Abstract

With the aging of the general population and an increasing number of stroke survivors, there is growing interest in outpatient stroke rehabilitation as a less expensive alternative to hospital-based programs. In this chapter, we evaluate the effectiveness of three forms of outpatient rehabilitation, which we have defined as: hospital-based, community-based and early supported discharge. Each will be evaluated again standard or traditional care for an outpatient stroke patient.
Key Points

Early Supported Discharge

- Early supported discharge provides similar outcomes for patients with milder strokes, compared to inpatient rehabilitation, and appears to save costs.

Outpatient Therapy

- It is unclear if outpatient therapy results in improved ability to perform activities of daily living.
- Home-based and hospital-based outpatient therapy appears to be equally effective.
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7. Outpatient Stroke Rehabilitation

With the aging of the general population and an increasing number of stroke survivors, there is growing interest in outpatient stroke rehabilitation as a less expensive alternative to hospital-based programs. Debate continues as to which setting provides the best opportunity for continued improvement following discharge from inpatient rehabilitation. Arguments in favour of hospital, community and home-based programs have all been made. There is also debate as to whether early-supported discharge programs may, in fact, be superior to inpatient rehabilitation for a select group of patients. These disputes are addressed in this chapter.

7.1 Early Supported Discharge

The genesis of early supported discharge (ESD) programs arose from a recognition that patients may prefer to return home following a stroke and that inpatient interdisciplinary stroke rehabilitation may not be associated with the best outcomes. Since the goal of therapy is to establish skills that are applicable to the home environment, where better to learn but in the home? Critics of ESD argue that most patients are already discharged as soon as it is feasible.

A Cochrane Review assessing the efficacy of ESD for acute stroke patients, conducted by the Early Supported Discharge Trialists, was first published in 2001 and updated most recently in 2012 (Fearon & Langhorne 2012). The purpose of this review was to determine whether ESD, with appropriate community support, could be as effective as conventional inpatient rehabilitation and reduce the length of hospital stay. ESD interventions were designed to accelerate the transition from hospital to home. The review included the results from 14 trials (1,957 patients).

A variety of outcomes were assessed comparing early supported discharge with conventional care at the end of scheduled follow up, which ranged from 3 to 5 years. The results are presented in Table 7.1 and in Section 7.3 (Summary of Cochrane Reviews). ESD programs were associated with shorter periods of initial hospitalization, and a reduction in the number of patients requiring institutional care following discharge as well as reduced levels of dependency at 6 months. The programs did not appear to adversely affect the health status, mood or satisfaction of caregivers. Costing data were available for seven trials. The estimated costs of the programs ranged from 23% less to 15% more compared with the control condition, with the majority of the trials reporting cost savings.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Significant Result? (Y/N)</th>
<th>OR and 95% CI or * Weighted Mean Difference and 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>No</td>
<td>0.91 (0.67 to 1.25)</td>
</tr>
<tr>
<td>Death or need for institutionalization</td>
<td>Yes</td>
<td>0.78 (0.61 to 1.00)</td>
</tr>
<tr>
<td>Death or dependency</td>
<td>Yes</td>
<td>0.80 (0.67 to 0.97)</td>
</tr>
<tr>
<td>ADL Barthel Index scores</td>
<td>No</td>
<td>0.03 (-0.08 to 0.15) *</td>
</tr>
<tr>
<td>Length of initial hospital stay (days)</td>
<td>Yes</td>
<td>-7.0 (-10.0 to -4.2)*</td>
</tr>
<tr>
<td>Length of total hospital stay</td>
<td>Yes</td>
<td>-9.7 (-13.6 to -5.8)*</td>
</tr>
<tr>
<td>Subjective Health status</td>
<td>No</td>
<td>0.0 (-0.10 to 0.11)*</td>
</tr>
<tr>
<td>Satisfaction with services</td>
<td>Yes</td>
<td>1.6 (1.08 to 2.38)*</td>
</tr>
<tr>
<td>Number of readmissions to hospital</td>
<td>No</td>
<td>1.26 (0.94 to 1.67)</td>
</tr>
</tbody>
</table>

There were three types of ESD service organization presented in the review:
1. ESD team with coordination and delivery: a multidisciplinary team, which coordinated discharge from hospital and post discharge care, and provided rehabilitation therapies in the home.

2. ESD team coordination: discharge and immediate post discharge plans were coordinated by a multidisciplinary care team, but rehabilitation therapies were provided by community-based agencies.

3. No ESD team coordination: therapies were provided by uncoordinated community services or by health-care volunteers.

As hypothesized by the authors, the increasing coordination of services was associated with an improved outcome (see Table 7.2).

**Table 7.2 Outcome At End Of Scheduled Follow-Up (ESD Vs. Conventional Care) Stratified By Level Of Service Provision (More Coordinated To Less Coordinated)**

<table>
<thead>
<tr>
<th>Death or dependency</th>
<th>Significant Result? (Y/N)</th>
<th>Odds Ratio (OR) and 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall result</td>
<td>Yes</td>
<td>0.79 (0.64 – 0.97)</td>
</tr>
<tr>
<td>ESD team with coordination and delivery</td>
<td>Yes</td>
<td>0.71 (0.53 – 0.94)</td>
</tr>
<tr>
<td>ESD team coordination</td>
<td>No</td>
<td>0.68 (0.46 – 1.01)</td>
</tr>
<tr>
<td>no ESD team coordination</td>
<td>No</td>
<td>1.23 (0.79 – 1.91)</td>
</tr>
</tbody>
</table>

There was no difference in the proportion of patients who were dead or dependent at the end of scheduled follow up when stratified for age (≤ 75 yrs or > 75 yrs), sex, presence of a caregiver, ESD team base (hospital outreach or community inreach) or control service (stroke unit or other ward). There was a reduction in the odds of a poor outcome for patients with a moderate initial stroke severity (BI 10-20), (OR= 0.73; 0.57-0.93), but not among patients with severe disability (BI< 9) and also among patients who received care from a coordinated multidisciplinary ESD team (0.70; 0.56- 0.88) compared to those without an ESD team. Based on the results of this study, it would appear that a select group of patients, with mild to moderately disabling stroke, receiving more coordinated ESD could achieve better outcomes compared to organised inpatient care on a stroke unit. Langhorne(2003) suggested that the reason that studies have reported superior outcomes among ESD patients is likely due to the effect of the home environment, which is probably the best place to relearn ADL skills.

Early supported discharge, providing interdisciplinary rehabilitation in the home instead of in a hospital, appears to offer the same benefits as an in-hospital stroke rehabilitation unit but this concept has been largely tested in less severely disabled stroke patients.

Two other reviews have investigated this topic (Anderson et al. 2002; Noorani et al. 2003). Anderson et al. (2002), reported the benefits of ESD programs in reducing hospital length of stays by an average of 13 days and offering an average of 15% cost savings compared to inpatient rehabilitation. The Canadian Coordinating Office of Health Technology Assessment (CCOHTA) conducted a review of ESD compared to usual care(Noorani et al. 2003). The review included RCTs published from 1995 to July 2002, with nine articles representing five RCTs meeting their inclusion criteria.

The five RCTs included a total of 940 patients. Stroke severity was noted to be mild. At six months follow-up the odds of death or institutionalized care were similar between the groups. There were no significant differences observed between the two groups in the mean Barthel Index (BI) score, although in the two trials where it was measured, a higher number of the ESD patients were considered...
independent score (BI ≥ 19) compared to controls (OR 1.82, 95% CI 1.16, 2.86). The ESD patients showed a significant decrease in length of hospital stay (approximately 10 days) when compared to controls (Noorani et al. 2003).

Individual Studies
Twenty studies have evaluated the efficacy of early supported discharge post stroke. The results are presented in Table 7.3. When examining the results of studies reporting the outcomes of patients who received early supported discharge, it is important to consider the process by which patients were selected for inclusion. If the eligibility criteria are very restrictive and many potential patients excluded, this results in a selection bias that in turn influences the generalizability of the results.

Table 7.3 Efficacy of Early Supported Discharge in Stroke Rehabilitation

<table>
<thead>
<tr>
<th>Author, Year Country PEDro Score</th>
<th>Methods</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rogers et al. (1997) UK 6 (RCT)</td>
<td>92 of 402 stroke admissions were randomized to receive either early support discharge or conventional care. Eligibility criteria included patients who were not living in nursing home or were severely handicapped prior to stroke, Barthel Index 5-19 at 72 hrs post stroke and medically stable with no other conditions precluding rehabilitation.</td>
<td>Median length of stay (LOS) in hospital was significantly shorter for those receiving early supported discharge (13 vs. 22 days). There were no significant differences in functional outcome measures between the 2 groups.</td>
</tr>
<tr>
<td>Rudd et al. (1997) UK 7 (RCT)</td>
<td>331 stroke patients randomized to receive specialist community rehabilitation (CR) for up to 3 months after discharge or to receive conventional hospital and community care (CH). 660 patients from one of the two treating hospitals were screened. Of these, 300 were randomized. It is not clear how many patients were screened from the second treating hospital to recruit the 31 patients randomized. Eligibility criteria included medically stable stroke patients who lived alone and were able to transfer independently or who lived with resident caregiver and were able to transfer with help.</td>
<td>LOS after randomization was significantly shorter for the CR patients than the CH patients (12 vs. 18 days). There were no differences in functional outcomes. No cost savings were realized despite a reduction in hospital bed days.</td>
</tr>
<tr>
<td>Duncan et al. (1998) USA 5 (pilot RCT)</td>
<td>20 minimally and moderately impaired stroke patients who had completed inpatient rehabilitation and who 30 to 90 days were after stroke onset were randomized to receive either home based exercise program, 3 x/ wk for 8 wks, or to receive usual post-stroke care. The number of patients screened was not reported.</td>
<td>Effects of the intervention on upper extremity dexterity and functional healthy status were equivocal and no significant differences were noted between the two groups on any of the outcome measures.</td>
</tr>
<tr>
<td>Widen Holmgvist et al. (1998) Sweden 7 (RCT)</td>
<td>81 patients were randomized to receive either early supported discharge with continuity of rehabilitation at home for 3 to 4 months or to receive routine rehabilitation service in a hospital, day care and/or outpatient care. Eligibility criteria included patients who were continent, independent in feeding and normal mental functioning with impaired motor function and/or aphasia at one week. 86 of 220 stroke patients</td>
<td>No significant differences were noted between the two groups on any of the outcome measures.</td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Design</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Ricauda et al. (1998)</td>
<td>Italy</td>
<td>3 (RCT)</td>
</tr>
<tr>
<td>Ronning and Gulgvo (1998)</td>
<td>Sweden</td>
<td>6 (RCT)</td>
</tr>
<tr>
<td>Anderson et al. (2000)</td>
<td>Australia</td>
<td>8 (RCT)</td>
</tr>
<tr>
<td>Indredavik et al. (2000)</td>
<td>Norway</td>
<td>7 (RCT)</td>
</tr>
<tr>
<td>Kalra et al. (2000)</td>
<td>UK</td>
<td>8 (RCT)</td>
</tr>
<tr>
<td>Mayo et al. (2000)</td>
<td>Canada</td>
<td>7 (RCT)</td>
</tr>
</tbody>
</table>

von Koch et al. (1998) | 6-month follow-up to Widen Holmqvist et al. 1998. | Total Lindmark Motor Capacity Assessment |
7. Outpatient Stroke Rehabilitation

<table>
<thead>
<tr>
<th>(2000) Sweden 6 (RCT)</th>
<th>83 patients were randomized to receive early supported discharge and continued rehabilitation at home by specialized team (HRG) or to routine rehabilitation (RRG). Eligibility criteria included patients who had impaired motor capacity and/or dysphagia, were continent and independent in feeding. The number of patients screened was not reported.</th>
<th>score was significantly better in favour of the HRG and Inter-group difference in Barthel Mobility scores significantly better for the HRG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bautz-Holter et al. (2002) Norway 8 (RCT)</td>
<td>82 acute stroke patients were randomized to early-supported discharge or conventional rehabilitation services groups. Nottingham EADL was assessed at 3 and 6 mos. Patients who were medically stable with a Barthel ADL score between 5 and 19 at 72 hrs post stroke were eligible to participate. 436 patients were admitted to the stroke unit, during the study period. Randomized patients represented 20% of those screened.</td>
<td>No significant differences in outcomes between the groups. The median LOS was reduced from 31 days to 22 days.</td>
</tr>
<tr>
<td>Suwanwela et al. (2002) Thailand 5 (RCT)</td>
<td>102 recent stroke patients with mild stroke (NIHSS &lt; 20), were randomized to receive either hospitalization for 3 days or to conventional 10 day hospitalization followed by home rehabilitation provided by family members and Red Cross volunteers.</td>
<td>There were no differences in functional outcome between the groups, measured by NIH stroke scale scores, BI scores and modified Rankin scores at 6 mos. There were also no differences in the rates of death or dependency between the groups.</td>
</tr>
<tr>
<td>Fjaertoft et al. (2003) Norway 7 (RCT)</td>
<td>52-week follow-up to Indredavik et al. (2000) study.</td>
<td>A greater proportion of ESUS patients was independent, defined as a modified Rankin Scale score of ≤2, (56.3% vs. 45.0%, p=0.045). There were non-significant improvements in independence, defined as a Barthel Index score of ≥ 95, favouring ESUS patients (52.5% vs. 46.3%, p=0.264).</td>
</tr>
<tr>
<td>Teng et al. (2003) Canada 7 (RCT)</td>
<td>Cost and caregiver burden analysis from Mayo et al. (2000).</td>
<td>The total costs after 3 mos. associated with the home care group were significantly less compared to the usual care group ($7,784 vs. $11,065 Canadian, p&lt;0.0001). Lower caregiver burden scores were associated with home intervention group.</td>
</tr>
<tr>
<td>Askim et al. (2004) Norway 7 (RCT)</td>
<td>62 acute stroke patients were randomized to either a ESUS or OSUS, as described by Indredavik et al. 2000. Primary outcome was the proportion of patients who were independent according to Modified Rankin Scale (mRS) (independence = mRS &lt; or = 2) 52 weeks after onset of stroke. Mortality and length of stay were registered during the 52 weeks Secondary outcomes were mRS at 6 and 26 weeks and Barthel Index (BI), Nottingham Health Profile (NHP) and Caregiver Strain Index (CSI) at 6, 26 and 52 weeks.</td>
<td>12 patients (39%) in the ESUS group vs. 16 patients (52%) in the OSUS group were independent according to mRS at 52 weeks (p = 0.444). There were no differences between groups on any secondary outcome measure, except less social isolation on NHP in the extended service group at 26 weeks (p = 0.046). There were no significant differences in length of stay.</td>
</tr>
<tr>
<td>Donnelly et al. (2004)</td>
<td>113 stroke patients who had been previously residing at home with no pre-existing mental or</td>
<td>There were no differences on any of the outcomes measured at 12 months (Barthel</td>
</tr>
<tr>
<td>Country</td>
<td>Study Design</td>
<td>Participants</td>
</tr>
<tr>
<td>---------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td>UK 7 (RCT)</td>
<td>physical disability were randomized to receive community-based rehabilitation (CBR) (n=59) or inpatient rehabilitation (n=54).</td>
<td>index, Nottingham ADL, 10-m timed walk, EuroQol, SF-36</td>
</tr>
<tr>
<td>Fjaertoft et al. (2004) Norway 7 (RCT)</td>
<td>Additional analysis from Indredavik et al. (2000) study.</td>
<td>ESUS patients had significantly better quality of life assessed by the Nottingham Health Profile after 52 weeks compared to the OSUS patients (mean scores: 78.9 vs.75.2,p =0.048).</td>
</tr>
<tr>
<td>Thorsen et al. (2005) Sweden 7 (RCT)</td>
<td>5-year follow-up to Widen-Holmqvist et al. (1998). Outcome assessment was possible in 54/81 patients originally randomized (67%). There were 30 patients in the home rehabilitation group and 24 patients who remained in the conventional rehabilitation group.</td>
<td>A greater proportion of patients in the intervention group had achieved independence, assessed using the Katz extended ADL instrument, but there were no differences using the Barthel Index. There were no differences between the groups in median Sickness Impact Profile scores, Frenchay Activities Index scores, 9-hole peg test or timed 10 metre walk.</td>
</tr>
<tr>
<td>Torp et al. (2006) Denmark 6 (RCT)</td>
<td>Following discharge from inpatient rehabilitation, patients were randomized to two groups. The control group received standard care, which included discharge planning, home care services, day care services and physiotherapy (n=95). Patients in the intervention group received care from an interdisciplinary team, which also coordinated discharge planning and provided a maximum of 10 home visits to provide care/therapy (n=103). The primary outcome assessed was length of hospital stay.</td>
<td>There was a statistically non-significant difference in LOS between the groups (-4.6 days). Mean LOS was 35.2 days for the intervention group and 39.8 days for the control group. There was no differences in functional status between groups 6 months after discharged, measured by the Barthel Index.</td>
</tr>
<tr>
<td>Askim et al. (2006) Norway 7 (RCT)</td>
<td>Additional analysis from Askim et al. (2004). Berg Balance Scale (BBS) scores, walking speed and motor sub scores of the Scandinavian Stroke Scale (SSS) were assessed at baseline, 6, 26 and 52 weeks after stroke onset.</td>
<td>Patients in the OSUS (control) group had significantly faster walking speed at one-week post intervention. There were no other differences in BBS or walking speed between the groups at any of the other evaluation points. All patients with initial severe leg paresis suffered from poor balance one year after stroke. The odds ratio for poor balance was 42.1 (95% CI; 3.5-513.9) among patients with no initial walking ability.</td>
</tr>
<tr>
<td>Suwanwela et al. (2007) Thailand No Score</td>
<td>407 acute stroke patients were admitted to an acute stroke unit, characterised by semi-intensive monitoring with early discharge. Their complication rate, mortality and LOS were compared to a historical cohort of patients (n=387) treated on a general medical ward, prior to the implementation of the stroke unit.</td>
<td>Complications during hospital stay including brain edema, hemorrhagic transformation, GI bleeding, pneumonia and pressure sores occurred more frequently among patients treated on the GMW. Mortality was higher among GMW patients (8.8% vs. 2%, p&lt;0.001) LOS was longer for GMW patients (11 vs. 8 days. p&lt;0.001).</td>
</tr>
<tr>
<td>Pessah-Rasmussen and Wendel (2009) Sweden No Score</td>
<td>Patients admitted to ESD during the years 1997/98 and 2005/06 were compared with subjects from a national stroke registry.</td>
<td>Patients in both cohorts achieved significant improvements in ADL from the start to the end of the program. Patients admitted to ESD services did not differ from the registry subjects with regard to gender or age, but</td>
</tr>
</tbody>
</table>
Outpatient Stroke Rehabilitation

were less often living alone in 2005-06. There were no differences in the mean hospital LOS in either 1996/97 or 2005/06 and the registry participants. Therapy inputs were reduced during 2005/06 compared with 1997/98.

<table>
<thead>
<tr>
<th>Study</th>
<th>Proportion of Randomized Patients Either Admitted to Acute Care or Screened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rodgers et al. (1997)</td>
<td>92/402 total admissions (22.9%)</td>
</tr>
<tr>
<td>Rudd et al. (1997)</td>
<td>300/660 total admissions (45.5%)</td>
</tr>
<tr>
<td>Duncan et al. (1998)</td>
<td>Not reported</td>
</tr>
<tr>
<td>Holmqvist et al. (1998)</td>
<td>81/220 screened (37%)</td>
</tr>
<tr>
<td>Ricauda et al. (1998)</td>
<td>Not reported</td>
</tr>
<tr>
<td>Ronning &amp; Guldvog (1998)</td>
<td>251/849 total admissions (30%)</td>
</tr>
<tr>
<td>Anderson et al. (2000)</td>
<td>86/398 stroke admissions (21.7%)</td>
</tr>
<tr>
<td>Indredavik et al. (2000)</td>
<td>320/468 of patients screened (68%)</td>
</tr>
<tr>
<td>Kalra et al. (2000)</td>
<td>457/979 total admissions (47%)</td>
</tr>
<tr>
<td>Mayo et al. (2000)</td>
<td>114/1542 total admissions (7%)</td>
</tr>
<tr>
<td>Bautz-Holter et al. (2002)</td>
<td>82/439 total admissions (19%)</td>
</tr>
</tbody>
</table>

5-year follow-up from Holmqvist et al. 1998 examining changes in perceived health status assessed using the Sickness Impact Profile (SIP). 28 patients in the home rehabilitation group and 22 patients in the conventional rehabilitation group were available for study at 5 years. The differences in SIP scores between groups (early-supported discharge with home-based rehabilitation vs. inpatient rehabilitation) were compared at 3 and 6 months and years 1 and 5 post stroke.

There were no differences in total SIP scores at the end of 1 or 5 years. SIP scores did not change significantly between one and five years in the home rehabilitation group whereas it had deteriorated significantly in the conventional rehabilitation group (p=0.05).

At 5 years following randomization, there was no difference in the proportion of patients with mRS scores ≤2 between groups (P=0.213). The proportion of patients who were dead or living in institutions was similar. A higher proportion of patients in the ESD group was living at home (46.5% vs. 34.4%, p=0.032). There was a trend toward greater improvement in mRS scores in the ESD group from onset of stroke (38% versus 30%; p=0.106).

Discussion

The percentages of patients who were screened and randomized to receive treatment or the percentage of patients randomized from the pool of total acute stroke admissions are presented in Table 7.4. The wide range of percentages reported (7% -70%) likely speaks to the differences in the timing and the types of interventions offered under the broad category of what is considered to be ESD. In addition to an ESD services, Askim et al. (2004) also provided an enhanced component of care in the acute stages of hospital care. Although distinguishing between the effects on the outcome from two separate sources is difficult, the results of the study are consistent with those described by others and the study is included for completeness.
Eleven RCTs, all of “good” quality, randomized patients to a program of early supported discharge or stroke rehabilitation at home, compared them to conventional or “usual” stroke rehabilitation and measured some form of functional outcome (see Table 7.5).

Table 7.5 Summary of RCTs with PEDro ≥ 6 Evaluating Early Supported Discharge

<table>
<thead>
<tr>
<th>Author/Year/ PEDro score</th>
<th>LOS</th>
<th>Functional Outcome</th>
<th>Other Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson et al. (2000)</td>
<td>+</td>
<td>SF-36 (-)</td>
<td>Patient Satisfaction (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modified Barthel Index (-)</td>
<td>Mortality at 6 mos (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adelaide Activities Profile (-)</td>
<td></td>
</tr>
<tr>
<td>Bautz-Holter et al. (2002)</td>
<td>+</td>
<td>Nottingham EADL (-)</td>
<td>-</td>
</tr>
<tr>
<td>Kalra et al. (2000)</td>
<td>+</td>
<td>Barthel Index (+)</td>
<td>Odds of death or institutionalization (+ in favour of hospital rehab)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modified Rankin Scores (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(in favour of hospital rehab)</td>
<td></td>
</tr>
<tr>
<td>Askim et al. (2004); Askim et al. (2006)</td>
<td>-</td>
<td>Barthel Index, Modified Rankin (-)</td>
<td>NHP (social)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Berg Balance Scale (-)</td>
<td>(+ at 26 weeks)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Walking speed (-)</td>
<td></td>
</tr>
<tr>
<td>(Donnelly et al. (2004))</td>
<td>-</td>
<td>Barthel Index (-)</td>
<td>EuroQoL (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nottingham ADL (-)</td>
<td>SF-36 (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Patient satisfaction (-)</td>
</tr>
<tr>
<td>Indredavik et al. (2000),</td>
<td>+</td>
<td>Barthel Index – at 6, 26 and 52 weeks</td>
<td>% of patients at home</td>
</tr>
<tr>
<td>Fjaertoft et al. (2003),</td>
<td></td>
<td>Modified Rankin (- at 6 weeks)</td>
<td>(+ at 6 weeks)</td>
</tr>
<tr>
<td>Fjaertoft et al. (2005)</td>
<td></td>
<td>(+ at 26, 52 weeks, 5 years)</td>
<td>(- at 26 at weeks)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>% of institutionalization</td>
<td>(+ 5 yrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(+ at 6 weeks)</td>
<td>(- at 26 weeks)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(- 5 yrs)</td>
<td>(- 5 yrs)</td>
</tr>
<tr>
<td>Mayo et al. (2000)</td>
<td>+</td>
<td>Barthel Index (-)</td>
<td>Component of SF-36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timed Up &amp;Go (-)</td>
<td>Physical Health at 3 mos (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reintegration to Normal Living (+)</td>
<td>Patient’s Mental Health at 3 mos (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ADL scale for Older Americans (+)</td>
<td></td>
</tr>
<tr>
<td>Rudd et al. (1997)</td>
<td>+</td>
<td>Barthel Index (-)</td>
<td>Total Nottingham Health Profile (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rivermead ADL (-)</td>
<td>Caregiver strain (-)</td>
</tr>
<tr>
<td>Widen Holmqvist et al.</td>
<td>+</td>
<td>Barthel Index (-)</td>
<td>Aphasia quotient (-)</td>
</tr>
<tr>
<td>(1998), von Koch et al.</td>
<td></td>
<td>Katz ADL (-)</td>
<td>No. of falls resulting in injury (-)</td>
</tr>
<tr>
<td>(2000), von Koch et al.</td>
<td></td>
<td>Frenchay Activities Index (-)</td>
<td>10 metre timed walk (-)</td>
</tr>
<tr>
<td>(2001)**, Thorsen et al.</td>
<td></td>
<td>Motor Capacity (-)</td>
<td>number of falls (-)</td>
</tr>
<tr>
<td>(2005), Ytterberg et al.</td>
<td></td>
<td>Katz Extended ADL (+)</td>
<td>Sickness Impact Profile (-)**</td>
</tr>
<tr>
<td>(2010)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torp et al. (2006)</td>
<td>-</td>
<td>Barthel Index (-)</td>
<td>Additional health care contacts (-)</td>
</tr>
</tbody>
</table>
The results of RCTs from the United Kingdom, Sweden, Norway, Canada and Australia, have shown that highly-selected, mildly impaired stroke patients can be managed successfully at home by an interdisciplinary team, with similar outcomes compared to in-patient care. Unfortunately, the essential elements of characteristics of an effective ESD program remain uncertain. Moreover, it is important to emphasize that the stroke patients included in these studies had achieved relatively high levels of independence at the time of admission into the study. Nevertheless, patients were more satisfied with this type of care when compared to hospitalization and may have been more motivated. Von Koch et al. (1998), found that patients receiving rehabilitation in their homes took greater initiative and assumed more responsibility for their own care, compared to those receiving treatment in the hospital. Therapies also emphasized both a task-specific and contextual approach. However, even though patients were functioning at a high level, Anderson et al. (2000) found the mental stress of caregivers was significantly greater in the early supported hospital discharge group.

For patients with moderate and severe strokes, Andersen et al. (2000) suggested that early supported discharge was no longer cost-effective or advantageous, since the benefits were inversely proportional to the severity of the stroke. Bautz-Holter et al. (2002) reported non-significant differences in Nottingham Extended ADL scores at both three and six months in mildly impaired stroke patients receiving either conventional in-patient rehabilitation or early-supported discharge. Kalra et al. (2000) examined the efficacy of stroke unit care compared to a stroke team or to domiciliary (at home) care for early stroke rehabilitation and reported that for patients with moderate to severe stroke, stroke unit care was “more effective in reducing mortality, the need for institutional care and dependence. Moreover, rehabilitation of patients randomized to domiciliary care proved difficult as one third of the 153 patients so randomized were admitted to the stroke unit within two weeks for a variety of care reasons.”

Two trials assessing ESD programs included a follow-up period of 5 years (Fjaertoft et al. 2011; Thorsen et al. 2005). In both of these studies, there were beneficial effects associated with ESD in at least one of the outcomes assessed (Katz extended ADL and mRS scores). Of course, it was not possible to know what additional services patients in both groups may have received in the intervening years.

ESD was not associated with an improvement in health-related quality of life, a measure that was assessed in two of the studies (Donnelly et al. 2004; Ytterberg et al. 2010). At the end of 1 and 5 years there were no significant differences in study groups on HRQoL including the SF-36, EuroQoL or the Sickness Impact Profile.

Two studies were available for pooled analysis. The combined odds ratio for independence in ADL at 6 months to one year, using all of the reviewed studies with available data and PEDro score of 6 or greater was 1.45 (95% CI 0.92 to 2.30, p=0.11) (See Figure 7.1). The result suggests that there was no difference in the proportion of patients achieving independence in ADL between the two treatment conditions.

<table>
<thead>
<tr>
<th>Rodgers et al. (1997)</th>
<th>+ Nottingham Extended ADL (-)</th>
<th>Global health status of patients (-) Carer stress (-)</th>
</tr>
</thead>
</table>

+ Indicates a significant beneficial effect of home-based rehabilitation compared to conventional rehabilitation.
- Indicates no differences between home-based rehabilitation compared to conventional rehabilitation.
* 2001 study only
** 2010 study only
7.1.2 Potential For Cost Savings

Several of the RCTs included in the above review included an economic component in their study in an attempt to establish if ESD was associated with a cost savings. Although Beech et al. (1999) found that the cost of ESD was 8% less compared with conventional inpatient rehabilitation; the authors concluded that early community discharge was “unlikely to lead to financial savings” and its primary benefit was increasing the capacity of limited hospital beds. The relatively small cost savings from early discharge would be offset by increased financial costs of community-based rehabilitation services. The community-based rehabilitation costs, “would depend on (1) whether the community rehabilitation was introduced by reorganizing existing staffing establishments and (2) whether the increased demands on community health and social services could be absorbed within existing staffing structures.” Teng et al. (2003) in a follow-up study of Mayo et al. (2000), found that the total costs associated with the home care group after three months was significantly less compared to the usual care group ($7,784 vs. $11,065 Canadian, p<0.0001)(Figure 7.2). Fjaertoft et al. (2005) reported that although there was a significant reduction in inpatients days after 52 weeks (66 days for ESUS vs. 85 days for OSUS, p=0.012), this was not associated with a corresponding statistically significant reduction in mean total cost (18,937 EUR for ESUS vs. 21,824 EUR for OSUS).

Several systematic reviews have also been conducted. Brady et al. (2005) published an economic evaluation of ESD services including the results from 8 RCTs that included costing data. Using the data from the 6 studies of higher methodological quality, ESD was associated with cost-savings of 4 to 30 percent; however, the savings reached statistical significance in only a single study (Teng et al. 2003). The authors noted that it was difficult to generalize these findings since there were large variations in service delivery. For example, the duration of home rehabilitation varied from 4 weeks to 4 months. However, they did conclude that ESD could be provided at a modestly lower cost compared with inpatient rehabilitation for patients suffering from mild or moderate disability.

Larsen et al. (2006) conducted a systematic review of ESD including an examination of the costs compared with the alternative intervention, usually inpatient stroke rehabilitation. Using the results from 5 previously published RCTs, the average cost of home rehabilitation, which included an average of 11 home therapy sessions, was $1,340 USD per person. Although the authors do not provide the cost associated with inpatient rehabilitation they do report the cost average cost savings in bed days and nursing home stays, amounting to $140 USD per person. These authors concluded that ESD was the dominant intervention, since it was associated with both a cost savings and improved outcome, in the form of a reduction in the odds of death or institution (OR: 0.75, 95% CI 0.46 to 0.95).

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Saka et al. (2009) also examined the cost-effectiveness of stroke unit care combined with ESD using data on outcome from a previous trial (Rudd et al. 1997). The authors reported that at the end of 10 years, the combination of ESD and SU care was more cost-effective than a SU without ESD. The incremental cost-effectiveness ratio was £17,721 (increased incremental cost of £1,400/ increase of 2.23 quality adjusted life year gained per patient), which was below the willingness to pay threshold of £30,000 in the UK. The authors of this study converted Barthel Index scores to a measure of health-related quality of life using an unconventional method. The results should be interpreted cautiously.

Included as part of systematic review assessing the economic evidence for all integrated care provided to patients recovering from stroke across the spectrum of inpatient programs to the community, Tummers et al. (2012) reported on six ESD studies that met inclusion criteria. The studies included were all RCTs reporting no evidence for adverse effects on patient outcomes with ESD programs relative to the comparator group. Cost savings with ESD services were reported for all studies (4%-30% cost reduction), however only one study by Teng et al. (2003) was statistically significant; these results were similar to those found in Brady et al. (2005).

Potential cost savings associated with the implementation of ESD programs, when part of larger package of interventions including increased use of thrombolytic agents and stroke units was recently examined in a model including stroke admissions over a 3-year period in Canada. Cost avoidance associated specifically with increased use of ESD programs was estimated to be $133 million and $25.1 million, in direct and indirect costs, respectively (Krueger et al. 2012).

Conclusions Regarding Early Supported Discharge

*There is strong (Level 1a) evidence that stroke patients with mild to moderate disability, discharged early from an acute hospital unit, can be rehabilitated in the community by an interdisciplinary stroke rehabilitation team and attain similar or superior functional outcomes when compared to patients receiving in-patient rehabilitation.*

*There is strong (Level 1a) evidence that the costs associated with early-supported discharge are lower when compared to usual care.*

**Early supported discharge provides similar outcomes for patients with milder strokes, compared to inpatient rehabilitation, although it is uncertain whether there are any cost savings.**

7.1.3 Effective Elements of an ESD Program

The results from a recent consensus panel examining ESD have been published (Fisher et al. 2011). The panel included 10 of the authors whose RCTs had been included in the Cochrane ESD review. A modified Delphi process was used to determine who should be included in an ESD team and what features it should include. There was strong agreement (i.e. 100% agreement) that the members of the team should have specialized stroke care knowledge that the team should be multidisciplinary, and should include: a physiotherapist, occupational therapist and a nurse. There was also strong agreement that an ESD team should be hospital-based, organised by a team coordinator and each patient be assigned a key person to coordinate their care. There was also strong agreement that ESD teams should meet on a weekly basis. Consensus agreement (>75%) was established for 47 of the 56 statements that the panel voted on. An additional consensus process was undertaken, to build on the ESD work, for community based rehabilitation services in general (Fisher et al. 2013). This consensus panel included 26 participants from the U.K. Participants agreed (73%) that community stroke rehabilitation teams are distinct from ESD programs, but offer complimentary services. If patients are eligible for ESD and have
ongoing rehabilitation needs, 96% of participants agreed that they should have access to community rehabilitation services. Participants strongly agreed (92%) that ESD services could be provided by a community rehabilitation team given they are sufficiently and appropriately resourced. Additionally, 92% of participants strongly agreed that those patients who are not eligible for ESD should have access to community rehabilitation if necessary when discharged, and if a stroke survivor has complex needs related to the stroke, they should only be transferred to the community when the appropriate supports are in place (Fisher et al. 2013). A review of evidence for ESD implementation also highlighted that ESD services should be composed of a multidisciplinary team with stroke specialists, the team should work cohesively, and specific patient eligibility criteria should be in place (Mas & Inzitari 2012).

Two qualitative studies of ESD services from the patients’ and carers’ (Cobley et al. 2013), as well as healthcare professionals and commissioners (Chouliara et al. 2013), perspectives have also provided evidence for the components of an effective ESD program. The majority of patients from two ESD stroke centres in the UK were satisfied with the speed of transition home, home as the care location, the intensity and type of therapy, and the equipment used. Likewise, the majority of carers expressed their appreciation for the respite time. However, there was dissatisfaction with the abruptness of discharge from ESD services and the limited care, support, and education for caregivers. Receipt of relevant information was also cited as inadequate (Cobley et al. 2013). Another study from the UK interviewed 25 people involved with the provision of care for the two ESD teams (Chouliara et al. 2013). These informants noted that the ESD program allowed for an intensive, patient-centred intervention, reduced hospital stay and facilitated a smoother transition home for the patients. However, they noted some challenges with the referral decision making, transitions along the pathway of care, and redundancy of assessments across care locations (Chouliara et al. 2013).

7.2 Outpatient Therapy

Outpatient therapy in the sub-acute phase of stroke (4-8 weeks post stroke) is often prescribed following discharge from in-patient stroke rehabilitation units. Continuing therapy may include hospital-based “day” hospital programs or home-based rehabilitation.

In a review of factors affecting functional outcomes following stroke, Cifu and Stewart (1999) reported the results of three “moderate quality” RCTs examining the differences in functional outcomes between groups of patients who had received either home-based therapy or day hospital treatment (Gladman & Lincoln 1994; Tangeman et al. 1990; Young & Forster 1992). The authors concluded “Overall, the available literature demonstrates that participation in outpatient, home health, and day rehabilitation programs is strongly associated with improved functional outcome after stroke. This literature does not allow clear differentiation between types of non-inpatient rehabilitation services; however, home health services may be weakly associated with improved 6-month functional outcome when compared to day rehabilitation services”.

The Outpatient Service Trialists (2003) identified 14 studies that had randomized stroke patients to receive specialized outpatient therapy-based interventions (usually physiotherapy/occupational therapy or occupational therapy alone which largely focused on modifying task-oriented behaviour such as walking or dressing) or no routine treatment, including the results from 1,617 patients. The majority of therapies were provided in the patients’ homes (see Table 7.6).

Table 7.6 RCTs Included in the Outpatient Service Trialists (2002) Evaluating the Effect of Therapy-Based Rehabilitation vs. No Input

<table>
<thead>
<tr>
<th>Study</th>
<th>Focus of Therapy</th>
<th>Home or Hospital Based</th>
</tr>
</thead>
</table>

7. Outpatient Stroke Rehabilitation
Outpatient therapy was associated with an improvement in ADL and EADL function at the end of scheduled follow-up but was not associated with reductions of death or dependency, nor did it affect the outcomes assessed for carers. (Table 7.7)

Table 7.7 Results of Comparisons Evaluated at the End of Scheduled Follow-up

<table>
<thead>
<tr>
<th>Statistically Significant Differences Between Groups</th>
<th>Non-Statistically Significant Differences Between Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADL score (Barthel Index)</td>
<td>Death</td>
</tr>
<tr>
<td>EADL score (Nottingham Extended Activities of Daily Living)</td>
<td>Death or Institutional care</td>
</tr>
<tr>
<td></td>
<td>Death or Dependency</td>
</tr>
<tr>
<td></td>
<td>Death or Poor Outcome (deterioration/dependency)</td>
</tr>
<tr>
<td></td>
<td>Quality of Life QoL (Nottingham Health Profile)</td>
</tr>
<tr>
<td></td>
<td>Mood (General Health Questionnaire)</td>
</tr>
<tr>
<td></td>
<td>Carers’ QoL (Pearlman’s 6-point QoL scale and Social Functioning Examination)</td>
</tr>
<tr>
<td></td>
<td>Carers’ mood (General Health Questionnaire)</td>
</tr>
</tbody>
</table>

Another recent Cochrane review (Aziz et al. 2008) evaluated the benefit of therapy-based rehabilitation programs initiated more than one-year following stroke. Five trials were identified involving 487 subjects ((Green et al. 2002; Mulder et al. 1986; Sackley et al. 2006; Wade et al. 1992; Werner & Kessler 1996), The summary results from pooled analyses are presented in Table 7.15. The authors concluded that there was insufficient evidence to demonstrate that therapy was superior to usual care, which usually amounted to no additional care.

Table 7.15 Results of Cochrane Review of Therapy-Based Rehabilitation Services for Patients at Home More than One-year after Stroke (Aziz et al. 2008)

<table>
<thead>
<tr>
<th>Statistically Significant Differences Between Groups</th>
<th>Non-Statistically Significant Differences Between Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Death or Poor Outcome (deterioration/dependency)</td>
</tr>
<tr>
<td></td>
<td>Activities of Daily Living</td>
</tr>
<tr>
<td></td>
<td>Case fatality at the end of follow-up</td>
</tr>
<tr>
<td></td>
<td>Extended ADL</td>
</tr>
<tr>
<td></td>
<td>Sickness Index Profile</td>
</tr>
<tr>
<td></td>
<td>Patient’s mood</td>
</tr>
<tr>
<td></td>
<td>Carer’s mood</td>
</tr>
</tbody>
</table>
A recent meta-analysis (Ferrarello et al. 2011) including the results from 15 RCTs that examined the benefit of additional therapy late (>6 months) following stroke. The majority of the studies provided physiotherapy in an outpatient setting. The length of treatment ranged from 6 to 52 hours. The combined treatment effect for all outcomes assessed was 0.29, 95% CI of 0.14 to 0.45, indicating a small effect. The treatment effect associated with ADL was small and not significant (0.08, p=0.58).

In the following section, we examined the benefit of additional therapy provided either as home or hospital based rehabilitation, following discharge. Interventions provided within 6 months and beyond 6 months of stroke onset are presented separately.

### 7.2.2 Outpatient Stroke Rehabilitation Provided within 6 Months of Stroke Onset

Eighteen studies evaluated the efficacy of additional outpatient rehabilitation following stroke that had occurred within the previous 6 months. (Table 7.8)

<table>
<thead>
<tr>
<th>Author, Year Country</th>
<th>Methods</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith et al. (1981) Australia</td>
<td>133 stroke patients were randomized to receive one of three treatments following discharge from inpatient rehabilitation; 1) intensive outpatient rehabilitation, provided for 4 full days, 2) conventional rehab, provided for three ½ days /week and 3) no continued rehabilitation, although they were visited by a “health visitor” on a regular basis. Patients received up to 6 months of therapy.</td>
<td>At both 3 month and 12 month review, patients in the intensive group had better disability scores than those receiving conventional rehab, who in turn had better scores than patients receiving no additional rehabilitation. The greatest gains were achieved in the first three months.</td>
</tr>
<tr>
<td>Hui et al. (1995) China</td>
<td>128 elderly patients with acute stroke were randomized to inpatient care on a stroke ward under the care of either a neurologist or a geriatric team. Those under the care of neurologists were hospitalized until the attending physician felt that the patients had reached full rehabilitation potential. Patients under the care of the geriatric team were discharged home as soon as the team felt they were able to cope and given follow-up rehabilitation at the day hospital. Family or community support was arranged when necessary for both treatment groups.</td>
<td>There were no differences in the mean BI scores between the two groups at either 3 or 6 months follow-up. However, there was significantly greater improvement in scores from 0-3 months. There were also no differences in assessments of patients’ well-being, sleep problems or depression</td>
</tr>
<tr>
<td>Corr (1995) UK</td>
<td>110 stroke patients were randomized immediately following hospital discharge to either the intervention group receiving further rehabilitation at home by an occupational therapist based on the model of human occupation in addition to any other follow-up services arranged or to the control group that received no special intervention or follow up, although they could receive any available services as required.</td>
<td>More patients in the intervention group than in the control group were independent in feeding and using the telephone as assessed by the Nottingham Extended ADL Index.</td>
</tr>
<tr>
<td>Forster and</td>
<td>240 patients were randomized to receive visits</td>
<td>Mildly disabled patients (Barthel Index 15 to 19)</td>
</tr>
<tr>
<td>Study (Year)</td>
<td>Country</td>
<td>RCT</td>
</tr>
<tr>
<td>-------------</td>
<td>---------</td>
<td>-----</td>
</tr>
<tr>
<td>Young (1996)</td>
<td>UK</td>
<td>6 (RCT)</td>
</tr>
<tr>
<td>Goldberg et al. (1997)</td>
<td>USA</td>
<td>5 (RCT)</td>
</tr>
<tr>
<td>Logan et al. (1997)</td>
<td>UK</td>
<td>8 (RCT)</td>
</tr>
<tr>
<td>Walker et al. (1999)</td>
<td>UK</td>
<td>7 (RCT)</td>
</tr>
<tr>
<td>Andersen et al. (2000)</td>
<td>Denmark</td>
<td>8 (RCT)</td>
</tr>
<tr>
<td>Gilbertson et al. (2000)</td>
<td>UK</td>
<td>8 (RCT)</td>
</tr>
<tr>
<td>Gilbertson and Langhorne (2000)</td>
<td>Scotland</td>
<td>8 (RCT)</td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Rehabilitation Type</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Wolfe et al. (2000)</td>
<td>UK</td>
<td>Home treatment</td>
</tr>
<tr>
<td>Evans and Hendricks (1993)</td>
<td>USA</td>
<td>Home rehabilitation</td>
</tr>
<tr>
<td>Walker et al. (2001)</td>
<td>UK</td>
<td>Home treatment</td>
</tr>
<tr>
<td>Anderson et al. (2002)</td>
<td>Denmark</td>
<td>Home-based intervention</td>
</tr>
<tr>
<td>Chieu and Man (2004)</td>
<td>China</td>
<td>Home-based intervention</td>
</tr>
<tr>
<td>Ricauda et al. (2004)</td>
<td>Italy</td>
<td>Home-based intervention</td>
</tr>
<tr>
<td>McClellan and Ada (2004)</td>
<td>Australia</td>
<td>Home-base mobility program</td>
</tr>
<tr>
<td>Sackley et al. (2006)</td>
<td>UK</td>
<td>Occupational therapy</td>
</tr>
</tbody>
</table>
(n=63). Assessments, conducted at baseline, 3 and 6 months included BI and poor global outcome, defined as deterioration in BI score or death.

<table>
<thead>
<tr>
<th>Study</th>
<th>Description</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Welin et al.</strong>&lt;br&gt;(2010) Sweden 6 (RCT)</td>
<td>163 patients were randomized to receive continued care following discharge from an acute stroke service to either a stroke outpatient clinic (n=81) or to routine care provided by their general practitioner (n=81). The primary outcome was mortality, assessed at 12 months and again at 3-4 years. Other outcomes included modified Rankin Scale (mRS), BI, Scandinavian Stroke Scale (SSS), depression and perceived health (1-5 scale).</td>
<td>There were no statistically significant differences between groups at either assessment point; however, only mortality was reported at 3-4 year period as a large number of patients in both groups did not return to clinics.</td>
</tr>
<tr>
<td><strong>Chaiyawat and Kulkantrakorn</strong>&lt;br&gt;(2012b) Thailand 7 (RCT)</td>
<td>60 patients with recent ischemic stroke were randomly assigned to receive either a home rehabilitation program once a month for 6 months with audio-visual materials (intervention group) or usual care (control group). Data was collected from discharge from hospital to 2 years. Outcomes measured included BI, the modified Rankin Scale (mRS) and utility index (EQ-5D). Analyses were adjusted for age, depression, dementia and baseline outcome values.</td>
<td>At 2 years, mean BI scores were significantly improved in the intervention group compared with the control group (97.2 vs. 76.4, p&lt;0.001). The proportion of patients with r mRS 0 or 1 was greater in the intervention group (93 vs. 32%, p=0.02).</td>
</tr>
<tr>
<td><strong>Chaiyawat and Kulkantrakorn</strong>&lt;br&gt;(2012a) Thailand 7 (RCT)</td>
<td>Additional reporting from above study. Mean Hospital Anxiety and Depression scores were improved to a greater degree among patients in the intervention group: from 16.1 to 9.1 vs. 16.4 to 9.1, p= 0.003). Mean Thai Mini-Mental State Examination in both groups did not significantly differ (24.4 to 24.6 vs 23.8 to 24.1, p= 0.068).</td>
<td></td>
</tr>
<tr>
<td><strong>Chumbler et al.</strong>&lt;br&gt;(2012) USA 7 (RCT)</td>
<td>48 patients were randomized to either the intervention (n=25) or the control (n=23) group. Intervention lasted 3 months and involved 3 televisits (involved prescribing strength and balance exercises), an in-home messaging device (to facilitate outcome assessment and offer encouragement to patient to increase adherence to prescribed exercises), and 5 telephone calls (to explore barriers to completing exercises, advancing and reviewing the exercise program). Outcomes were assessed at baseline, 3 months and 6 months and included the motor subscale of the FIM, and the Late-Life Function and Disability instrument (LLFDI) – overall function component.</td>
<td>There were no statistically significant differences in primary outcomes between the two groups (p&gt;0.05). There were statistically significant improvements in some secondary outcomes, including task difficulty and personal role frequency (subcomponents of the disability component of the LLFDI) suggesting that patients in the intervention group had greater ability to perform life tasks.</td>
</tr>
</tbody>
</table>

**Discussion**

There were 12 RCT of good quality that evaluated the functional outcomes of patients who received additional outpatient therapy following a course of standard inpatient rehabilitation (see Table 7.9). In one case, additional therapy was provided within a nursing home (Sackley et al. 2006). In most cases, the control condition was no additional therapy following inpatient discharge. The results demonstrated some short-term improvements in
functional outcomes, although these differences disappeared over the long-term in studies where assessments were repeated beyond the treatment period. It is not clear whether the positive effects were lost over time due to a loss of gained function or due to delayed improvement in the control group.

### Table 7.9 Summary of RCTs Evaluating Hospital or Home-Based Stroke Rehabilitation within 6 Months of Stroke

<table>
<thead>
<tr>
<th>Author/Year/ PEDro score</th>
<th>n at Randomization</th>
<th>Intervention</th>
<th>Functional Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logan et al. (1997)</td>
<td>101</td>
<td>Enhanced Occupational Therapy</td>
<td>Barthel Index (-) Nottingham Extended ADL (+)</td>
</tr>
<tr>
<td>Andersen et al. (2000), Andersen et al. (2002)</td>
<td>155</td>
<td>Physiotherapy &amp; MD visits</td>
<td>Functional Quality of Movement Scale (-) Frenchay Activity Index (-) Extended ADL (-)</td>
</tr>
<tr>
<td>Gilbertson et al. (2000)</td>
<td>138</td>
<td>Occupational therapy</td>
<td>Nottingham Extended ADL (-) Global outcome (+/-)</td>
</tr>
<tr>
<td>Mcclellan and Ada (2004)</td>
<td>26</td>
<td>6 week mobility program</td>
<td>Functional reach (+) Quality of Life (-) Walking (-)</td>
</tr>
<tr>
<td>Walker et al. (1999), Walker et al. (2001)</td>
<td>185</td>
<td>Occupational Therapy</td>
<td>EADL and Barthel Index (+)</td>
</tr>
<tr>
<td>Wolfe et al. (2000)</td>
<td>43</td>
<td>Home visits by a Rehabilitation team</td>
<td>Barthel Index (-)</td>
</tr>
<tr>
<td>Ricauda et al. (2004)</td>
<td>120</td>
<td>Multidisciplinary Home Care</td>
<td>6 point ADL score (-) FIM (-)</td>
</tr>
<tr>
<td>Chaiyawat and Kulkantrakorn (2012b)</td>
<td>60</td>
<td>Home-based PT program</td>
<td>BI (+) mRS (+) Hospital Anxiety &amp; Depression Scale (+)</td>
</tr>
<tr>
<td>Corr (1995)</td>
<td>110</td>
<td>Occupational Therapy</td>
<td>Barthel Index (-) Nottingham Extended ADL (-)</td>
</tr>
<tr>
<td>Forster and Young (1996)</td>
<td>240</td>
<td>Home visits by an outreach nurse</td>
<td>Barthel Index (-)</td>
</tr>
<tr>
<td>Sackley et al. (2006)</td>
<td>118</td>
<td>Additional OT</td>
<td>Poor outcome (+)</td>
</tr>
<tr>
<td>Welin et al. (2010)</td>
<td>163</td>
<td>General practitioner</td>
<td>Barthel Index at 1 year (-)</td>
</tr>
</tbody>
</table>

+ Indicates a significant beneficial effect of community-based stroke rehabilitation versus routine care
- Indicates no difference between treatment groups

**Conclusions Regarding Outpatient Stroke Rehabilitation Provided within the First 6 Months of Stroke Onset**

**There is conflicting (Level 4) evidence that additional outpatient therapy improves performance of ADLs.**

**It is unclear if outpatient therapy results in improved functional outcomes.**
### 7.2.3 Outpatient Stroke Rehabilitation Provided beyond 6 Months of Stroke Onset

Eight RCTs evaluated the outcomes of patients who received either home, community or hospital-based therapy or services compared to patients who received standard or routine care, after 6 months of the stroke (see Table 7.10). The control condition was usually no additional therapy following inpatient rehabilitation.

### Table 7.10 Efficacy of Outpatient Therapy Delivered Beyond 6 Months of Stroke Onset

<table>
<thead>
<tr>
<th>Author, Year, Country</th>
<th>PEDro Score</th>
<th>Methods</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wade et al.</strong> (1992) UK 6 (Crossover RCT)</td>
<td>94 stroke patients with reduced mobility 1 year following stroke were randomized to one of 2 home therapy groups: 1) patients who received physiotherapy immediately upon entry into the study, continuing for 3 months followed by no therapy for 3 months or 2) received no therapy for 3 months followed by therapy for 3 months. Treatment emphasized self-management.</td>
<td>Immediately following treatment, both groups demonstrated a significant improvement in gait speed. At 3 months, the early therapy group showed a significant improvement in gait speed. Between 3-6 months, patients in the late therapy group showed a significant improvement in gait speed.</td>
<td></td>
</tr>
<tr>
<td><strong>Werner and Kessler</strong> (1996) USA 6 (RCT)</td>
<td>49 stroke survivors, at least 1 yr (mean, 2.9 yr) post stroke, were randomized to receive 1 hr each of physical and occupational therapy, four times per week, for 12 wk; therapy focused on neuromuscular facilitation and functional tasks, or to a group that received no additional treatment. Assessments were conducted at baseline, 3 and 9 months and included FIM, Brunnstrom stages of motor recovery, timed mobility tasks, and the Jebson hand evaluation, level of depression, self-esteem, and socialization.</td>
<td>The patients in the treatment group demonstrated significantly greater improvement in FIM (motor) scores at 3 months; however, there were no longer significant between group differences at 9 months. The treated group improved in terms of socialization and self-esteem as evidenced by a lower Sickness Impact Profile, whereas the controls tended to get worse. There was a trend toward less depression.</td>
<td></td>
</tr>
<tr>
<td><strong>Walker et al.</strong> (1996) UK 6 (crossover RCT)</td>
<td>30 stroke patients living at home experiencing difficulty with dressing 6 months following stroke were studied. Patients received regular dressing practice by a senior OT in their home for 3 months followed by 3 months of no intervention. 15 patients were randomized to receive assistance for 3 months followed by no assistance (group 1) and 15 patients received no assistance, followed by assistance (group 2).</td>
<td>Group 1 showed significant improvement in dressing during treatment phase with gains maintained during the control phase. Group 2 significantly improved in dressing during the treatment phase. Group 1 improved significantly over the treatment phase on the ADL self-care section with gains maintained after the non-intervention period. Group 2 showed significant improvement in ADL scores with treatment.</td>
<td></td>
</tr>
<tr>
<td><strong>Parker et al.</strong> (2001) UK 6 (RCT)</td>
<td>A multicentre trial of 466 stroke patients randomized to three groups. Two treatment groups received OT intervention at home for up to 6 months with a minimum of 10 sessions lasting not less than 30 min. ADL group treatment goals were set in terms of improving independence in self care tasks. Leisure group goals were set in terms of leisure activity and intervention included practising the leisure activity and the ADL.</td>
<td>No significant differences were found between groups on any of the outcome measures including the General Health Questionnaire (GHQ), Nottingham Extended ADL Scale, Nottingham Leisure Questionnaire, International Stroke Trial Outcome Questions, Barthel Index or London Handicap Scale (LHS).</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Country</td>
<td>N</td>
<td>Design</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>---</td>
<td>--------</td>
</tr>
<tr>
<td>Green et al. (2002)</td>
<td>UK</td>
<td>8</td>
<td>RCT</td>
</tr>
<tr>
<td>Lin et al. (2004)</td>
<td>Taiwan</td>
<td>7</td>
<td>RCT</td>
</tr>
<tr>
<td>Logan et al. (2004)</td>
<td>UK</td>
<td>8</td>
<td>RCT</td>
</tr>
<tr>
<td>Egan et al. (2007)</td>
<td>Canada</td>
<td>7</td>
<td>RCT</td>
</tr>
</tbody>
</table>
Discussion
A summary of 8 RCTs of good quality is presented in table 7.11. There was great variation in both the interventions provided and the outcomes assessed. Three good quality studies assessed the effectiveness of home therapy among chronic stroke patients. Green et al. (2004) pooled the data from Wade et al. (1992) and Green et al. (2002), which included the results from a total of 264 patients. There was a small, but statistically significant difference in the Rivermead Mobility Index scores between the treatment and control groups at 3 months. There were no other differences in the change scores from baseline to 3 months between the groups for Barthel Index, Frenchay Activities Index, or Hospital Anxiety & Depression Scale. The authors speculated that the reasons for their negative results may have been due to the low intensity of the interventions provided or to the heterogeneity of patients included in the two studies.

Table 7.11 Summary of RCTs with PEDro > 6 Evaluating Outpatient Therapy Provided Greater than 6 Months Post Stroke

<table>
<thead>
<tr>
<th>Author/Year/ PEDro score</th>
<th>n at Randomization</th>
<th>Intervention</th>
<th>Functional Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wade et al. (1992) 6</td>
<td>94</td>
<td>Delayed/Immediate Physiotherapy</td>
<td>Gait Speed (+)</td>
</tr>
<tr>
<td>Werner and Kessler (1996) 6</td>
<td>49</td>
<td>Additional Physical and Occupational therapy</td>
<td>Change in FIM from 0-3 mos (+) Change in FIM from 3-9 mos (-)</td>
</tr>
<tr>
<td>Walker et al. (1996) 6</td>
<td>30</td>
<td>Occupational Therapy for Dressing</td>
<td>Nottingham Dressing assessment (+)</td>
</tr>
<tr>
<td>Parker et al. (2001) 6</td>
<td>466</td>
<td>Occupational Therapy</td>
<td>Barthel Index (-) Nottingham Extended ADL (-)</td>
</tr>
<tr>
<td>Egan et al. (2007) 6</td>
<td>16</td>
<td>Home visits by an OT</td>
<td>COPM (+/-)</td>
</tr>
<tr>
<td>Lin et al. (2004) 7</td>
<td>19</td>
<td>Delayed/Immediate home-based Physiotherapy</td>
<td>BI (-) STREAM (+/-)</td>
</tr>
<tr>
<td>Green et al. (2002) 8</td>
<td>170</td>
<td>Home-based physiotherapy</td>
<td>Rivermead Mobility Index 3 mos (+) 6 mos (-) 9 mos (-)</td>
</tr>
<tr>
<td>Logan et al. (2004) 8</td>
<td>168</td>
<td>7 sessions OT designed to increase outdoor mobility</td>
<td>Getting out of the house (+) Nottingham EADL (+/-) Nottingham Leisure Questionnaire (-)</td>
</tr>
</tbody>
</table>

Conclusions Regarding Outpatient Therapy Provided at Least One-Year Following Stroke

There is conflicting (Level 4) evidence that home based therapy for chronic stroke survivors is associated with improvements in performance on ADLs and mobility.

7.2.4 Home-Based Therapy vs. Hospital-Based Outpatient Therapy
The increased focus on patient-driven care versus provider-driven care has sparked a debate as to whether stroke patients should be rehabilitated in hospital-based (inpatient and outpatient) programs or by community rehabilitation programs, which are usually home-based.
Young (1994) and Lincoln (1994) first debated this issue in the United Kingdom. Young (1994) argued that community care allowed stroke patients to reach their full potential, stating, “I do not believe that hospital care should be replaced by community services but that a more appropriate balance needs to be achieved; one which recognizes the limitations of hospitals and the pressing community (home) needs of stroke patients and their families.” Anderson et al. (1992) suggested that stroke rehabilitation required a longer-term commitment, probably at least 3–5 years after the initial stroke. This group argued that community-based rehabilitation offered a greater opportunity to deal with handicaps and address psychosocial issues more effectively following a stroke. A community-based approach was also argued to be more effective and efficient, addressing problems “in a way that is more relevant to the patient”.

In contrast, Lincoln (1994) argued that hospitals were the best venue to provide the required therapies, since co-ordinated care, so critical to interdisciplinary rehabilitation, was “difficult in practice” to put in place in a community setting, since often, the services provided were not stroke focused. The benefits of specialized stroke rehabilitation units have already been discussed in chapter 5. Specialized stroke rehabilitation centres also make it much easier to educate and train new stroke clinicians as well as conduct research.

A number of authors have noted the advantages of rehabilitation at home (Gilbertson et al. 2000; Gladman et al. 1993; Rudd et al. 1997). From the results of animal studies, it is well known that enriched environments, characterised by increased activities and greater social interactions, contribute to better outcomes (Johansson & Ohlsson 1996). However, there is evidence that much of a stroke patients’ time spent on a rehabilitation unit is both inactive and alone. Surprisingly little time is spent in therapy (Lincoln et al. 1996). Therefore, while theoretically stroke rehabilitation units should provide a more enriched environment compared with other forms of inpatient rehabilitation, the home environment may actually be more stimulating. Skills learned on the stroke rehabilitation unit may not transfer well to the home (Corr 1995; Forster & Young 1996; Indredavik et al. 2000). Adding to the complexity of the debate is the notion of supervised vs. unsupervised therapy time. Koh et al. (2012) assessed the relationship between the percentage of prescribed therapy time a patient performed at home (unsupervised) and at the hospital outpatient clinic (supervised) and a patient’s score on the Barthel Index (BI) at 1, 6 and 12 months after discharge. Performing more than 25% of the prescribed supervised therapy resulted in a statistically significant greater mean BI score at 1 and 6 months post stroke compared to those who performed less than 25% of the prescribed supervised therapy ($\beta$-estimate 8.8, 95% CI 0.5 to 17.0, $P$=0.39; $\beta$-estimate 20.1, 95% CI 11.0 to 29.2, $P$<0.001). These effects were not evident for patients who were more compliant (>75%) with unsupervised therapy time compared to those who were less compliant (<75%) (Koh et al. 2012). This study used a proxy measure for adherence and therapy time; results should be interpreted with caution.

Hillier and Inglis-Jassiem (2010) conducted a systematic review to compare the effectiveness of home vs. hospital-based outpatient rehabilitation services. Eleven trials were included. The authors reported that when the results from Barthel Index scores were pooled there was a significant effect in favour of home-based rehabilitation at 6 weeks and 3–6 months, although the effects were less clear at 6 months.

There is currently no standard for the services that are provided and their intensity or duration for community-based rehabilitation following stroke. The superiority of home vs. hospital outpatient rehabilitation remains unclear.

**Individual Studies**
There were ten RCTs evaluating the functional outcomes of patients who received home-based therapy compared to hospital-based outpatient therapy. The results are presented in Table 7.12.

### Table 7.12 Home vs. Hospital-Based Outpatient Therapy

<table>
<thead>
<tr>
<th>Author, Year Country</th>
<th>PEDro Score</th>
<th>Methods</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gersten et al. (1968) USA 5 (RCT)</td>
<td>238 stroke patients were randomly assigned to receive rehabilitation at home or in a clinic setting.</td>
<td>128 completed the study. No differences in the functional, social or psychological status of patients in the 2 groups.</td>
<td></td>
</tr>
<tr>
<td>Wall and Turnbull (1987) Canada 3 (RCT)</td>
<td>Following discharge from hospital 20 subjects with residual hemiplegia were randomly assigned to one of 4 groups to participate in a 6 mos, twice weekly, 2 hrs/week progressive exercise program including 10 exercises. Group A received all therapy in a clinic, group B received all therapy at home, group C received 1 hour of therapy in clinic and 1 hour at home under the supervision of a spouse and subjects in group C received no additional therapy. Gait symmetry and speed were assessed monthly at up to 3 months following end of treatment.</td>
<td>There were no significant differences among groups at any time point, for any of the outcome measures. There were significant improvements within all intervention groups on 1 single testing time compared with baseline values in gait speed and one of the 2 measures used to assess gait symmetry, although none were statistically significant from baseline to end of treatment.</td>
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</tr>
<tr>
<td>Young and Forster (1992) UK 6 (RCT)</td>
<td>124 stroke patients were randomized to attend a geriatric day hospital twice weekly for post-stroke care or to be treated at home by one of five experienced community physiotherapists.</td>
<td>A significantly greater proportion of home physiotherapy patients were assessed as independent by the Barthel Index, the Motor Club Assessment (MCA), and the Functional Ambulatory Category (FAC).</td>
<td></td>
</tr>
<tr>
<td>Gladman et al. (1993) UK 6 (RCT)</td>
<td>327 stroke patients were randomized to receive domiciliary service for up to 6 months or hospital-based rehabilitation services.</td>
<td>Domiciliary group showed significantly greater performance on Extended ADL household and leisure sub-scores at 6 months.</td>
<td></td>
</tr>
<tr>
<td>Gladman et al. (1994) UK 6 (RCT)</td>
<td>Follow up of 1993 study reporting outcomes between 6-months and one-year after discharge.</td>
<td>Relative risk of death or institutionalization in the domiciliary group was 1.6 after one year.</td>
<td></td>
</tr>
<tr>
<td>Baskett et al. (1999) New Zealand 7 (RCT)</td>
<td>100 patients were randomized to receive either weekly visits by an occupational therapist and/or physiotherapist who prescribed a program of exercises and activities or to receive outpatient/day hospital therapy.</td>
<td>Change in BI score was significantly better for the hospital therapy group compared to the home therapy group between entry and exit from the study. There were no other significant differences between the groups.</td>
<td></td>
</tr>
<tr>
<td>Roderick et al. (2001) UK 7 (RCT)</td>
<td>140 stroke patients were randomized to receive rehabilitation through either home rehab or geriatric day hospital. Randomization was stratified by sex, age and disability level.</td>
<td>No significant differences noted between the 2 groups on the Barthel Index, Rivermead Mobility Index, Frenchay Activities Index, at 6 months.</td>
<td></td>
</tr>
<tr>
<td>Lincoln et al. (2004) UK 7 (RCT)</td>
<td>428 stroke patients and their carers were randomized to rehabilitation from a community stroke team or to routine care, which could include day hospitals or</td>
<td>There were no significant differences between patients who received rehabilitation from community stroke team and those who received routine care in their independence in</td>
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</tbody>
</table>
outpatient departments. Most patients in the treatment group were referred upon discharged from inpatient rehabilitation. Activities of daily living, mood, quality of life or knowledge of stroke. Patients in the community stroke team group were more satisfied with the emotional support they had received. There were no significant differences between the groups in satisfaction with practical help or overall satisfaction. Carers of patients in the community stroke team were under less strain than carers in the routine care group. Carers of patients in the community stroke team group reported greater levels of overall satisfaction.

| Bjorkdahl et al. (2006) Sweden 8 (RCT) | 59 patients discharged from inpatient rehabilitation programs were randomized to receive additional rehabilitation (occupational and physical therapy) that was home based (HB) (n=30) or day hospital (DH) (n=29). Patients in both groups received 9 hours of training per week for 3 weeks. Patients in the HB group were offered training based on their own needs (i.e. personal care, shopping) while those in the DH group received care that that was more-impairment-oriented. The Assessment of Motor & Process Skills (AMPS) FIM, Instrumental Activity Measure (IAM) and the National Institutes of Health Stroke Scale (NIHSS) and Barrow Neurological Institutes Screening (BNIS) were assessed at discharge form hospital, 3 weeks, 3 months and 1 year. | There were no significant differences between groups on any of the outcomes assessed. Both groups achieved modest gains in most of the outcome measure assessed. The costs associated with HB rehabilitation were lower. |
| Lord et al. (2008) New Zealand 7 (RCT) | Three hospitals and three community settings in New Zealand. 32 subjects discharged from 3 inpatient rehabilitation units were randomly allocated to receive additional rehabilitation in the community (led by an assistant physiotherapist)(n = 14) or at hospital outpatients (led by a physiotherapist) (n = 16) twice a week for seven weeks. The community intervention involved practice of functional gait activities in community environments relevant to each participant. Hospital-based physiotherapy was based upon a Motor Relearning approach. The primary outcome measure was gait speed assessed using the 10-m timed walk (10MTW)(m/min), before and after intervention and at 6 months follow-up. Participants in both groups received an average of 13 treatments. Subjects in both groups achieved large gains in 10MTW from baseline to end of treatment. Community group mean: 27.8 to 43.9 m/min compared with the hospital-based group mean: 27.6 to 43.6 m/min. There were no significant differences between groups (P = 0.86). Only 11 participants reported independent community ambulation. |
| Redzuan et al. (2012) Malaysia 3 (RCT) | 106 patients admitted to hospital with stroke who had a caregiver and were discharged from a neurology ward were randomized to an intervention or control group. Intervention involved the use of a 45 minute self-instructional DVD consisting of 6 areas of | There were no significant differences in the number of patients with improved MBI scores from baseline to 3 month discharge between the groups (60% of patients in the intervention group experienced improved scores while 45.7% of the control group had improved |
therapy (patient positioning and handling, bed mobility, passive range of motion exercise, stretching and strengthening of the upper and lower limbs, transfer techniques, and activities of daily living). Patients in the intervention group received two outpatient therapy sessions per month and the DVD for home use. Patients in the control group received one outpatient therapy session (2 hours) per week and were encouraged to practice the learned skills at home between sessions. Patients’ level of independence was assessed using the modified Barthel Index (MBI) at recruitment and 3 month follow-up.

Gladman et al. (1993), (DOMINO study-see Figure 7.1) studied 327 stroke patients who were randomized to receive home outpatient therapy or hospital-based outpatient rehabilitation after stratification by hospital ward at discharge (Health Care of the Elderly (HCE), general medicine and stroke unit). Patients with significant disability were eligible to participate in the study if they had been admitted to hospital with an acute stroke and were being discharged to their own homes, unless they required respite care, or refused to give consent. Overall, the study reported no difference at three and six months in functional outcomes, perceived health of the patients, social engagement or life satisfaction of their carers between the home or community-based and the hospital-based outpatient services. However, overall the hospital-based outpatient rehabilitation services were less costly.

These patients were also tracked between six months and one-year in a follow-up study (Gladman & Lincoln 1994). The largest group of patients was transferred from the HCE ward. These were elderly and frail patients and the rate of death and institutionalization at one year was higher (38% for home-based rehabilitation and 24% for hospital-based rehabilitation) than in the other two strata. However, the day hospital service costs were estimated to be 26% higher. A second group of patients were discharged from the stroke unit and had better household and leisure activity scores at 6 months when treated with home-based outpatient therapy. These patients were usually younger with extensive neurological involvement. Here the home-based outpatient costs were 2.6 times greater. The third group of patients, discharged from general medical wards was of intermediate age and received routine hospital-based care. There were no differences in outcomes although the cost of hospital-based outpatient care was only 56% that of the home-based rehabilitation care. This study suggested that different subgroups of stroke patients might have different rehabilitation requirements.

Discussion
There were seven good quality studies that evaluated functional outcome among patients who had received home-based therapy compared to hospital-based outpatient therapy. The results are summarized in Table 7.13. The majority of studies demonstrated that there were no differences between treatment groups, suggesting that both forms of treatment are equally effective.

Conclusions Regarding Home-Based vs. Hospital-Based Stroke Rehabilitation

There is strong (Level 1a) evidence that home-based and hospital-based outpatient stroke rehabilitation programs are equally effective in achieving modest gains in ADL following inpatient rehabilitation.
Home-based and hospital-based outpatient therapy appears to be equally effective.

The reader is referred to Module 19 for a review of social support and leisure therapy Interventions associated with outpatient care.

Figure 7.1 Gladman et al. (1993)(DOMINO Study Group) and Gladman et al. (1994)

At 6 months, there was no difference in the proportion of patients who were residing at home, in hospital, residential care, or who were dead. At one year, 11% of patients in the Domiciliary Rehabilitation Services (DRS) group were in an institution compared to 8% in the Hospital Rehabilitation Services (HRS) group. There was a trend towards higher rates of death or institutionalization for the DRS group at one year (27% vs. 19%, p=ns).

Table 7.13 Summary of Functional Outcome Measures From RCTs with PEDro ≥ 6 Evaluating Home-Based Therapy vs. Hospital-Based Therapy

<table>
<thead>
<tr>
<th>Author, Year PEDro score</th>
<th>N at randomization</th>
<th>Intervention</th>
<th>Functional Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bjorkdahl et al. (2006) 8</td>
<td>59</td>
<td>Day hospital versus home visits by therapists</td>
<td>Motor &amp; Process Skills (-) FIM (-) Instrumental Activity Measure (-) National Institutes of Health Stroke Scale (-) Barrow Neurological Institutes Screening (-)</td>
</tr>
<tr>
<td>Lord et al. (2008) 7</td>
<td>32</td>
<td>Community-based, PT assistant led vs. outpatient hospital-based, PT led</td>
<td>Walking speed (-)</td>
</tr>
<tr>
<td>Lincoln et al. (2004) 7</td>
<td>421</td>
<td>Day hospital/outpatient visits vs. home based program</td>
<td>Barthel Index (-) EADL (-)</td>
</tr>
<tr>
<td>Roderick et al. (2001) 7</td>
<td>140</td>
<td>Day hospital vs. home based program</td>
<td>Barthel Index (-)</td>
</tr>
<tr>
<td>Baskett et al. (1999)</td>
<td>100</td>
<td>Day hospital versus home</td>
<td>Barthel Index (+ hospital)</td>
</tr>
</tbody>
</table>
7.3 Cochrane Reviews for Outpatient Rehabilitation Therapies following Stroke

There are currently five Cochrane reviews examining the effectiveness of Outpatient Therapies for the rehabilitation of stroke. These reviews examine slightly different populations and therapy approaches, however, primary outcomes all focus on the improvement or deterioration in Activities of Daily Living (ADLs) and risk of death. A summary of these reviews is presented in table 7.14.

Table 7.14 Summary of Cochrane Reviews for Outpatient Rehabilitation Therapies following stroke

<table>
<thead>
<tr>
<th>Author, Year Country Title</th>
<th>Methods</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outpatient Service Trialists (2003) UK</strong>&lt;br&gt;Therapy based rehabilitation for stroke patients at home</td>
<td>14 RCTs examining therapy interventions to increase task oriented behaviour (physiotherapy, occupational therapy, multi-disciplinary care) compared with conventional or no care were included in the review. Therapies could take place in a hospital, home, or centre based location. <strong>Primary Outcome</strong>: proportion of patients who were dependent (or had deteriorated) in personal ADLs at the end of follow up. <strong>Secondary Outcomes</strong>: death at follow up, proportion requiring institutionalization at follow up, extended ADL performance, subjective quality of life or mood at follow up, caregiver mood at follow up.</td>
<td>No statistically significant difference was found in the combined odds of death or being less dependent at the end of follow up between patients receiving therapy based services vs. controls (OR 0.93, 95%CI: 0.7-1.22, p=0.6). The odds of deterioration in ADLs or dependency were significantly less in the group receiving therapy based services (OR 0.60, 95%CI: 0.58-0.97, p=0.009) There was an overall increase in ADL scores in the therapy group compared with controls (SMD 0.14, 95%CI: 0.02-0.25, p=0.02).</td>
</tr>
<tr>
<td><strong>Legg et al. (2007) UK</strong>&lt;br&gt;Occupational therapy for patients with problems in ADL following stroke</td>
<td>64 studies were identified, and 9 were included in the review. All studies were RCTs of occupational therapy (OT) interventions with a focus on ADL performance compared to usual or no care. <strong>Primary Outcome</strong>: proportion of patients who were dependent (or had</td>
<td>Individuals receiving OT interventions were significantly more independent in ADLs than controls (SMD 0.18, 95%CI:0.04-0.32, p=0.01) The odds of death and deterioration (poor outcome) were significantly less in groups receiving OT therapy when compared with controls (0.60, 95%CI: 0.39-0.91, p=0.02) There were no significant differences in the risk of death or institutionalization between the groups.</td>
</tr>
</tbody>
</table>
### Aziz et al. (2008)
**Malaysia**

**Therapy-based rehabilitation services for patients at home more than one year following stroke**

5 RCTs were included in the review. Trials that examined community based stroke patients receiving therapy services compared with conventional care were reviewed. At least 75% of participants in the included studies were ≥12 months post stroke.

**Primary Outcome:** death or poor outcome, including the proportion of patients who were dependent (or had deteriorated) in personal ADLs at the end of follow up

**Secondary Outcomes:** death at follow up, proportion requiring institutionalization at follow up, extended ADL performance, subjective quality of life or mood at follow up, caregiver mood at follow up

Reviewers were unable to assess between group differences in mood and quality of life

Only one trial reported poor outcome at the end of study follow up. This study reported a significant difference between groups in favour of the treatment group (26% difference in outcome, \( p=0.03 \)). Pooled analysis was not able to detect a difference between groups in ADL performance (SMD -0.06, 95%CI: -0.32-0.20, \( p=0.65 \))

No significant differences in death, performance in extended ADLs, subjective health, or mood were noted between groups

### Fearon and Langhorne (2012)
**UK**

**Services for reducing the duration of hospital care for stroke patients**

14 RCTs comparing conventional inpatient hospital stroke care with service intervention aimed at providing rehabilitation support in a community setting and, thereby, reducing the length of hospital care, were included in this review.

**Primary outcome:** death or long term dependency at end of follow up, length of index hospital stay

**Secondary outcomes:** ADL and extended ADL scores, subjective health status, mood, carer outcomes

The intervention group showed a significantly shortened length of stay in hospital (\( p<0.0001 \)). The odds of death at end of study was non-significant between groups (OR 0.91, 95%CI: 0.67-1.25, \( p=0.58 \)). The odds of death or institutionalization and death or dependency was reduced in the intervention group (OR 0.78, 95%CI: 0.61-1.0, \( p=0.05 \)) and (OR 0.80, 95%CI: 0.67-0.97, \( p=0.02 \)) respectively.

An increase in extended ADL scores were noted in intervention participants (SMD 0.14, 95%CI: 0.02-0.26, \( p=0.02 \))

No significant differences were noted between groups in ADLs, health status, or mood.

### Fletcher-Smith et al. (2013)
**UK**

**Occupational therapy for care home residents with stroke**

Included studies examined the impact of occupational therapy for care home residents (i.e. long term or nursing care facility) with stroke as compared to standard care.

**Primary outcome:** performance in ADLs at end of study follow up

**Secondary outcomes:** ADL performance at end of intervention, death, global quality of life, mobility, mood, cognition, hospital admission or admission to a

Only one trial was included in this review. The trial was insufficient for conclusions to be drawn regarding all primary and secondary outcomes.
The results of these five reviews are generally quite positive in favour of therapy treatment groups when compared with no therapy or conventional care controls. Three of the five reviews observed either less deterioration or greater improvement in intervention subjects when examining measures of ADL and extended ADL. This was even observed in a population of participants that were >12 months post stroke. A reduction in the risk of death, dependency, and poor outcome was also noted in the majority of studies. However, studies looking at improvements in mood, health status, and quality of life were not able to detect any differences in outcomes between groups. Overall, the provision of outpatient therapies to patients following stroke is effective in improving patient outcomes, particularly pertaining to an improvement (or reduced decline) in ADL performance and the risk of death. Furthermore, in addition to an improvement in ADLs, one study was able to show that therapy services post discharge has the potential to significantly reduce hospital length of stay. There is no current evidence to support the impact of occupational therapy for home care residents, and this may be a potential area of interest for future research.
7.4 Summary

1. **There is strong (Level 1a) evidence that stroke patients with mild to moderate disability, discharged early from an acute hospital unit, can be rehabilitated in the community by an interdisciplinary stroke rehabilitation team and attain similar or superior functional outcomes when compared to patients receiving in-patient rehabilitation.**

2. **There is strong (Level 1a) evidence that the costs associated with early-supported discharge are lower when compared to usual care.**

3. **There is moderate (Level 1b) evidence that enhanced rehabilitation and discharge services result in improvements in functional outcomes for patients with moderate to severe strokes. Moreover, patients who were treated with enhanced stroke rehabilitation experienced a reduced length of hospital stay and had a greater likelihood of discharge home.**

4. **Based on subgroup analysis from two RCTs, there is strong (Level 1a) evidence that the rates of death/dependency and institutionalization are greater among patients with moderate to severe strokes, discharged with support, back to the community.**

5. **There is conflicting (Level 4) evidence that outpatient rehabilitation initiated within 6 months of stroke onset improves functional outcomes when compared to routine care.**

6. **There is conflicting (Level 4) evidence that home-based therapy for chronic stroke survivors is associated with improvements in performance on ADLs mobility.**

7. **There is strong (Level 1a) evidence that home-based and hospital-based outpatient stroke rehabilitation programs are equally effective in achieving modest gains in ADL following inpatient rehabilitation.**

8. **There is limited (Level 2) evidence that subgroups of stroke patients may benefit from different outpatient treatment approaches; for elderly frail stroke patients, day hospital services may reduce death and institutionalization while for younger stroke patients, home-based outpatient therapy may improve functional and quality of life outcomes.**
References


