Level of Evidence</th>
<th>Validity Rating</th>
<th>Intervention and Outcome Measure/s</th>
<th>Conclusions</th>
<th>Limitations (critical appraisal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sashika et al, 1996</td>
<td>Non-randomised, matched groups trial with control group</td>
<td>III-2</td>
<td>8</td>
<td>Late phase (mean 26 months post THR) exercise programs with Grp A (n=8) bilateral ROM and low resistance isometric exercises vs Grp B (n=8) as grp A + eccentric contractile exercises vs Control (n=7) no home program Outcomes = Hip ROM, strength, isometric torque, gait speed, cadence, pain and ADL and practise ratio.</td>
<td>All groups improved significantly on isometric torque on effected side. Group B had most significant improvement bilaterally compared to other groups. No significant change in ROM in all groups. Group A and B significantly improved in gait speed and cadence. 70% practice ratio. Feedback - difficult for patients to perform eccentric contractile exercises due to reduced standing balance on one leg.</td>
<td>Sample size small. Unsure whether assessor was blinded to group membership. ?impact of high compliance rate on effectiveness of the program.</td>
</tr>
<tr>
<td>Trudelle-Jackson et al, 2004</td>
<td>RCT</td>
<td>II</td>
<td>12</td>
<td>Late phase (4-12 months post THR) exercise program with control (n=14) group home program consisting of basic isometric and AROM exercises as used early post THR rehabilitation compared with experimental (n=14) group home program of controlled weight bearing exercises. Each had regular home-based follow up by a PTY. Outcomes = Physical function, lower limb strength, postural stability and fear of falling.</td>
<td>Significant change in self perceived function, strength and postural stability in experimental group but not control group. No differences between groups on fear of falling or activity avoidance.</td>
<td>Assessor not blinded to group allocation. No non-exercising control. Small sample size.</td>
</tr>
<tr>
<td>Jan et al., 2004</td>
<td>RCT</td>
<td>II</td>
<td>11</td>
<td>Late phase (min 1.5 years post THR) home program exercise group (n=26) of low resistance isotonic strengthening vs non-exercising control group (n=27). Outcomes = hip muscle strength, functional activity (ie. stair climbing, use of public transport, donning socks), walking speed and practice ratio.</td>
<td>Exercise group broken into high compliance and low compliance groups and results compared with control group. High compliance group showed significant improvements on all measures whereas control and low compliance groups showed no significant improvement on any measures. Therefore program effective if compliance rate was 50% or more.</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix 9: Studies comparing CR to institutional rehabilitation after TKR (summary of evidence)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Level of Evidence</th>
<th>Validity Rating</th>
<th>Intervention and Outcome Measure/s</th>
<th>Conclusions</th>
<th>Limitations (critical appraisal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palmer Hill et al., 2000</td>
<td>RCT</td>
<td>II</td>
<td>10</td>
<td>ED day 5-7 post OP and MD orthopaedic outreach (n=32) vs IP rehab (n=28). Outcomes = knee society clinical rating system, PT self report satisfaction and reported complication rates.</td>
<td>No significant difference in knee FX between groups. Higher satisfaction levels in outreach group. Higher infection rate in control group. Higher reported joint pain in outreach group however outreach had more bilateral and multiple joint diseases than control.</td>
<td>Outreach intervention not described in detail, co-intervention issues not addressed, questionable validity of outcome measures and small sample size (intervention group 32 vs control group 28). Knee ROM scores not reported.</td>
</tr>
<tr>
<td>Kramer et al., 2003</td>
<td>RCT</td>
<td>II</td>
<td>13</td>
<td>Home PTY program (n=80) with telephone follow up vs clinic based outpatient PTY program (n=80). Outcomes = knee society clinical rating system, Western Ontario and McMaster Uni osteoarthritis index, Medical outcomes SF, Distance walked 30 seconds, knee flexion ROM.</td>
<td>No significant differences between groups on any outcome measures.</td>
<td>Co-intervention issues not addressed. Eligibility criteria included unilateral TKA, presurgery 90 degrees active knee flexion, functional other hip and able to follow home program therefore ? effectiveness of home program for patients with a more complicated history (ie. co-morbidities, reduced motivation, limited ROM). Av baseline knee flexion ROM 110 degrees.</td>
</tr>
<tr>
<td>Sheppherd et al., 1998</td>
<td>RCT</td>
<td>II</td>
<td>12</td>
<td>ED and HAH (n=37) vs IP hospital care (n=49). Outcomes = Dartmouth COOP chart (general health status), SF 36, modified mini mental status exam, Bristol knee score, carer strain index, hospital readmission rates, mortality rates.</td>
<td>No significant difference between groups. No differences in carer strain. Carers in HAH group reported higher satisfaction levels. More pts in HAH group preferred HAH group. 30% allocated to HAH stayed in hospital due to post OP complications. ?appropriateness of HAH.</td>
<td>Duration of intervention received by participants not detailed (?did some receive more therapy than others) and issues of co-intervention not addressed. Knee flexion ROM not assessed as an outcome.</td>
</tr>
<tr>
<td>Rajan et al., 2004</td>
<td>RCT</td>
<td>II</td>
<td>5</td>
<td>Early post inpatient discharge home exercise program only (n=60) compared with home exercise program and outpatient clinic based physiotherapy (n=56). Outcome = knee flexion ROM.</td>
<td>No differences in knee ROM between the groups at any of the three examination points (baseline, 3 mths, 6mths and 1 year post TKA).</td>
<td>Av knee flexion ROM at baseline was 92 degrees ?benefits for patients with greater knee flexion contractures (as sample in Kramer study where there was greater baseline deficit).</td>
</tr>
</tbody>
</table>
Appendix 10: Studies comparing or investigating different types of CR treatments after TKR (summary of evidence)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Level of Evidence</th>
<th>Validit Rating</th>
<th>Intervention and Outcome Measure/s</th>
<th>Conclusions</th>
<th>Limitations (critical appraisal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost et al, 2001</td>
<td>RCT</td>
<td>II</td>
<td>12</td>
<td>Functional exercise program (aimed at improving function) compared with traditional exercise program (continued exercises given in hospital). Outcomes = leg extensor power, walking speed, pain on walking and knee ROM.</td>
<td>No significant differences between groups but trend at 12 months for groups to not reach pre-operative knee flexion ROM.</td>
<td>50% participant loss at 12-month follow-up.</td>
</tr>
<tr>
<td>Worland et al, 1998</td>
<td>RCT</td>
<td>II</td>
<td>10</td>
<td>Home CPM machine compared with home-based physiotherapy rehabilitation program. Outcomes = ROM, satisfaction and complication rates.</td>
<td>Greater knee flexion contracture at 2 weeks post in CPM group however no differences at 6 weeks and 6 months post. Pre-operative knee ROM associated with postoperative knee ROM. 35/37 reported satisfied with CPM machine as an alternative.</td>
<td></td>
</tr>
</tbody>
</table>