

A randomized controlled trial of day hospital and day centre therapy

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Objective : To compare the outcome of day hospital to day centre rehabilitation.

Design : Single blind randomized controlled trial with home assessments at baseline (twice), six weeks and three months.

Setting : Mainly rural health district. Day hospital and social services day centres in market towns.

Subjects : One hundred and five physically disabled older patients living at home referred for day hospital rehabilitation or maintenance before discharge from hospital (66) or referred as outpatients (39).

Interventions : Day hospital treatment or day centre rehabilitation by a physiotherapist and two health support workers.

Main outcome measures : Barthel Index, Philadelphia Geriatric Morale Scale and Caregiver Strain Index.

Results : More day centre (23/55) than day hospital patients (6/50) ($p < 0.001$) withdrew from allocated treatment by choice or because of operational difficulties. Both groups improved significantly in functional ability and reduction of care-giver strain by three months but there was no significant difference between groups. The mean improvement in Barthel Index (standard error) for day hospital = +1.5 (0.41) ($n = 34$) and day centres = +1.5 (0.48) ($n = 38$). The mean difference (95% confidence interval) between day hospital and day centre was 0 (-1.28, +1.28). Likewise the mean Philadelphia Geriatric Morale Scale improvement for day hospital +1.8 (0.66) ($n = 35$) and day centres was +0.9 (0.63) ($n = 38$). The mean difference was -0.88 (-2.7, +0.95). The mean reduction in Caregiver Strain for day hospital was -1.45 (0.5) ($n = 23$) and day centre was -1.59 (0.47) ($n = 27$). The difference was -0.14 (1.52, +1.24). (These analyses are all on an intention-to-treat basis.)

Conclusion : Whilst the improvement in functional ability and care-giver strain was similar in both groups, day centre rehabilitation was less popular and had practical difficulties. If these difficulties can be overcome the model should be tested elsewhere.

Introduction

Day hospitals in the UK provide short-term rehabilitation for disabled older patients. Day centres provide recreation, companionship and a break for carers and attendance is usually long term. However much overlap exists.¹ Both attempt to help people remain independent at home. Day hospitals are frequently on hospital sites while day centres are found in local authority residential homes, or community centres closer to clients' homes.

Our 25-place day hospital in Huntingdon serves a mainly rural catchment, so many patients have far to travel. We wanted to provide more local rehabilitation but could not afford the capital expense of building and the revenue disadvantage if it was not used every day. One solution was to provide therapy in a day centre. To see whether day centre rehabilitation was a feasible, effective and more local alternative therapy option we performed a single blind randomized controlled trial.

Previous trials have compared day hospital²⁻⁵ to treatment at home but not at a day centre. Our prospectively defined hypothesis was that there was no difference in activities of daily living, morale or care-giver strain between day hospital and day centre rehabilitation.

Patients and methods

The study was conducted between June 1993 and June 1996 at the Orchard Centre day hospital at Hinchingsbrooke Hospital, and social services day centres in Huntingdon (Hunters Down) and St Neots (The Hillings). The district ethics committee approved the trial protocol. All patients referred for day hospital by the multidisciplinary team at discharge planning or outpatient assessment were eligible if they lived within the catchment area of the two day centres. Patients were excluded (a) if they suffered from dysphasia assessed by the Boston aphasia scale cartoon;⁶ if the multidisciplinary team thought that they required (b) nursing, (c) a medical procedure or drug monitoring, (d) treatment more than twice a week, or (e) specific, focused occupational therapy (for example for hand movements).

Design

The study was a single blind randomized controlled trial. The prespecified outcome measures at three months were the Barthel Index,⁷ Philadelphia Geriatric Morale Scale⁸ and Care-giver Strain Index.⁹ Death and permanent admission to nursing or residential homes by three months were abstracted (by CB) from hospital case notes.

Consent

A physiotherapist unattached to the trial team explained the purpose of the trial to potential subjects at discharge planning (inpatients) or initial assessment (outpatients). If they wished to take part they signed a consent form after reading an explanatory leaflet.

Randomization

Immediately after consent, subjects were randomly allocated to day hospital or day centre by a sequence of labelled tickets in sealed, opaque envelopes securely kept and opened by a senior ward clerk unattached to the trial team. These were assembled elsewhere by Professor Khaw in computer-generated blocks of 20.

Treatment conditions

At day hospital, a two-person ambulance collected patients and a staff nurse assessed them on arrival. About one-third of all patients then received some occupational therapy input, for example group reminiscence or quizzes. The remainder joined in social, gardening, music or craft group work. In the afternoon the physiotherapists assessed and devised pragmatic individualized plans with patients and carers if possible. Patients received instructions in walking, transfers and stairs. They also received treatment with equipment which was not available at the day centres, including heat, ice, ultrasound, parallel bars and an Arjo lifting and mechanical aid (Arjo Hospital Equipment Ltd, Acre Road, Reading, UK).

At day centres, five places on two fixed days per week were available. A volunteer driver collected clients in an ambulance. A senior physiotherapist (JL) and the healthcare support workers assessed and treated patients either in the day centre day room, a purpose-built treat-

ment room during the morning (Hunters Down), or any vacant bedroom during the afternoon (Hillings). Treatment consisted of an active and passive exercise programme. The only equipment available was a Bobath plinth, a standing frame and a Flotron for treatment of oedema. Patients were also instructed in the use of aids and stairs. There was no prespecified number or length of treatments at either venue. Rather, individual plans and duration of treatments were formulated for patients at the first visit. No formal goal-setting took place.

Patient evaluations

A research sociologist (SB) blind to treatment venue interviewed patients for the Philadelphia Geriatric Morale Scale⁸ and Abbreviated Mental Test score¹⁰ (baseline only) at home twice between recruitment and the start of therapy, and at six weeks, three months and one year. The first baseline visit took place the day following recruitment for outpatients or discharge for inpatients if possible. The second took place a week later, if possible the day before the first treatment. She questioned the principal care-giver for the Barthel Index⁷ and Caregiver Strain Index.⁹

Statistical analysis

This analysis was based on intention to treat including all patients. To corroborate conclusions, the analysis was repeated on an as-treated basis to check the sensitivity of the conclusions to subjects switching treatment group.

The incremental area under the curve¹¹ (i.e. the change in accumulated score from baseline per six weeks) was calculated for each individual from the two baseline, six-week, three-month and one-year scores. This analysis is designed to produce a single number for each subject from a series of observations over time and is especially useful for calculating a missing observation when the earlier and later observations are available. A positive area indicates an accumulated increase in score, a negative area a decrease and zero no accumulated change. The mean change in each group from baseline to three months and the difference between the two groups in the size of change were calculated with 95% confidence intervals using analysis of variance. Analysis of covariance, controlling for baseline score, was

used to check that this score was not influenced by floor or ceiling effects. The chi-squared test was used to compare proportions. Cohen's kappa¹¹ was used to assess blinding beyond chance agreement. The Mann-Whitney *U*-test was used to assess group differences in number of visits. The Statistical Package for the Social Sciences software was used for all analyses. (An interim analysis was performed in March 1995 for the funding bodies.)

To calculate the sample size we specified a significance level of 1% and power of 90%. The smallest difference in Barthel Index change between the two treatment settings that we wished to detect was 1. After recruiting the first 25 patients we obtained the mean within-subject change in Barthel Index and the standard deviation (=0.82). A total sample size of 40 was calculated¹¹ so we recruited over 100 to allow for a large drop-out rate.

Results

The treatment groups did not differ markedly at baseline (Table 1).

Completeness of follow-up and missing data (Figure 1)

Day hospital

Fifty patients were allocated to day hospital. Three-months data were unavailable for 17 patients (Figure 1). One subject's score was estimated (see statistics section, above) because their carer was unavailable at three months, giving a total of 34 Barthel Indexes. For the Caregiver Strain Index, in addition to the 17 missing patients seven had no carer and three carers were unavailable, giving 23 three-month scores. There were 35 Philadelphia Geriatric Morale Scores since two subjects whose carers were unavailable could be interviewed.

Day centres

Fifty-five subjects were allocated to day centres (26 to St Neots, 29 to Huntingdon). Three-months data were unavailable for 18 patients (Figure 1). One subject's Barthel Index was estimated because the patient was ill at three months, giving 38 three-month scores. For the

Table 1 Baseline characteristics of the two groups.

	Day hospital patients (<i>n</i> = 50)	Day centre patients (<i>n</i> = 55)
Male	20 (40%)	18 (33%)
Female	30 (60%)	37 (67%)
Lived alone	16 (32%)	12 (22%)
Inpatients	34 (68%)	32 (58%)
Outpatients	16 (32%)	23 (42%)
Average age (SD)	80.98 (8.15)	79.8 (7.0)
Main diagnosis:		
Stroke	10 (20%)	13 (24%)
Osteoarthritis	8 (16%)	6 (11%)
Fracture	7 (14%)	6 (11%)
Parkinsonism	4 (8%)	5 (9%)
Baseline abbreviated mental test score less than seven	7 (16%) (<i>n</i> = 43) ^a	13 (27%) (<i>n</i> = 48) ^b
Median baseline Barthel interquartile range	15 (<i>n</i> = 44) ^b 12–17	15 (<i>n</i> = 48) ^b 11–17
Mean baseline Barthel (SD)	14.1 (3.8)	13.9 (4.4)
Mean baseline Philadelphia Geriatric Morale Scale (SD)	10.0 (4.0) (<i>n</i> = 44) ^b	9.3 (4.3) (<i>n</i> = 48) ^b
Mean baseline Caregiver Strain Index (SD)	4.9 (2.6) (<i>n</i> = 32) ^c	4.4 (3.1) (<i>n</i> = 33) ^d

^aOne subject too tired to answer the abbreviated mental test score.

^bFor reasons subjects were not assessed see Figure 1.

^cOf the 44 assessed at baseline, 11 had no carer, one carer could not be contacted and one carer refused interview.

^dOf the 48 assessed at baseline ten had no carer, three could not be contacted (two not before the patient died), one refused interview, and one subject would not let the carer be contacted.

Caregiver Strain in addition to the 18 missing patients, eight had no carer, three were unobtainable and one subject disallowed contact, but for two subjects (one too tired, one too ill) three-month data could be estimated, giving 27 three-month Caregiver Strain scores. For the Philadelphia Geriatric Morale Scale omissions were as for the Barthel Index, except that one subject had become too demented to be interviewed and for two subjects (one too tired, one too ill) three-month data could be estimated, giving 38 (Figure 1).

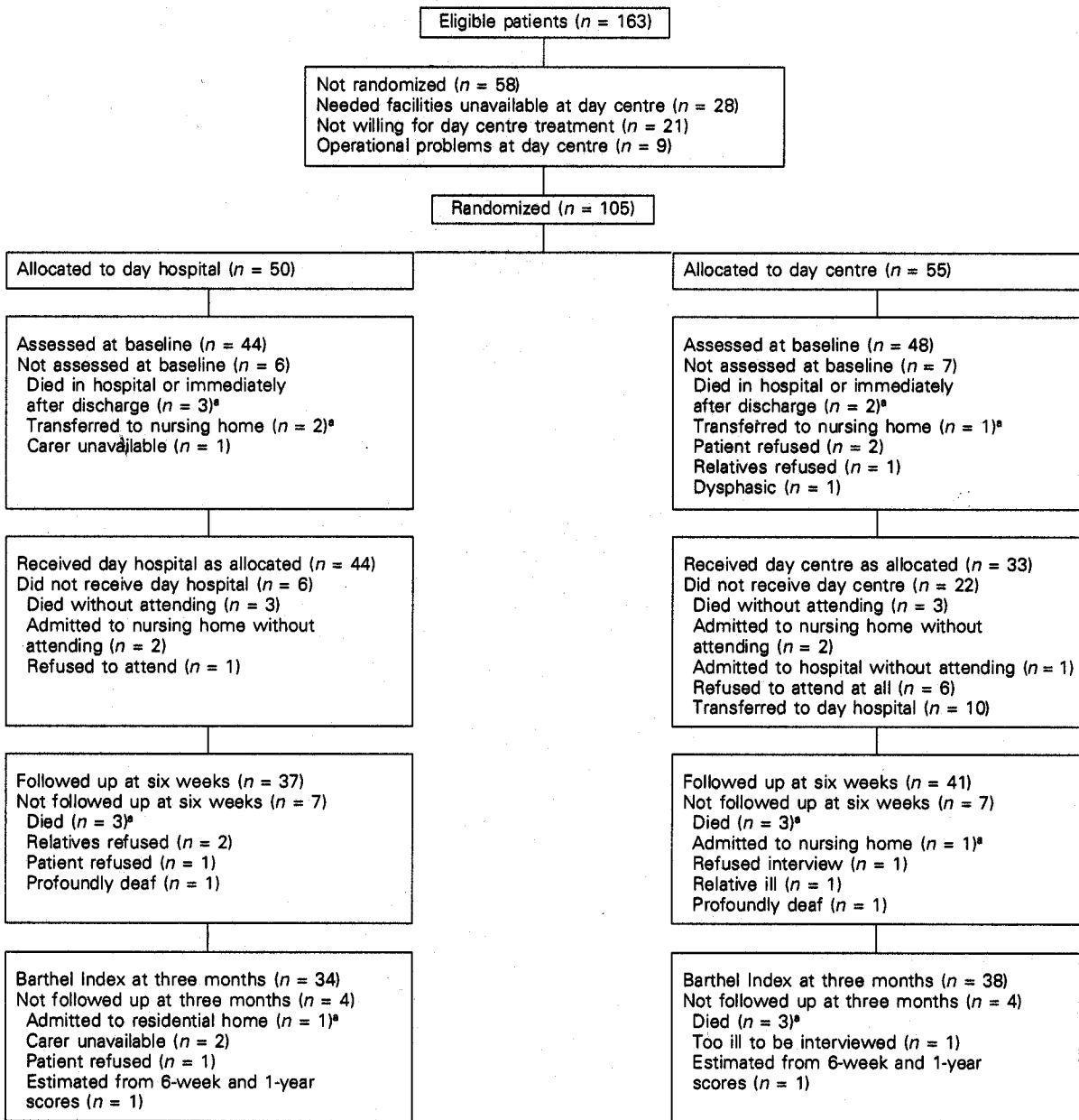
Number of treatments and deviations from allocated treatments

The median number of treatments (interquartile range in brackets) at the day hospital was 11.5 (5–20.5) and day centre 10 (5–14). This difference is not significant. Fourteen day hospital and 13 day centre patients were still being treated at three months. Significantly more ($p = 0.002$) day centre (22/55) than day hospital (6/50) patients did not comply with treatment. Ten of these day

centre patients transferred to day hospital for the following reasons (numbers in brackets): could not be transported by one person (4), did not like day centre (3), no transport to village on day available (1), no space in day centre (1) and too ill (1).

Change in status at three months

Significant improvements, with the 95% confidence intervals excluding no change, were seen at three months for Barthel Index and Caregiver Strain for both day hospital and day centres. No significant improvements were seen for the Philadelphia Geriatric Morale Scale. There were no significant differences in the changes in scores between day hospital and day centres. On an intention-to-treat basis the mean change in Barthel Index for day hospital was +1.5 (95% confidence interval 0.66–2.34) ($n = 34$) and for day centres was +1.5 (0.53–2.47) ($n = 38$), the mean difference between day centre and day hospital was 0 (–1.28, +1.28) the as-treated difference was +0.33 (–1.96, +1.61). On an intention-to-treat



*Adverse outcome (death or institutionalization) was no commoner among day centre (10/55) than day hospital patients (9/50).

Figure 1 Trial profile. One hundred and sixty-three consecutive patients were considered and 58 excluded. Twenty-eight needed facilities unavailable in the day centres: speech therapy (8), occupational therapy (4), three times weekly treatment (4), nursing (3), medical cover (1), oxygen (3) and a one-day multidisciplinary assessment only (2). Three patients were excluded because a two-person ambulance was needed due to difficult access to house (2) or an overweight patient (1). Twenty-one would not consent because of the possibility of randomization to day centre: refusal was by relatives (4), patient (8), consultant (3), physiotherapist (1), and nurses (4). One patient and relative were unable to give consent due to learning difficulties. Nine were excluded because of operational problems in day centres: transport (7), no place available (2).

basis the mean Philadelphia Geriatric Morale Scale change for day hospital was +1.8 (0.46, 3.14) ($n = 35$) and for day centres was +0.92 (-0.36, 2.2) ($n = 38$); difference = -0.88 (-2.7, +0.95) and as-treated difference -0.95 (-2.81, 0.9). On an intention-to-treat basis the mean Caregiver Strain change for day hospital was -1.45 (0.5) ($n = 23$) and for day centre was -1.59 (0.47) ($n = 27$); the mean difference between day centre and day hospital was -0.14 (-1.52, +1.24), the as-treated difference was -0.22 (-1.6, +1.6). None of the differences were significant after adjustment for subjects' baseline scores.

Evidence of successful blinding

The interviewer correctly identified 38/55 as day hospital and 20/38 as day centre, yielding kappa = 0.22 indicating poor agreement/successful blinding.¹¹

Discussion

No statistically significant or clinically important difference was found between the two treatment settings for activities of daily living, morale or care-giver strain. Either there is truly no difference between day hospital and day centre therapy or our trial's design or execution failed to detect one (type 2 error). In fact, attendance at either was associated with an improvement of one or two points in the Barthel Index and reduction of carer strain of about one point. For progressive conditions (e.g. Parkinson's disease or osteoarthritis) this probably reflects a response to treatment, though for others (e.g. stroke) it might be due to natural recovery with time. Significantly more subjects withdrew from day centre treatment compared to day hospital.

Limitations of our study

When determining sample size we tried to minimize the risk of a type 2 error by comparing within-subject change between assessments rather than between-subject differences and by allowing for a large drop-out. Because the within-subject differences did not have a significantly skewed distribution we could use parametric methods and thus could also test for sensitivity of the results to baseline score. Unfortunately the

high number of unanticipated exclusions, losses to follow-up and the ten subjects who transferred to day hospital reduce the power to detect a true difference and the observed changes may apply only to a selected group. The reasons for exclusion and change give insight into the limitations of day centre therapy, particularly transport, facilities, patient, relative and professional choice.

Comparison with other studies

Ours is the first study to examine day centre rehabilitation of older patients and to show a significant reduction in carer strain. Whether this reduction is due to functional improvement or to a twice weekly break for carers merits further study, perhaps by comparing care-giver strain between day hospital and home-based rehabilitation. It is the first rural study and the only UK trial including nonstroke patients and outpatient referrals. The results are similar, however,^{2,4} with a 1-2 point improvement in the Barthel Index. We were unable to confirm that day hospital prevents adverse outcomes (Figure 1).⁴

Occupational therapy

The day hospital group received some input from the occupational therapists and the day centre group did not, yet both groups achieved similar improvements in activities of daily living. It would be wrong to conclude that occupational therapy was of no benefit in this sample. The trial was not designed to test that hypothesis and occupational therapy was only one of many differences in the treatment conditions between the day hospital and the day centres.

Some problems with day centre therapy

Day centre therapy provides more local rehabilitation and is also cheaper than therapy at day hospital. The cost per attendance at day hospital was £77.39 and at day centre £59.46 (Borland and Burch, unpublished report to East Anglian Regional Health Authority, 1995). However, day centre therapy presents major difficulties in practice and a larger study is needed elsewhere to see if it is truly as effective as day hospital. At our regular meetings with the trial staff and day centre managers a number of themes were mentioned: the stigma of day centres, a perception

(not necessarily borne out by the data) that day centre treatment was inferior and the difficulties of providing therapy at day centres. A number of operational problems repeatedly occurred at day centres: lack of rehabilitation space and equipment, difficulties with transport reliability or range and fundamental differences in health and social services philosophies. For example there was conflict between rehabilitation and recreation when the exercise class encroached on space in the day area used by the bingo group! Patients expecting physiotherapy were not always happy to sit and chat with clients who were there for company. On the other hand disabled social service clients sometimes resented the treatment trial patients received though the trial staff did give advice and treatment to nontrial attenders. Nevertheless tensions could arise between health and social services staff working to different objectives with disabled clients in limited space. Discharge from day centres was a major problem. At day hospital, once rehabilitation is completed or no more can be done, the therapist discharges the patient. At a day centre, however, attendance is usually indefinite.

Randomized trials of rehabilitation in the very old

Our patients were older (mean 80.5 years) than the Bradford (71 years)² and Nottingham (health care of the elderly subgroup) (77 years)⁴ trials. Randomized controlled trials of rehabilitation in the very old suffer from major problems in recruitment, compliance and drop-out due to death, illness and moves to institutional care. It is also particularly hard at recruitment to know how well patients will cope with lengthy interviews and many personal questions. This accounted for the two profoundly deaf patients and perhaps others who withdrew by three months.

Conclusion

Whilst the improvement in functional ability and reduction in care-giver strain was similar in both groups, day centre rehabilitation was less popular and there were practical difficulties giving treatment in the day centre setting. If these prob-

lems can be overcome this model of care should be compared to day hospital elsewhere. It would also be useful to know whether a reduction in care-giver strain occurs with home-based therapy, and whether the activities involved in day centre attendance, such as getting ready, walking to transport and meeting other people, also lead to functional improvement.

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