

The efficacy of community rehabilitation for aged clients after stroke - a review of the literature

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Executive Summary

This literature review explored the evidence in relation to the effectiveness of community rehabilitation (CR) post stroke for aged clients. This review primarily summarises studies addressing the issue of the effectiveness of early discharge to CR settings, after stroke.

Overall, the 10 trials reviewed compared early supported discharge (ESD) from hospital to CR, with conventional rehabilitation involving inpatient rehabilitation and traditional outpatient follow-up for these groups. These studies generally indicated that ESD to CR was as effective as conventional inpatient rehabilitation in terms of patient outcomes. The majority of these service delivery models involved providing co-ordinated, intensive rehabilitation programs by specialist multidisciplinary teams for varying amounts of time post hospital discharge. Where the ESD team co-ordinated discharge but CR was provided by primary health care services under the co-ordination of the ESD team, overall the outcomes between the groups were either the same or better for the ESD to CR group.

Gains in functioning have been shown to be maintained for the people receiving CR indicated by studies following up participants up to five years post completion of their rehabilitation program. Additionally, studies comparing home-based interventions with institutional rehabilitation (ie. rehabilitation provided in day hospitals) for outpatients with stroke largely indicate more positive benefits in terms of functional outcome and community participation in the home-based rehabilitation groups.

Findings also indicate that people with stroke can experience functional benefits, from CR interventions, delivered by a range of health professionals for years post discharge from hospital. However, the exact timing and content of home-based therapies to achieve optimal outcomes is unclear as benefits have been cited in numerous studies where intervention timing, duration, nature and content differ across studies. Cost analysis between services is inconclusive as findings also vary in this area.

Increased responsibility falling upon family caregivers is a factor which must be considered during ESD to CR. Family caregivers should be well informed and supported during CR in order for potential burden to be reduced.

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1. Context and aims 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 community rehabilitation (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 stroke. The main question to be addressed by this review using a systematic search strategy and quantitative critical appraisal tool was what are the outcomes of early supported discharge (ESD) to CR compared to the outcomes of inpatient rehabilitation for people aged over 65 years following a stroke.

2. Procedure for literature searches, inclusion and review

A systematic search strategy (outlined in Appendix A) was employed to select relevant literature in accordance with set criteria to address the review question. Validity of selected literature addressing the research question was critically evaluated using a tool developed by the McMaster University Occupational Therapy Evidence-Based Practice Research Group (outlined in Appendix B). Studies relating to the aim of the review were designated a level of evidence in accordance with the NHMRC guidelines (outlined in Appendix C) and results summarised (refer to Appendices E - I).

3. CR after stroke

3.1 Stroke in Australia

The Australian Institute of Health and Welfare (AIHW) (2006) indicated that in 2003 there were an estimated 346,700 survivors of stroke with most survivors living at home with a carer with the majority requiring assistance with basic daily living tasks such as self-care, household chores, health care, transport and mobility. The ageing population is likely to drive an increase in the number of strokes in the futures (AIHW, 2006). Consequently, there is an expected need for increased resources to treat people with stroke due to an ageing population.

3.2 *Reviews of CR service delivery*

3.2.1 Hospital at home

Hospital at home (HAH) schemes aim to avoid hospital admission by providing services at home that would otherwise have required a hospital stay (Shepperd & Illiffe, 2006). However avoidance of hospital admission has been shown to have poorer outcomes than stroke-unit care (Langhorne et al., 2001).

3.2.2 Home-based CR versus outpatient rehabilitation after stroke

Evidence of the effectiveness of home-based community rehabilitation after discharge from hospital following stroke is available from several randomised controlled trials comparing home-based rehabilitation with outpatient institutional rehabilitation (ie. day hospital based rehabilitation) conducted in the United Kingdom (Gladman & Lincoln, 1994; Gladman, Lincoln, & Barer, 1993; Roderick et al., 2001; Young & Forster, 1992), New Zealand (Baskett, Broad, Reekie, Hocking, & Green, 1999) and the United States (Sargent & Patterson, 1993). Day hospital and home based therapy for stroke patients were found to be equally as effective in terms of patient outcome in several RCT's (Baskett, Broad, Reekie, Hocking, & Green, 1999; Gladman, Lincoln, & Barer, 1993). Young et al. (1992), found that patients with stroke receiving home-based physiotherapy rehabilitation demonstrated higher levels of independence in ADLs, walking, stair climbing and social activity compared to those patients treated in a geriatric day hospital setting. This trial also demonstrated that costs of the home-based physiotherapy to be significantly less than the costs of the day hospital physiotherapy (Young & Forster, 1993). The DOMINO study, which compared domiciliary and hospital based outpatient rehabilitation, found greater improvements were made in extended ADL between 3 and 6 months by patients allocated to the domiciliary group compared to the hospital based group (Gladman, Lincoln, & Barer, 1993). Roderick et al. (2001) in a comparison of a domiciliary multidisciplinary rehabilitation service with a geriatric day hospital service demonstrated the domiciliary rehabilitation to be as effective as day hospital care with the average cost per patient being the same in each group. Gladman et al. (1993) in an RCT of a sample of 327 stroke patients, found that those treated at home had more positive outcomes in household ADL's and leisure at six months post discharge compared to those in an outpatient hospital based treatment group, however these differences were not apparent at 12 month follow up (Gladman & Lincoln, 1994). Additionally, there was a tendency for younger patients with stroke to do better with home-based therapy than hospital-based therapy. In an RCT conducted in the USA, a significantly beneficial impact of home intervention on reintegration to normal living, instrumental ADL's and on physical health, was shown when compared with the outcomes for a group of patients receiving conventional hospital based stroke rehabilitation (Sargent & Patterson, 1993).

3.2.3 Early supported discharge

Early supported discharge (ESD) schemes aim to accelerate the discharge to home of patients already admitted to hospital (Langhorne et al., 2005). Early supported

discharge (ESD) schemes have been subject to investigation where outcomes across home and hospital settings have been compared. A Cochrane review by Sheppherd and Iliffe (2006) included 22 trials which compared ESD to CR with inpatient hospital care where five of the studies were samples of participants with stroke (Holmqvist et al., 1998; Indredavik, Bakke, Slordahl, Rokseth, & Haheim.L.L., 2000; Ricauda et al., 2004; Ricauda, Fiorio, Mariona, Molashci, & Fabris, 1998; Richardson, Warburton, Wolfe, & Rudd, 1996; Rodgers et al., 1997). This review highlighted, in reference to stroke, that patients allocated to ESD to CR, reported higher levels of satisfaction with treatment, were more likely than the inpatient rehabilitation group to be at home at six weeks follow up and were more independent in ADLs. Three of the five trials measured carer strain and all three indicated no differences in carer strain between the groups. However only one of the three studies found carers to have a preference for ESD to CR. Two of the five trials reported a reduction in hospital LOS for the CR group. A meta-analysis by Langhorne et al. (2005) included 11 trials, 10 of which were published investigating ESD services for patients with stroke (C. Anderson et al., 2000; Donnelly, Power, Russell, & Fullerton, 2004; Holmqvist et al., 1998; Indredavik, Fjaertoft, Ekeberg, Loge, & Morch, 2000; Mayo et al., 1999; Richardson, Warburton, Wolfe, & Rudd, 1996; Rodgers et al., 1997; Ronning & Guldvog, 1998; Suwanwela, Phanthumchinda, Limtongkul, & Suvanprakorn, 2002; Thommessen, Bautz-Holter, & Laake, 1999). The findings indicated patients receiving ESD services were more likely to be independent and living at home than those receiving conventional services including standard care based in a stroke unit. It was also revealed that ESD services can shorten hospital stays and are a way to manage rising demands for hospital beds. The authors reported most of the evidence of benefit of ESD services to come from trials where specialist multidisciplinary teams provided intervention in a co-ordinated fashion. The authors cautioned that the effectiveness of ESD in rural communities has not been adequately tested and most evidence of ESD benefit is for patients with moderate disability and that for patients with more severe disability the savings in hospital bed days may be outweighed by risks of poorer outcome.

Qualitative findings indicate that ESD to CR empowered the patient and family to take charge of care and be actively involved in decision-making and taking action (Mayo et al., 1999). A qualitative case study using participant observation and semi-structured interviews of therapists working with patient with stroke in both hospital and home settings found that the context affects the roles of the therapist and the patient (Koch, Wottrich, & Holmqvist, 1998). In the home context, the role of the therapist was observed to change from expert and teacher to guest, friend, and layman. The role set in the home appeared to give patients initiative, confidence and prompted goal setting, mobilising the patient's motivation, whereas the hospital context was observed to be disempowering for the patient (Koch, Wottrich, & Holmqvist, 1998).

The major focus of this literature review is on establishing the efficacy of ESD to CR compared with extended hospital admission.

4. Efficacy of CR after Stroke

4.1 Studies comparing early supported discharge to CR with inpatient rehabilitation following stroke

A summary of 11 published randomised controlled trials (RCTs) and 6 published follow-up studies related to the outcomes of two of these RCTs, are included in this review (refer Appendix E). One of these studies investigated an Australian sample of people with stroke. The outcomes in terms of activities of daily living (ADL), quality of life (QOL), health status, mobility and falls, mood, cognition, death and dependency between the groups are summarised in Appendix F.

The studies outlined in Appendix E compare ESD from hospital to home with conventional inpatient stroke rehabilitation and follow up services. The majority of the studies involved ESD from hospital to one co-ordinated, multidisciplinary team providing organised, individualised rehabilitation programs (6 out of 11 studies) primarily providing services for three to four months post discharge. Four of the studies involved ESD and co-ordination of CR with the existing, local community services which depended on the availability of services in the participant's local area. One study involved ESD with physician and physiotherapy home visits only.

These studies concluded that ESD to CR services were equally as effective (6 out of 11 studies) or better than conventional rehabilitation (4 out of 11 studies) primarily in terms of basic ADL outcomes (Fjaertoft, Indredavik, Johnsen, & Lydersen, 2004; Fjaertoft, Indredavik, & Lydersen, 2003; Koch, Widen-Holmqvist, Kostulas, Almazan, & Pedro-Cuesta, 2000), extended ADL outcomes (Mayo et al., 1999; Thorsen, Holmqvist, Pedro-Cuesta, & von Koch, 2005), participation in social activity (Koch, Widen-Holmqvist, Kostulas, Almazan, & Pedro-Cuesta, 2000), subjective quality of life (Fjaertoft, Indredavik, Johnsen, & Lydersen, 2004; Mayo et al., 1999) and general health (Mayo et al., 1999; Thommessen, Bautz-Holter, & Laake, 1999) at various times post discharge from hospital. One Turkish study (Ozdemir, Birtane, Tabatabaei, Kokino, & Ekuklu, 2001) indicated conventional hospital rehabilitation to be superior to early discharge in terms independence in ADLs and cognition. However, in this case the conventional rehabilitation involved intense, daily, multidisciplinary rehabilitation whereas the CR group received non-intense rehabilitation comprising a Physiotherapist and Physician visit once weekly for two hours to provide instructions to caregivers to complete rehabilitation activities. Hospital readmission rates were not significantly different between the groups in the six studies that measured this variable with the exception of one study where hospital readmission was greater in the inpatient rehabilitation group (Mayo et al., 1999) (refer Appendix G).

Although only five of the 11 studies measured patient and carer satisfaction, there was a trend towards increased patient satisfaction in the CR groups however, overall, carer satisfaction did not differ significantly between the groups (refer Appendix H).

4.2 Long-term follow-up of outcomes in the comparison studies

Long term followed up studies (Koch, Pedro-Cuesta, Kostulas, Almazan, & Holmqvist, 2001; Koch, Widen-Holmqvist, Kostulas, Almazan, & Pedro-Cuesta, 2000; Thorsen, Holmqvist, Pedro-Cuesta, & von Koch, 2005). indicated greater improvements in the ESD to CR group in terms of motor capacity, manual dexterity, walking, extended ADL and perceived dysfunction the first 3 months post stroke onset and continued improvements in the three to six months post stroke, despite CR being ceased by 3-4 months post stroke in this group. At the five year follow up the ESD group was more independent in extended ADL (Thorsen, Holmqvist, Pedro-Cuesta, & von Koch, 2005). Similar findings were reported in the study by Indredavik et al. (2000) where the ESD group had greater improvements in basic ADLs at 6 months and 12 months and in QOL at 12 months.

4.3 CR therapy intensity

Ryan et al. (2006) in an RCT compared intensive and non-intensive home-based rehabilitation following stroke for 165 patients recently discharged from hospital, where the intensive group received six or more face-to-face contacts per week and the non-intensive group received three or less face-to-face contacts per week, over a 12 week period post hospital discharge. This study found that those receiving more intensive rehabilitation had higher levels of social participation and health related quality of life at 3 months post discharge. This finding was also supported by the study by Ozdemir et al (2001) which indicated that participants with stroke who receive intensive, daily multidisciplinary inpatient rehabilitation made significantly better gains in terms of motor function, ADL function and cognition compared to a group that received non-intensive input in the form of one home visit weekly where rehabilitation was provided by family rather than a health professional.

4.4 CR therapy content

A critical literature review of 11 studies (Corr & Bayer, 1995; Drummond & Walker, 1995; Gilbertson & Langhorne, 2000; Hanger, Walker, Paterson, McBride, & Sainsbury, 1998; Holmqvist et al., 1998; Jongbloed & Morgan, 1991; Koch, Widen-Holmqvist, Kostulas, Almazan, & Pedro-Cuesta, 2000; Logan, Ahern, Gladman, & Lincoln, 1997; Parker et al., 2001; Tangeman, Banaitis, & Williams, 1990; Werner & Kessler, 1996) related to the effectiveness of community-based occupational therapy programs for people over the age of 65 following stroke, indicated that individualised, community-based OT programs can reduce hospital readmission and improve performance in ADL in the short-term (8 weeks) but not consistently in the long term (6 months) (Wilkins, Jung, Wishart, Edwards, & Norton, 2003). The review indicated that specific, intensive interventions (ie. dressing) can improve specific ADL skills and for those not admitted to hospital after stroke, a home program can make a difference to ADL, caregiver strain and handicap at 6 months (Wilkins, Jung, Wishart, Edwards, & Norton, 2003). The review also indicated that intensive, short-term programs including OT and PT at one year post stroke can improve balance and ADL in the short-term (Wilkins, Jung, Wishart, Edwards, & Norton, 2003). For older

adults up to 5 years post stroke, intensive OT and PT programs can improve functional independence and decrease sickness impact (Wilkins, Jung, Wishart, Edwards, & Norton, 2003).

A Cochrane review (2006) by an outpatient service trialist group assessed the effectiveness of therapy-based rehabilitation services for people with stroke living at home in terms of risk of deterioration in performance of ADLs and influence on improving a person's ability to perform ADLs. The review concluded that therapy-based rehabilitation services for patients living at home after stroke reduces the odds of a poor outcome in terms of death or deterioration in ability to perform ADLs and has a beneficial effect on performance of personal ADLs and extended ADLs (Outpatient service trialists, 2006). However, the exact nature and content of therapy-based rehabilitation services, the economic benefits of provision of services and most effective way to structure the provision of these services is unclear (Outpatient service trialists, 2006).

A study of 20 participants in Canada who were at least 6 months post stroke were assessed pre and post an eight week, twice weekly community based group exercise program. Participants demonstrated improved the balance, mobility, co-ordination, walking endurance and strength on the hemiparetic side (Leroux, 2005). A study of six participants in Australia who were 12 months post stroke assessed the participants pre and post a task-specific home-based exercise protocol involving three home-based visits for three weeks aimed at improving sit-to-stand and lower limb strength (Monger, Carr, & Fowler, 2002). Results of this study indicated significant improvements in functional performance of sit to stand in chronic stroke patients, which also improved walking speed (Monger, Carr, & Fowler, 2002).

4.5 Comparing service use and cost between settings

Published studies comparing CR with institutional rehabilitation reporting service use and costs are summarised in Appendix G. Hospital length of stay was significantly less in the CR groups in six of the nine studies (C. Anderson, Mhurchu, C.M., Rubenach, S., Clark, M., Spencer, C., Winsor, A., 2000; C. Anderson et al., 2000; Holmqvist et al., 1998; Indredavik, Fjaertoft, Ekeberg, Loge, & Morch, 2000; McNamee & Christensen, 1998; Richardson, Warburton, Wolfe, & Rudd, 1996) resulting in savings in terms of hospital bed days. There were mostly no differences in hospital readmission rates with the exception of one study in favour of the CR group (Teng et al., 2003) Overall costs were largely similar between the groups however studies varied in what costs were measured making comparison between studies difficult. One study comparing costs of a home-based rehabilitation group (n=53) with a hospital-based rehabilitation group (n=68) in Sweden indicated that the total costs between the groups did not differ when the higher social welfare costs in terms of home help services for the home-based rehabilitation group were weighed against the costs in terms of hospital bed days saved (Andersson, Levin, Oberg, & Mansson, 2002). This was similar to findings of the cost minimisation analysis of the UK early supported discharge RCT (McNamee & Christensen, 1998). However a number of

studies showed a lower average cost per person in favour of the CR groups (C. Anderson, Mhurchu, C.M., Rubenach, S., Clark, M., Spencer, C., Winsor, A., 2000; Beech & Brockbank, 1999; Mayo et al., 1999; McNamee & Christensen, 1998). Three studies analysed costs incurred according to functional independence with two studies indicating those with higher dependency levels to be more costly overall (C. Anderson, Mhurchu, C.M., Rubenach, S., Clark, M., Spencer, C., Winsor, A., 2000; McNamee & Christensen, 1998) and one study finding no differences on the basis of dependency (Teng et al., 2003).

5. Carer burden

Published studies comparing CR with inpatient rehabilitation reporting outcomes in terms of caregiver strain are summarised in Appendix I. Overall, those studies reporting caregiver strain primarily found no differences between the groups on this measure. However the samples differed in the overall level of strain, with the Australian sample of carers found to have strain levels corresponding with the norm for the general population (C. Anderson et al., 2000) whereas Donnelly et al. (2004) found high overall levels of carer strain.

Although the study by Anderson et al. (2000) found that the overall sample had carer strain levels corresponding with the norm for the population in South Australia, caregivers of the accelerated discharge to CR group demonstrated significantly lower SF-36 mental health component scores and less participation in active household maintenance activities. The authors indicated that in accelerated discharge interventions, there needs to be a focus on emotional support for the caregivers and specific goal setting related to their needs as well as the patient's needs (Lincoln, Dixon, & Knights, 2004).

A study carried out in London with patients four to five years post stroke indicated that of the sample of 106 patients, 89% lived in private accommodations and all of those with moderate to severe disability living at home had an identified caregiver, mostly a spouse (Wilkinson, Wolfe, Warburton, Howard, & Ross-Russell, 1997). According to the carer strain index, 20% had scores suggesting increased stress, with more than half agreeing the change in their relative was stressful, that some behaviour was upsetting and that they had changed plans (Wilkinson, Wolfe, Warburton, Howard, & Ross-Russell, 1997).

A study using face-to-face interviews and questionnaires of 102 family caregivers of people with stroke in Hong Kong at 12-weeks after discharge from hospital, explored the health status, function and caregiving demands of the person with stroke, social support and the general health of the caregivers (Sit, Wong, Clinton, Li, & Fong, 2004). This study found that carers of people with stroke reported that caregiving at home was demanding with the most frequently mentioned demands being medical and nursing treatment, monitoring of health condition, mobility assistance, performance of household tasks and provision of reassurance (Sit, Wong, Clinton, Li, & Fong, 2004). The majority of carers expressed fatigue and stress associated with

caregiving and difficulty balancing needs of the person with stroke with that of other family members. Tangible and informational support was most lacking with most of this support coming from health professionals. The authors looked at the relationship between the general health questionnaire results for caregivers and the available social supports and found that those family caregivers caring for a relative with higher levels of independence in ADLs, better tangible supports and social companionship, tended to have better psychosocial health status (Sit, Wong, Clinton, Li, & Fong, 2004). These findings have implications for pre-discharge planning and community care in terms of mobilising and working to assist available natural support networks during stressful transition or providing support where existing natural supports are insufficient.

A study carried out in South Yorkshire examined the relationship between the dependency levels of the person with stroke (according to the Bartel Index), carer stress and patient mood (depression and anxiety scores according to the hospital anxiety and depression scale) for 125 patients and family caregivers on discharge from inpatient rehabilitation and on completion of a community rehabilitation program (Jones, Charlesworth, & Hendra, 2000). Approximately 40% of the participants showed signs of depression after completion of rehabilitation and those with higher levels of dependency were more likely to be depressed. Carer stress scores were high during and after rehabilitation and were higher for those carers of patients taking antidepressant medication (which was 1 in 5 patients in this sample) and for patients who were incontinent and catheterised (Jones, Charlesworth, & Hendra, 2000). This association between signs of depression and the presence of urinary incontinence has also been found in a further study of 213 community dwelling people with stroke (Jorgensen, Engstad, & Jacobsen, 2005). At the end of rehabilitation, patient age, dependency levels and depression were all significantly related to carer stress scores (Jones, Charlesworth, & Hendra, 2000)

6. Conclusion

There is no single model for rehabilitation in the community for people with stroke as models differ in their timing, duration of service, therapy and team content (Enderby & Wade, 2001; Geddes & Chamberlain, 1994). However most of the evidence of benefit of ESD to CR services comes from trials where specialist multidisciplinary teams provide intervention in a co-ordinated fashion (Langhorne et al., 2005). Although CR has been shown to be at least as effective as inpatient rehabilitation in terms of patient outcomes for people with stroke, it is clear that community-based services as well as inpatient hospital and outpatient services need to be available to meet the needs of people at different stages of the rehabilitation continuum (Disler & Wade, 2003).

Overall there is a need to establish findings applicable to the Australian service system as the majority of comparative studies involve samples of people with stroke in the UK, Sweden and Norway where geographical and service system issues may not be applicable to the Australian context. It is noteworthy that the majority of these

comparative studies measured outcomes in terms of ADLs, mobility, health status and death or dependency, but measures of QOL, mood, cognition, carer strain, carer satisfaction and falls are included far less frequently. Only one study reported the level of informal support provided by family caregivers. There is a need to establish outcomes for people with stroke and their carers in terms of mood, satisfaction, QOL, falls and level of care.

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8. APPENDICES

Appendix A: Search Strategy

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

- a. stroke or CVA or cerebrovascular accident or stroke (6166 titles retrieved and reviewed)
- b. stroke or CVA or cerebrovascular accident or stroke and outcomes (271 titles retrieved and reviewed)
- c. stroke or CVA or cerebrovascular accident or stroke and training and staff and rehabilitation (62 titles retrieved and reviewed)

Searches were carried out on the following electronic databases using the following search limiters (ages 65 and over, journal articles only, published since 1990):

- Silverplatter Medline
- Rehabilitation and Physical Medicine
- Cochrane Database register of controlled trials
- Pubmed
- CINAHL and Pre CINAHL
- Psychlit

2. The article titles initially retrieved (total = 6499) were reviewed by one person. Titles relevant to the aims of the review were marked and the abstract was then reviewed. Those not meeting the inclusion criteria were excluded. A full report was retrieved for those meeting the inclusion criteria and of relevance to the aims. No independent reviewer was used as one person completed all searches, review and selection of articles.

The articles were selected for full review of the text if the title and abstract involved:

- comparison of institutional rehabilitation with home-based or CR
- description or investigation of the outcomes of a home-based or CR program
- staff training needs in the community to address needs of people with stroke
- roles of staff in CR after stroke
- description of outcomes after discharge from hospital following stroke
- patient and caregiver reports of needs post discharge from hospital

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 and was relevant to the aims of the review on further examination.

Inclusion/Exclusion criteria and search limiters:

- Studies reviewed related to participants who were 65 years of age and over and had experienced a stroke.

- Included were journal articles published between 1990-2006 in English
- Studies reporting on samples of participants from developing countries were excluded
- Included were:
 - All studies which compared rehabilitation outcomes for early discharge to CR with inpatient rehabilitation;
 - Review articles reporting outcomes of people with stroke living in the community and selected key journal articles
 - All articles related to training needs and roles of service providers working with people with stroke in the community
- There were no exclusion criteria based on level of evidence or type of outcome measure/s used. These factors are summarised in appendices for each included article.

Appendix B: Procedure for Assessing Validity of Studies

Each study included in this review was critically evaluated using a tool developed by the McMaster University Occupational Therapy Evidence-Based Practice Research Group (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.

McMaster critical appraisal checklists (quantitative and qualitative)

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

Appendix C: 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-test and post-test
- V** Expert opinion, descriptive studies, individual case studies

Detailed at:

http://qheps.health.qld.gov.au/odb/hau/ebpallied/documents/levels_of_evidence.doc

Appendix D: Abbreviations used in summary of evidence tables

ADL	activities of daily living
AROM	active range of motion
AX	assessment
BI	Barthel Index
CR	community rehabilitation
CVA	cerebrovascular accident
ED	early discharge
ESUS	extended stroke unit service
FAI	Frenchay Activities Index
FIM	Functional Independence Measure
FX	function
GHQ	General Health Questionnaire
GP	general practitioner
HADS	Hospital Anxiety and Depression Dcale
HAH	hospital at home
IADL	instrumental activities of daily living
IP	inpatient
LOS	length of stay
MBI	Modified Barthel Index
MD	multidisciplinary
MMSE	Mini Mental Status Examination
MOW	Meals On Wheels
NHP	Nottingham Health Profile
OSUS	ordinary stroke unit service
OT	occupational therapy
PT	patient
QOL	quality of life
RCT	randomised controlled trial
ROM	range of motion
RS	Rankin Scale
SIP	Sickness Impact Profile
SP	speech pathology
SW	social worker

Appendix E: Studies comparing early hospital discharge to CR with inpatient rehabilitation following stroke (summary of evidence)

Reference	Level of Evidence*	Validity Rating	Country	Description of Intervention for CR group	Description of Intervention for Hospital Group	Severity of impairments/disabilities in samples	Limitations (critical appraisal)
Donnelly, Power, Russell, & Fullerton, 2004	II	11	Belfast and Ulster, Ireland.	Early hospital discharge (following home visit and aids and equipment in place at home) to community-based multidisciplinary stroke team consisting of OT, PT, SP and rehabilitation assistants. Weekly team meetings to discuss progress against goals. Average 2.5 home visits per week over 3 months.	Hospital based multidisciplinary team rehabilitation in a stroke unit with follow up in rehabilitation day hospital after discharge.	Moderate to higher functioning on Bartel index. 10% = or <9 on bartel index indicating severe disability.	
Richardson, Warburton, Wolfe, & Rudd, 1996	II	11	Central London, England	Hospital discharge when social services package and required home adaptations in place with community rehabilitation from a multidisciplinary team of OT, PT, SP and therapy aid with neurological training. Weekly team clinical meetings chaired by a consultant physician. Maximum of one daily visit from each therapist for maximum of 3 months. Outpatient services available as for Control group (ie. home care, MOW, community nursing) with exception of therapy services. On discharge referral to conventional services as appropriate.	Conventional, hospital based inpatient rehabilitation (approximately half provided in stroke unit and half in general medical or elderly care wards) with conventional outpatient resources (hospital based stroke clinic, day hospital, domiciliary PT and SP, outpatient PT and community resources). Maximum level of home care was three, one hour visits daily for personal care, MOW and community nurse visits.	42% in CR group and 40% in control group scored 0-14 on bartel index (defined as severe disability). Mean bartel index score for both groups at hospital discharge was 15/20 (moderate level of disability).	Participants included if lived alone and could transfer independently and if lived with a carer could transfer with assistance. Therefore, excludes those needing more assistance at home. Excluded patients not living within reasonable travelling distance to the team.
Holmqvist et al., 1998	II	12	Stockholm, Sweden	Three to four month program tailored to patient needs, frequency of home visiting varied. Intervention used a task and context orientated approach, family included in rehabilitation, counselling and education offered to patient and family. Team consisted of 2PT, 2OT, 1SP and consultant SW where 1 therapist acted as a case manager for each patient. Multidisciplinary meetings 2.5 hours weekly.	Routine rehabilitation which consisted of inpatient rehabilitation and day care and/or outpatient care provided from the geriatric department.	Almost half of the patients were independent in personal ADL according to the Katz index. CR group were more dependent in ADLs. Average MMSE score was 27/30 and all participants had mental functioning within normal limits (>23/30 on MMSE). All had	Small study size N=83 and needing approximately N=130 for sufficient effect size. Authors reported likely insufficient effectiveness of randomisation resulting in some imbalances favour the CR group in pre-stroke levels of social activities, associated diseases, coping capacity and number of patients with aphasia.

Reference	Level of Evidence*	Validity Rating	Country	Description of Intervention for CR group	Description of Intervention for Hospital Group	Severity of impairments/disabilities in samples	Limitations (critical appraisal)
						impaired motor capacity according to Lindmark Scale and/or dysphasia according to an Aphasia test. Authors described the sample as moderately disabled.	
Koch, Widen-Holmqvist, Kostulas, Almazan, & Pedro-Cuesta, 2000	II	12	Stockholm, Sweden	As per Holmqvist et al., 1998. This study was a 6 month follow up post stroke onset of outcome and hospitalisation and resource use of the sample from Holmqvist et al., 1998. At follow up N=40 in the hospital group and N=38 in the community rehabilitation group.	As per Holmqvist et al., 1998. This study was a 6 month follow up of the sample from Holmqvist et al., 1998.	As per Holmqvist et al., 1998.	Small sample size (40 vs 38) = small effect size to detect small differences.
Koch, Pedro-Cuesta, Kostulas, Almazan, & Holmqvist, 2001	II	12	Stockholm, Sweden	As per Holmqvist et al., 1998. This study was a 12 month follow up post stroke onset of outcomes, resource use and health care costs of the sample from Holmqvist et al., 1998. At follow up N=39 in the hospital group and N=38 in the community rehabilitation group.	As per Holmqvist et al., 1998. This study was a 12 month follow up of the sample from Holmqvist et al., 1998.	As per Holmqvist et al., 1998	Small sample size (39 vs 38) = small effect size to detect small differences.
Holmqvist, Koch, & Pedro-Cuesta, 2000	II	12	Stockholm, Sweden	As per Holmqvist et al., 1998. This study reports 6 month follow up post stroke in terms of resource utilisation of health and social care, impact on family caregivers and patient satisfaction. At follow up N=40 in the hospital group and N=38 in the community rehabilitation group.	As per Holmqvist et al., 1998.	As per Holmqvist et al., 1998	
Thorsen, Holmqvist, Pedro-Cuesta, & von Koch, 2005	II	12	Stockholm Sweden	As per Holmqvist et al., 1998. This study reports five year follow up of patient outcome in terms of mortality, motor capacity, ADL, social activities, subjective dysfunction and falls. At follow up N= 30 available in the community rehabilitation group and N=24 available in the hospital group.	As per Holmqvist et al., 1998	As per Holmqvist et al., 1998	Short duration of initial interventions followed by a long break until 5 year follow up assessment means differences between groups could be due to confounding factors within that time.

Reference	Level of Evidence*	Validity Rating	Country	Description of Intervention for CR group	Description of Intervention for Hospital Group	Severity of impairments/disabilities in samples	Limitations (critical appraisal)
Ronning & Guldvog, 1998	II	10	Norway	(N= 124) Treatment from health services in one of the 20 local municipalities which vary in their capacities to provide services however are required to offer primary health care including PT, OT, SP and nursing support. Communication between the hospital and primary health care provider occurred before patient transfer.	(N=127) An inpatient rehabilitation unit with 6 designated beds for stroke patients with access to co-ordinated, multidisciplinary rehabilitation from nursing, PT, OT, SP, SW and neurology. Rehabilitation was goal based. Family involvement in team meetings. Each patient had one therapist acting as case co-ordinator. Bobath approach used for physical and functional rehabilitation.	Median bartel index scores reported at admission as 44 for hospital rehabilitation group and 43 for the municipality rehabilitation group. Authors classified a moderate or severe stroke as a bartel score of < or = 50 and a mild stroke as a bartel score of > or = 50.	Limited number of broad outcomes measures used. Detail of interventions for the CR group not given and amount of rehabilitation varied in the CR group due to 20 different municipalities governing services available. No enhanced support given to the CR group and 30% of CR group did not receive any rehabilitation post discharge from hospital.
C. Anderson et al., 2000	II		Adelaide, Australia	(N=42). Interdisciplinary team comprised a co-ordinator (an OT), rehabilitation consultant, PTs,OTs, SWorkers, SPs and rehab nurses. Goal focussed rehabilitation that occurred in the patient's home with emphasis on self learning, adjustment to disability and practice sessions between visits. Weekly team meetings to discuss patient progress. Referral to community agencies for ongoing care on discharge.	(N=44) Conventional care and rehabilitation on an inpatient ward either in acute-care medical/geriatric ward or in multidisciplinary stroke rehabilitation unit. Care pathways were used, discharge planning and follow-up care in the community organised.	Median MBI scores at randomisation 85 for CR group and 86 for hospital group. MMSE median 28/30 for both groups.	
Mayo et al., 1999	II	12	Montreal, Canada	(N=58) Prompt discharge to home rehabilitation followed by follow up services by a multidisciplinary team of nursing, PT, OT, SP and dietician for 4 weeks for all participants. Individualised intervention based on needs provided at home with at least 1 nursing home visit weekly. Arrangements for further rehab and medical care were made after 4 weeks.	(N=56) Usual care services provided were in line with current practices for discharge planning and referral for follow up services comprising PT, OT and SP as required and offered through extended acute hospital stay, inpatient or outpatient rehabilitation or home care via local community health clinics. Patients could also arrange for paid private care.	Measures of impairment and disability did not differ between the groups at baseline. Average BI score for home group 84 and usual care group 82.	Excluded persons with no caregivers available at home in the first 4 weeks after discharge.

Reference	Level of Evidence*	Validity Rating	Country	Description of Intervention for CR group	Description of Intervention for Hospital Group	Severity of impairments/disabilities in samples	Limitations (critical appraisal)
Thommessen, Bautz-Holter, & Laake, 1999	II	11	Oslo, Norway	(N=42) Early supported discharge team offering early discharge co-ordination of discharge and continued rehabilitation provided by general community service organisations in 11 different local areas. The ESD team encouraged a multidisciplinary team for each stroke patient and offered support and supervision to community service staff. ESD team consisted of a nurse, OT and PT with a key worker system.	(N=40) Conventional procedures for discharge and continued rehabilitation provided by the same services as the ESD group. However no co-ordination and support from the ESD team at discharge.	BI index score at 7 days post stroke for ESD group 16.5 and conventional rehab group 14.	Strength of the study is all patients received the same stroke unit care prior to discharge.
Indredavik, Fjaertoft, Ekeberg, Loge, & Morch, 2000	II	10	Trondheim, Norway	(N=160) Extended Stroke Unit Service (ESUS). Acute stroke unit care as for the OSUS combined with service from a mobile stroke team offering ESD and co-ordination of further plans post discharge including nursing, support and rehabilitation in co-operation with primary health care. Team consisted of a nurse, PT, OT and physician. Aim was to establish support to allow return home and rehab at home, in a day clinic or a combination of both as necessary.	(N=160) Ordinary Stroke Unit Service (OSUS) involved treatment in a combined acute and rehabilitation stroke unit (in accordance with evidence based recommendations) and follow up after discharge organised by rehab clinics or the primary health care system.	Mean BI and Scandinavian Stroke Scale score at baseline for ESUS 60/43 and OSUS 58/47. Authors classified BI score > or = 95 as independence in ADL.	Limited number of broad outcome measures of ADL used (LOS, BI and Modified Rankin Scale). Strength of the study is that all patients received the same stroke unit care prior to discharge.
Fjaertoft, Indredavik, & Lydersen, 2003	II	10	Trondheim, Norway	As per Indredavik et al., 2000. This study reports on 12 month follow up of the sample in terms of independence in ADLs and living arrangements.	As per Indredavik et al., 2000.	As per Indredavik et al., 2000.	As per Indredavik et al., 2000.
Fjaertoft, Indredavik, Johnsen, & Lydersen, 2004	II	10	Trondheim, Norway	As per Indredavik et al., 2000. This study reports on 12 month follow up of the sample in terms of QOL, instrumental ADLs, mood, cognition and carer strain.	As per Indredavik et al., 2000.	As per Indredavik et al., 2000.	As per Indredavik et al., 2000.
Askim, Rohweder, Lydersen, &	II	10	Trondheim, Norway	(N=31). Participants with acute stroke living in rural municipalities of Malvik, Melhus and Kjaebu (30-	(n=31) As for Indredavik et al., 2000	Mean BI score and Scandinavian Stroke Scale score at baseline for	Strength of the study is that all patients received the same stroke unit care prior to discharge.

Reference	Level of Evidence*	Validity Rating	Country	Description of Intervention for CR group	Description of Intervention for Hospital Group	Severity of impairments/disabilities in samples	Limitations (critical appraisal)
Indredavik, 2004				90 minutes from city of Trondheim) eligible for an extended stroke unit service (as outlined above in Indredavik et al. 2000).		ESUS 57/45 and OSUS 54/41. Authors classified BI score > or = 95 as independence in ADL.	
Rodgers et al., 1997	II	12	United Kingdom	(N=45) Early supported discharge from hospital by a stroke discharge team comprising a co-ordinator, OT, PT, SP, SW and OT technician. Nursing provided by primary care team. Medical care provided by GP. Home care services provided by the trust with home care workers given specific training in post stroke needs. Interdisciplinary, key worker approach and regular review meetings in the patient's home involving carers. Role of team was to co-ordinate a smooth discharge and continue a care plan at home with no time limit on involvement.	(N=42) Conventional inpatient hospital rehabilitation and outpatient community services provided by the primary care team, community rehabilitation services, outpatient services and social services as appropriate. Discharge arrangements were made according to the usual practice on the ward. Of the three participating hospitals, one had a dedicated inpatient stroke unit and in the other hospitals, patients with stroke were cared for on general medical or care of the elderly wards.	Eligibility criteria was BI of 5-19 at 72 hrs post stroke. Median BI at 7 days post stroke 15 (CR group) and 13 (hospital group).	Small sample size limits generalisability of the results.
Ozdemir, Birtane, Tabatabaei, Kokino, & Ekuklu, 2001	II	6	Turkey	(N=30) Home based rehabilitation group comprising of a PT and physician visit to the home for 2 hours once a week giving instruction to family caregivers on exercise and positioning. Medical support was given. Techniques requiring professional rehabilitation provision were not provided (ie. therapy).	(N=30) Intense, daily multidisciplinary rehabilitation in an inpatient hospital setting.	Groups did not differ at baseline in terms of ADL, cognitive function and physical deficits.	Home based group did not receive any enhance, therapy input, which could explain the results in favour of the inpatient group. Unblinded assessment at baseline and following rehabilitation interventions. Assessment performed 'after rehabilitation' and not at a set time post stroke onset. Small sample size.

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

Appendix F: Summary of studies comparing patient outcomes in terms of functioning, death and dependency (summary of evidence)

Reference	ADL's	QOL	Health Status	Mobility and Falls	Mood	Cognition	Death or dependency
Donnelly, Power, Russell, & Fullerton, 2004	No significant differences between group on Barthel index, Nottingham ADL at baseline and 12 months post randomisation.	No significant differences between group on EuroQOL and QOL assessment at baseline and 12 months post randomisation.	No significant differences between group on SF36 physical functioning and mental health, 10 min timed walk at baseline and 12 months post randomisation.	No significant differences between groups on 10 minute timed walk at baseline and 12 months post randomisation. Falls Not measured	Not reported	Not reported	Not reported
Richardson, Warburton, Wolfe, & Rudd, 1996	No significant differences between groups on Modified bartel index and rivermead ADL at hospital discharge and 12 months.	Not measured	No significant differences between groups on Nottingham health profile at hospital discharge and 12 months.	No significant differences on 5 m timed walk and motoricity index at hospital discharge and 12 months. Falls not measured.	No significant differences between groups according to the hospital anxiety and depression scale (HADS) at 12 months.	No significant differences between groups on the mini mental status examination at hospital discharge and 12 months.	No differences in rate of death between groups.
Holmqvist et al., 1998 (3 month follow up) Koch, Widen-Holmqvist, Kostulas, Almazan, & Pedro-Cuesta, 2000 (6 month follow up) Koch, Pedro-Cuesta, Kostulas, Almazan, & Holmqvist, 2001 (12 month follow up) Thorsen,	At 6 months follow up, the CR group significantly higher scores in Barthel Mobility. Total Bartel, Katz ADL personal and extended index scores not significantly different between groups at 3, 6 & 12 month follow up. At 5 year follow up the CR group was more independent in extended ADL.	No differences between groups on Frenchay activities index (FAI) at 3 and 12 month and 5 year follow up. At 6 month follow up FAI indicated the level of social activity was significantly higher in the CR group. At 5 years the CR group demonstrated higher levels of activity in some home based domestic and leisure tasks.	Perceived dysfunction according to the sickness impact profile (SIP) at 3 months indicated higher levels of dysfunction in communication and emotional behaviour and at 6 months the CR group perceived higher levels of dysfunction with communication. No differences between groups at 12 months or 5 years on the SIP.	No significant differences on 10m timed walk, Lindmark Motor Capacity Index, manual dexterity and gait velocity at 3, 6 and 12 months & 5 year follow up. No differences in falls between the groups at 3, 6 & 12 months & 5 years.	Not reported	Not formally assessed at follow up. All participants had MMSE >23/30 on discharge (average 27/30)	Death or dependency rates were 24% for the CR group and 44% for the hospital group at 6 and 12 months follow up (according to the Bartel index).

Reference	ADL's	QOL	Health Status	Mobility and Falls	Mood	Cognition	Death or dependency
Holmqvist, Pedro-Cuesta, & von Koch, 2005							
Ronning & Guldvog, 1998	No differences between groups on BI or Scandinavian Stroke Score at 7 months post stroke.	Not reported	No differences between groups on SF-36 at 7 months post stroke	Not reported	Not reported	Not reported	No differences between groups in death or dependency. When dependency (a BI < 75) and death outcomes were combined, hospital group was significantly better.
C. Anderson et al., 2000	No differences on MBI or Adelaide Activities Profile at 6 months follow up.		No differences between groups on SF-36 or Nottingham Health profile at 6 month follow up.	No differences between groups in number of falls at follow up.	No differences in emotional state as reflected by the Nottingham Health Profile at 6 month follow up	MMSE not assessed at follow up.	No differences between groups in terms of death or MBI scores at 6 month follow up.
Rodgers et al., 1997	No significant differences on Nottingham Extended ADL scale however CR group appeared to be participating overall in more extended ADL tasks.	No differences between groups on Oxford Handicap Scale.	No differences between groups on Dartmouth Coop Global Health Status and general health questionnaire for carers at 3 month follow up.	No differences between groups in mobility according to Nottingham Extended ADL mobility subscale. Falls not reported.	Not reported	Not reported	No differences between groups at 3 months
Indredavik, Fjaertoft, Ekeberg, Loge, & Morch, 2000 Fjaertoft, Indredavik, & Lydersen, 2003 Fjaertoft, Indredavik, Johnsen, &	ESUS group more independent (defined as a Modified Rankin Scale [RS] score = or <2) at 26 weeks (p=0.017) and 12 months (p=0.04) follow up compared to OSUS and the BI at 26 weeks (p=0.056) but not at 52 weeks (p=0.264).	Total Global Nottingham Health Profile part 1 scores significantly better for ESUS group at 12 month follow up (p=0.048) No differences between groups on Frenchay Activity Index at 12 months.	Not reported	No differences between groups at 12 months on physical mobility subscale of the Nottingham Health Profile	No differences on emotional reactions subscale of the Nottingham Health Profile or on Montgomery-Asberg Depression Scale at 12 months follow up.	No differences between groups on MMSE at 12 month follow up.	No differences between the groups in terms of mortality at 6, 26 and 12 months post stroke onset. OSUS group more dependent than ESUS group according to BI and Modified Rankin Scale. Patients with moderate-severe stroke severity benefited most from ESUS in terms of ADL status.

Reference	ADL's	QOL	Health Status	Mobility and Falls	Mood	Cognition	Death or dependency
Lydersen, 2004 (12 month follow up QOL and function)							
Askim et al., 2004	No significant differences between the groups according to the Modified Rankin Scale or BI at 6, 26 and 52 weeks post stroke.	No significant differences between the groups on the Nottingham Health Profile (NHP) at 6, 26 or 52 weeks post stroke.	Not reported	No differences between groups on physical mobility subscale of the NHP.	No differences on emotional reactions subscale of the NHP.	Not reported	No differences between the groups in mortality.
Thommessen, Bautz-Holter, & Laake, 1999	IADL score according to the Nottingham Extended ADL was higher in ESD group at 3 and 6 months but not significantly different from control group.		Significant difference (p=0.02) in patient GHQ score in favour of the ESD group but no differences seen at 6 months. No differences in relative GHQ score between groups at follow up.	No differences in mobility between the groups according to mobility subscale of the Nottingham extended ADL scale.	No differences between groups according to the Montgomery Asberg depression scale at follow up.	Not reported	No differences in mortality or rates of institutional care at 3 and 6 months. Combined outcome of death and institutionalisation at 6 months was less favourable for control group, however not reaching significance.
Mayo et al., 1999	Home group better than usual care group after the 4 week intervention and at 3 month follow up in terms of instrumental ADL according to Older Americans Resource scale for IADL (p=0.03). No significant differences between the groups on the BI.	Home group improved more significantly than usual care from 1 month to 3 months (p=0.006).	No differences overall and overtime on mental health (according to SF36) in both groups. Home group better on physical health SF36 than usual care group (p=0.01). Home group improved significantly more than usual care group from 1 month to 3 months post stroke on overall SF36 (p=0.048) and physical subscale of SF-36 (p=0.01).	Both groups improved significantly and equally over time on impairment measures including the timed up and go and the stroke rehabilitation assessment of movement.	Not reported	Not reported	Not reported
Ozdemir, Birtane, Tabatabaei, Kokino, &	Functional independence according to the FIM showed greater	Not reported	Not reported	No differences in spasticity (according to the Ashworth scale) however	Not reported	Cognition according to the MMSE showed greater	

Reference	ADL's	QOL	Health Status	Mobility and Falls	Mood	Cognition	Death or dependency
Ekuklu, 2001	improvement in the hospital group.			motor status according to the Brunnstrom Scale was better in the hospital group (p=0.01)		improvement in the hospital group.	

Appendix G: Summary of studies comparing Service Use and cost between settings (summary of evidence)

Reference	LOS hospital	Hospital Readmission	Community service use/cost	Inpatient hospital cost
Donnelly, Power, Russell, & Fullerton, 2004	Mean LOS CR group 42 days. Mean LOS for hospital group 50 days. Not significantly different.	N=6 readmitted for CR group. N=7 readmitted for hospital group. Not significantly different.	Overall cost for the CR at 6 and 12 months post randomisation was less however difference between groups was not significant (hospital n=20 and CR n=18).	Overall cost of inpatient care was less for the CR group however this difference was not significant (hospital n=20 and CR n=18).
Richardson, Warburton, Wolfe, & Rudd, 1996	Mean LOS for CR group after randomisation was 12 days. Mean LOS for hospital group after randomisation was 18 days. LOS for CR significantly less for CR group compared to hospital group.	No differences between groups.	Percentage use of home help and meals on wheels at 12 months did not differ between groups. Total therapy provided did not differ significantly between groups.	Cost savings reported in terms of hospital bed days saved.
Holmqvist et al., 1998 Koch, Widen-Holmqvist, Kostulas, Almazan, & Pedro-Cuesta, 2000 (6 month follow up) Koch, Pedro-Cuesta, Kostulas, Almazan, & Holmqvist, 2001 (12 month follow up) Holmqvist, Koch, & Pedro-Cuesta, 2000	Mean LOS for hospital group 29 days. Mean LOS for CR group 14 days. 52% reduction in hospitalisation.	No difference in rehospitalisation (N=10) and LOS at rehospitalisation (N=6) between the groups at 6 months. No differences between the groups in rehospitalisation at 12 month follow-up.	CR group received a mean of 10 home visits by therapists which was completed 3-4 months after stroke. At 12 months follow-up there were no significant differences between the groups in the total number of outpatient visits (outpatient care or rehabilitation) or use of home help during the first year post stroke. Estimated cost of health care and rehabilitation (including hospitalisation, outpatient rehabilitation, primary care, private caregivers) in the first year after stroke revealed a cost difference of 2,300 euros in favour of the CR group.	Hospital bed day saved (52% reduction). At 12 month follow up, the mean total number of hospital bed days for the hospital group (N=33) was significantly greater than the CR group (N=18).
C. Anderson et al., 2000	Median total LOS CR group 15 days. Median total LOS hospital group 30 days. (p<0.001)	No differences between groups at 6 months after randomisation.	No differences between groups in use of community services (including day centres, outpatient rehabilitation, private therapy, district nursing, respite or MOW) at 6 months follow up.	Reduction in terms of bed days saved.
Rodgers et al., 1997 McNamee & Christensen, 1998 [Cost analysis and service use	Median LOS for CR group 13 days. Medial LOS for hospital group 22 days.	No differences between the groups at 3 months.	Cost of managing the stroke over 6 months were 7155 pounds per patient compared with 7480 for hospital service. Therefore,	Reduction in terms of bed days saved.

Reference	LOS hospital	Hospital Readmission	Community service use/cost	Inpatient hospital cost
analysis of sample in (Rodgers et al., 1997]	(p=0.02)		additional costs of ESD scheme were balanced by the value of bed days saved. Those patients with greater dependency levels according to BI were significantly more costly to manage overall, irrespective of care type offered.	
Indredavik, Fjaertoft, Ekeberg, Loge, & Morch, 2000 Fjaertoft, Indredavik, & Lydersen, 2003 [12 month followup]	Average LOS for ESUS 18.6 days. Average LOS for OSUS 31.1 days. Includes acute stroke and rehabilitation inpatient stay. (p=0.0004)	Not reported	Significantly more patients in the ESUS discharged to home and at home at 6 week follow up compared with OSUS (who were more likely to be in an institution or inpatient rehabilitation), however no differences at 52 weeks in terms of the number living at home or living in an institution.	
Askim et al., 2004	Average LOS for ESUS 23.5 days Average LOS for OSUS 30.5 days Average LOS is combined stroke unit and inpatient rehabilitation and is not significantly different.	Not reported		
Thommessen, Bautz-Holter, & Laake, 1999	Median LOS for ESD group 22 days Median LOS for control group 31 days (p=0.09)	No differences between the groups in terms of readmission to hospital at 3 and 6 month follow up.	No significant differences between the groups at 3 or 6 months in terms of service use (nursing, home care, OT, PT).	Savings in terms of hospital bed days saved.
Mayo et al., 1999	Average total LOS for home group 10 days Average total LOS for usual care group 16 days.	Not reported		Savings in terms of hospital bed days saved.

Appendix H: Summary of studies comparing patient and carer satisfaction with services (summary of evidence)

Reference	Patient satisfaction	Carer satisfaction
Donnelly, Power, Russell, & Fullerton, 2004	Patients in the CR group significantly more satisfied than hospital group at 12 months post randomisation.	Majority of carers reported satisfaction with services in both groups.
Richardson, Warburton, Wolfe, & Rudd, 1996	No differences between groups. Patients in the CR group were more satisfied with care provided in hospital compared to the control group.	No differences between the groups.
Holmqvist et al., 1998 (3 month follow up) Holmqvist, Koch, & Pedro-Cuesta, 2000	Statistically significant difference at 3 months follow up in satisfaction with participation in treatment program planning in favour of the CR and overall CR group had higher satisfaction with care.	Not reported
C. Anderson et al., 2000	No differences between groups at 6 month follow up	No differences between groups at 6 month follow up
Thommessen, Bautz-Holter, & Laake, 1999)	More patients reported to be satisfied with care in the ESD group however this was not a significant difference.	More patients reported to be satisfied with care in the ESD group however this was not a significant difference.

Appendix I: Summary of studies comparing early supported discharge to CR with inpatient rehabilitation reporting carer strain (summary of evidence)

Reference	Caregiver strain
Donnelly, Power, Russell, & Fullerton, 2004	Carer strain (measured by carer strain index) higher at baseline and 12 months in hospital group compared to CR group, although not significantly different. High levels of reported carer strain noted in both groups.
Richardson, Warburton, Wolfe, & Rudd, 1996	No differences between groups at 12 months
Holmqvist et al., 1998 (3 month follow up) Koch, Widen-Holmqvist, Kostulas, Almazan, & Pedro-Cuesta, 2000 (6 month follow up) Koch, Pedro-Cuesta, Kostulas, Almazan, & Holmqvist, 2001 (12 month follow up) Holmqvist, Koch, & Pedro-Cuesta, 2000	At 12 months, all patients received informal care by a spouse or a close relative. Spouses sickness impact profile health related QOL displayed median dysfunction of less than 1% of both groups.
C. Anderson et al., 2000	Caregivers of the CR group demonstrated lower general mental health scores ($p=0.01$) and less participation in active household maintenance activities ($p=0.05$) compared to hospital group at 6 month follow up. However sample size is small (data based on 50% of the total sample, who had a carer). Also, scores for both groups, although different, correspond with the norm for the general population of South Australia, indicating their general mental health was not poor.
Rodgers et al., 1997	Reported no difference in carer stress between the groups according to the general health questionnaire for carers.
Fjaertoft, Indredavik, Johnsen, & Lydersen, 2004	No differences between groups on the carer strain index at 12 month follow up however the trend was towards reduced burden for the caregivers in the ESUS group.
Askim, Rohweder, Lydersen, & Indredavik, 2004	No differences between the group on carer strain index at 6, 26 and 52 weeks follow up.