

MOBILITY AND DEMENTIA: IS PHYSIOTHERAPY TREATMENT DURING RESPITE CARE EFFECTIVE?

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SUMMARY

Background. Mobility problems experienced by elderly people with a dementia are associated with falls, fractures and admission to long-term care. A hospital respite care admission is therefore often seen as an opportunity to provide physiotherapy treatment.

Aim. To find whether elderly people with a dementia and a mobility problem show a greater improvement in mobility skills if given physiotherapy treatment than if given non-physical activities intervention during a hospital respite admission.

Method. A controlled randomized multicentre trial with independent blinded assessment. The Southampton Mobility Assessment (mobility score) and Two Minute Walking Test (distance walked) were undertaken at the beginning and end of the study admission and beginning of the next respite admission. Following the first assessment, participants were randomized to either physiotherapy or activities.

Results. Eighty-one participants, from 12 clinical centres, with a mean age of 81.9 years and CAPE I/O score of 2. During the study admission there was a non-significant trend for a lower reduction in mobility score of the physiotherapy group (Mann-Whitney; $p = 0.614$) and a non-significant trend for greater decrease in distance walked in the activities group (t -test; $p = 0.325$).

Discussion. The results of this trial do not support the positive changes demonstrated elsewhere. However, changes in respite care during the early stages of this trial may have produced differences between the sample for this trial and that for the pilot study. This trial was therefore underpowered.

Conclusion. This trial suggests that future research needs to change the focus from clinical settings to presentations. Copyright © 1999 John Wiley & Sons, Ltd.

KEY WORDS—Dementia; rehabilitation; physical therapy; respite care; motor skills; psychomotor performance; disability evaluation; treatment outcome

Hospital respite care is an established service for elderly people with a dementia and aims to

maintain people 'at home' (Rai *et al.*, 1986; Pearson, 1988). Moving from 'home' to long-term care is influenced by immobility (MacLennan and Isles, 1984). During a hospital respite care admission, therefore, physiotherapy is one of the forms of treatment provided. This is directed at the variety of mobility problems which may be associated with multi-infarct dementia (MID), Alzheimer's disease (AD) and Lewy body disease

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(Girling and Berrios, 1990; Funkenstein *et al.*, 1993; Thajeb, 1993; Taylor, 1994; Ala and Frey, 1995; Alexander *et al.*, 1995; Tanaka *et al.*, 1995; Gnanalingham *et al.*, 1997). These mobility problems are seen even when the elderly person has only mild or moderate cognitive impairment and may increase as dementia progresses (Teri *et al.*, 1989; Morris *et al.*, 1987; Bennett *et al.*, 1992; Frannssen *et al.*, 1993). The impact of this gait disturbance is highlighted by the associations which have been found with falling (O'Keefe *et al.*, 1996) and fractures in excess of those seen in elderly people without dementia (Asada *et al.*, 1996; Johansson and Skoog, 1996; O'Keefe *et al.*, 1996). Oleske and colleagues (1995) found that a fall was the most frequent mechanism for injury in a demented population, 21.3% of whom sustained an injury during a 6-month period.

Although a respite care admission is often seen as an opportunity to provide physiotherapy treatment (Griffith, 1993), little direct evidence exists to support this practice. Research into the effects of physiotherapy treatment for elderly people who are resident in hospital long-term care suggests that mobility status may improve (Pomeroy, 1993, 1994). It is thus reasonable to anticipate improvements at an earlier stage in the dementing process.

The hypotheses for this study were:

1. Elderly people with dementia who are given rehabilitative physiotherapy treatment during a standard 2-week respite care admission maintain or improve their mobility skills compared with those who are given an equivalent amount of non-physical activities
2. Improvements/maintenance in mobility skills during a respite care admission are maintained at the beginning of the next respite care admission
3. If the physiotherapy intervention improves mobility, nurses spend less time on mobility-related support of patients

METHOD

A controlled randomized multicentre clinical trial with independent blinded assessment was undertaken following a controlled randomized pilot study utilizing the same treatment intervention.

A pilot study with 19 participants was undertaken in one of the clinical centres. The sample size calculation for the final trial was based on finding

in the pilot study a 3-metre improvement in the distance walked in 2 minutes in the treatment group compared to no change in the control group. Using the pooled standard deviation of change from the pilot study of approximately 4 metres, the calculation suggested a sample of 38 participants in each group giving 90% power to detect a difference at 5% level of significance. For the mobility score this allowed the identification of differences of 1.8 points but no smaller. To allow for the eventuality of withdrawal from the study, the total sample size was set at 80 participants to allow a 5% safety margin.

A research physiotherapist identified elderly people with dementia who on their next planned 2-week respite admission (not first admission and only one study admission for each person) fulfilled the following study criteria:

- A primary diagnosis of dementia recorded in the medical notes by a psychiatrist
- No other neurological diagnosis, eg stroke with obvious hemiplegia, history of alcoholism, severe arthritis or heart disease
- Weightbearing not prevented by hip and/or knee contractures
- Medically fit in order to participate in therapy
- No suspected drug-related impairment
- Living 'at home' with an informal carer
- Having a mobility problem that required help or supervision for transfers and/or walking

Ethical approval was obtained from the local Ethical Committees for all the centres participating in this trial. Before the study admission the patient's next-of-kin (usually the main informal carer) was approached for informed consent. Those consenting were randomly allocated to either the treatment or activities group. Randomization was stratified by clinical centre.

Baseline and outcome measures were made by a research therapist blinded to participants' study condition.

Baseline data were recorded on the second day of the study admission: age; gender; clinical differential diagnosis obtained from the medical notes (AD, MD, mixed dementia (Mix) and undifferentiated dementia (Undiff)); cognitive impairment as measured by the Clifton Assessment Procedure for the Elderly Information/Orientation (CAPE I/O) score (Pattie, 1981); whether neuroleptic medication was being used currently or had been in the past; and the neuromuscular features of muscle tone (normal or rigid), posture (normal or

abnormal) and sitting balance (falls or maintains) which were used in an earlier study (Pomeroy, 1994).

Outcome measures were made on the second and penultimate day of the study admission and the second day of the next respite admission (mean 5.58 weeks later, range 1.00–14.00 weeks) using the Southampton Mobility Assessment (Pomeroy, 1990) and the Two Minute Walking Test (Stewart *et al.*, 1990). The Southampton Mobility Assessment is specifically designed for use with elderly people with dementing illness. It records ability from immobile (score 0) to walk four steps (score 18). The Two Minute Walking Test requires participants to walk in their normal manner along a measured corridor for 2 minutes. This is a sensitive but simple measure of everyday function and is therefore suitable for use with this population. In this trial, use of physical support from an object and/or one person was allowed.

The Southampton Mobility Assessment (mobility score) was recorded on videotapes which were then sent to two senior physiotherapists, blinded to the study condition, who scored them independently. A mean mobility score was calculated for each participant.

From the second day of the study admission participants individually received a maximum of 10 half-hour sessions of either physiotherapy treatment (Appendix 1) or non-physical activities (Appendix 2). All sessions were provided by the research physiotherapist in a quiet area in each clinical centre.

Change in mobility and distance walked from the baseline assessment for the physiotherapy and activities groups were analysed with the Mann-Whitney test for mobility score and a two-sample *t*-test for distance walked. Ninety-five per cent confidence intervals for differences in mean changes were calculated for both measures.

The possibility was also to be tested that if the physiotherapy intervention improved mobility, nurses would spend less time on mobility-related support of patients (a supposed opportunity to spend more time on activities designed to improve quality of care). Participants were observed for 4 hours (10 am–2 pm, including a meal period) on three occasions by the research therapist blinded to the study condition: during the second day of their study admission, the penultimate day of the study admission, and the second day of their next respite admission. Most mobility-related contacts (eg transfer from wheelchair to dining chair, moving

to bathroom, standing, sitting but not toileting and personal hygiene) between patient and any member of the nursing staff were categorized and timed. Differences between groups and within groups, over time, were examined.

RESULTS

Twelve clinical centres participated initially with a further four recruited later due to a reduction in the number of respite beds in centres. A total of 210 patients was screened for inclusion in the trial. Of these, 119 did not fulfil the study criteria: 44% had another neurological diagnosis (40 potential participants had sustained a hemiplegic stroke) and 29% were to be discharged into long-term care. Ninety-one patients fulfilled the criteria, but informed consent for 10 could not be obtained; 81 patients were therefore recruited to the trial, 60 women and 21 men, with a mean age of 81.9 years (range 66–98) and a mean CAPE I/O score of 2 (range 0–9).

Forty-three patients were randomly allocated to physiotherapy and 38 to activities. Three patients did not complete the second or third assessments and 12 patients completed two assessments but not the third. The main reasons for withdrawal were: death ($N = 2$), discharge to a nursing home ($N = 3$) and not returning for respite during the course of the trial ($N = 4$). Numbers used for analysis are shown in Tables 1–4.

At the beginning of the respite study admission there were no differences between the groups for CAPE I/O score, age, gender, clinical diagnosis, muscle tone, posture, balance, neuroleptic medication and mobility score (Tables 1 and 2). In spite of the randomization, there was a difference in the distance walked in 2 minutes, with the physiotherapy group walking 8.4 metres further than the activities group (Table 3), which was large enough to reach significance ($p = 0.013$). As the main outcomes were changes from baselines, any initial group difference was accounted for in the analysis.

The mean number of treatment/activity sessions provided was eight of a potential 10 (range 0–10). One patient did not receive any physiotherapy because of a refusal to participate in treatment sessions.

At the end of the respite study admission, there was a greater reduction in mobility score of the activity group than the physiotherapy group (Table 2) but this was not statistically significant

Table 1. Descriptive factors for physiotherapy and activity groups

Descriptive factors	Study group	
	Physiotherapy (<i>N</i> = 43)	Activities (<i>N</i> = 38)
<i>Age</i>		
Mean	82.0	81.8
Median	80.0	82.0
SD	8.0	8.4
Range	70–98	66–98
<i>Gender</i>		
Male	11 (26%)	10 (26%)
Female	32 (74%)	28 (74%)
<i>CAPE I/O score*</i>		
Mean	2.5	1.5
Median	2.0	1.0
SD	2.5	2.0
Range	0–9	0–8
<i>Clinical diagnosis</i>		
AD	25 (58%)	20 (53%)
Undif	13 (30%)	13 (34%)
MID	3 (7%)	5 (13%)
Mix	2 (5%)	0
<i>Muscle tone</i>		
Normal	31 (72%)	27 (71%)
Rigid	12 (28%)	11 (29%)
<i>Posture</i>		
Normal	30 (70%)	24 (63%)
Abnormal	13 (30%)	14 (37%)
<i>Sitting balance</i>		
Maintains	41 (95%)	35 (92%)
Falls	2 (5%)	3 (8%)
<i>Neuroleptic medication</i>		
Yes	25 (58%)	17 (45%)
No	18 (42%)	21 (55%)

* Minimum possible score = 0.

($p = 0.614$) and the distance walked had increased on average by 3.1 metres in the physiotherapy group compared to 0.6 metres in the activities group (Table 3; $p = 0.325$). At the beginning of the next respite admission, no significant changes were found in mobility score or distance walked since the beginning of the study admission (Tables 2 and 3).

Table 4 shows that the nursing time spent in the two groups was similar. The striking finding is that nurses had few such mobility-related contacts and that the time spent on assisting patients with their mobility needs was small, with a mean of

approximately 3 minutes per 4-hour observation period (Table 4). In both treatment and activity groups, that amount of time decreased from the beginning of the study admission to the next respite admission, but the changes were small.

DISCUSSION

The results of this trial indicate that although there was a trend during the study admission for a greater improvement in distance walked in the physiotherapy group compared to the activities group, the difference was not statistically significant. During the study admission the mobility score decreased in both groups, with a greater decrease in the activities group, but again the difference was not statistically significant. Inferences from this trial are, however, hampered by the finding that the mobility score and distance walked of those in this trial were more variable than for participants in the pilot study. Furthermore, the median mobility score was higher so that this study was subject to a possible ceiling effect. These differences prompted another power calculation using the data from this trial, which indicated a sample size of 352 rather than 80 to find a 3-metre difference.

The finding of larger standard deviations for mobility score and distance walked in the trial sample than the pilot sample is an illustration of a difficulty inherent to clinical rehabilitation research: how to control for evolution in service delivery over the course of a trial. Minor changes in individual clinical centres can, of course, be accommodated within a randomized multicentre design, but during the initial stages of this trial, important national changes in the delivery of respite care were taking place. Informal discussions with clinicians in the centres involved suggest that since the changes, the number of hospital respite care beds has been reduced and that the casemix has changed. An alternative reason for the mismatch between the pilot and trial sample could be that the power calculation was based on too small a standard deviation. This could have arisen because the pilot study was undertaken in one centre or because the pilot sample was too small.

The negative result of this trial contrasts with the results of earlier studies undertaken within the hospital long-term care setting (Pomeroy, 1993, 1994). However, this trial had: a shorter treatment period (2 weeks compared to between 5 and 9 weeks); a smaller number of mean treatment

Table 2. Mobility scores for physiotherapy and activity groups (maximum possible score = 18)

	Study group		Physio-activities Mean difference (95% CI)	<i>p</i> -value*
	Physio (<i>N</i> = 43)	Activity (<i>N</i> = 38)		
<i>Beginning study admission</i>				
Mean	15.4	13.3	NA	NA
Median	17.5	16.0		
SD	4.1	6.0		
Range	0–18	0–18		
<i>N</i>	41	37		
<i>End study admission</i>				
Mean	15.1	12.2	2.9 (0.4, 5.3)	<i>p</i> = 0.048
Median	17.0	16.0		
SD	4.2	6.4		
Range	0–18	0–18		
<i>N</i>	41	37		
<i>Beginning next respite admission</i>				
Mean	15.0	12.4	2.7 (–0.02, 5.4)	<i>p</i> = 0.157
Median	16.5	15.3		
SD	4.4	6.6		
Range	0–18	0–18		
<i>N</i>	36	30		
<i>Change at end of study admission from beginning study admission</i>				
Mean	–0.4	–1.1	0.8 (–0.8, 2.3)†	<i>p</i> = 0.614
Median	0.0	0.0		
SD	2.2	4.1		
Range	–8.5–6	–16–5		
<i>N</i>	41	37		
<i>Change at beginning next respite admission from beginning study admission</i>				
Mean	–0.0	–0.3	–0.6 (–2.0, 0.8)	<i>p</i> = 0.297
Median	0.0	0.0		
SD	2.27	3.26		
Range	–8–4	–12–5		
<i>N</i>	36	30		

* Mann-Whitney U test; † Based on separate variance *t*-test.

sessions (eight compared with 15–27); higher mean CAPE I/O scores (2, range 0–8) than the earlier studies (0.8, range 0–4); and a higher initial mean mobility score in this trial (14.35) than in the earlier studies (4.8). In addition to the possible differences between participants, the conditions were also different as this trial tested activities and physiotherapy whereas the earlier studies compared no intervention to physiotherapy. Two questions for further inquiry are therefore raised by this trial:

(a) Is a longer treatment period required to produce an increase in mobility skills of elderly people with dementia who require respite care?

(b) Is the ‘physiotherapy effect’ seen in earlier studies due to being involved in an activity rather than the physical training as such, since both conditions involve elements of sensory stimulation and social contact?

Because this trial did not show a positive mobility effect for physiotherapy treatment, the hypothesis that a positive effect may reduce nursing time spent on basic mobility activity was not tested. However, the data collected on mobility-related contact give food for thought. Mobility-related contact comprises the most basic patient–nurse interactions, yet there was a surprisingly low amount of it. This finding has been demonstrated

Table 3. Distance walked (metres) in two minutes for physiotherapy and activity groups

	Study group		Physio-activities Mean difference (95% CI)	<i>p</i> -value*
	Physio (<i>N</i> = 43)	Activity (<i>N</i> = 38)		
<i>Beginning study admission</i>				
Mean	32.2	23.8	NA	NA
Median	33.10	19.70		
SD	15.7	22.1		
Range	0-62.8	0-80.2		
<i>N</i>	41	37		
<i>End study admission</i>				
Mean	35.3	24.4	10.9	<i>p</i> = 0.017
Median	35.4	23.0	(2.04, 19.74)	
SD	18.6	20.4		
Range	0-84.2	0-66.7		
<i>N</i>	41	37		
<i>Beginning next respite admission</i>				
Mean	35.8	26.4	9.3	<i>p</i> = 0.087
Median	37.2	25.7	(-1.4-20.0)	
SD	19.6	23.6		
Range	0-96.1	0-80.2		
<i>N</i>	35	30		
<i>Change at end of study admission from beginning study admission</i>				
Mean	3.1	0.1	2.5	<i>p</i> = 0.325
Median	2.6	0	(-2.54, 7.59)	
SD	9.3	13.0		
Range	-14.2-35.7	-29.3-41.8		
<i>N</i>	41	37		
<i>Change at beginning next respite admission from beginning study admission</i>				
Mean	3.8	3.9	-0.2	<i>p</i> = 0.951
Median	2.5	2.2	(-6.15, 5.78)	
SD	11.8	12.3		
Range	-35.5-33.3	-21.2-31.0		
<i>N</i>	35	30		

*Two-sample *t*-test.

elsewhere (Clark and Bowling, 1989; Armstrong-Esther *et al.*, 1994) and suggests that the usual interactions between nurse and patient during respite stays do not provide a rich structured environment.

CONCLUSION

The questions raised, plus the difficulties experienced in undertaking clinical research within the context of a changing service, suggest that a possible way forward may be to move the focus away from particular clinical settings. Instead, the focus should be based on the clinical presentation

of elderly people with dementia and a mobility problem wherever they may be. In the meantime, it seems sensible to propose that physiotherapy treatment restricted to a hospital respite care admission may not be effective, as (a) previous research suggests that 2 weeks may be insufficient to effect an improvement (Pomeroy, 1994) and (b) the present trial did not show a marked trend for improvement in mobility skills.

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Table 4. Nursing time (minutes) spent on mobility-related contacts during 3 4-hour periods

	Study group	
	Physiotherapy	Activities
<i>Beginning study admission</i>		
Mean	3.97	3.15
Median	3.28	2.48
Range	0–14.2	0–9.43
Percentile 25	1.48	1.4
Percentile 75	5.1	4.1
N	41	37
<i>End study admission</i>		
Mean	3.07	2.55
Median	2.4	2.2
Range	0–11.1	0–10.85
Percentile 25	1.05	0.68
Percentile 75	5.07	3.98
N	41	37
<i>Beginning next respite admission</i>		
Mean	2.43	2.78
Median	1.7	1.2
Range	0–11.06	0–16.78
Percentile 25	0	0
Percentile 75	3.63	3.63
N	41	37
<i>Total of watch days for each participant</i>		
Mean	9.47	8.48
Median	7.05	4.82
Range	0.2–29.78	0.2–27.37
Percentile 25	3.73	3.03
Percentile 75	13.32	12.13
N	41	37

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- address the identified problem/s. Any particular intervention may be used for more than one problem. Each treatment session lasts for 30 minutes and is led by a physiotherapist with expertise in the remediation of movement disorders so that appropriate sensory stimuli are provided and the appropriate approach is used for the patient's behavioural and cognitive attributes.

A. Specific interventions to increase joint range of movement and muscle strength

1. Passive exercises (head, neck, trunk and all four limbs) may include specific joint mobilizations to improve/maintain range of movement)
2. Active exercises (head, neck, trunk and all four limbs) in all planes of movement with and without resistance
3. Prone lying

B. Interventions to reeducate bed mobility

4. Bridging
5. Rolling into side-lying from supine
6. Getting legs on and off the bed
7. Pushing up from side-lying to sitting and lowering down to side-lying

C. Interventions to reeducate balance in sitting or standing

8. Patient reaches with one or both hands to touch or pick up objects, eg 'reach and touch my hand; pick up the book on the shelf'
9. Throwing/catching/bouncing a ball/balloon in sitting/standing
10. Progressively increasing the time spent in unsupported sitting/standing
11. Produce displacement in sitting/standing by physiotherapists providing a gentle push to sternum/shoulders/back
12. Reducing base of support, eg sitting nearer the edge of bed/chair, moving feet closer together
13. Transferring weight from buttock to buttock or foot to foot
14. Reaching down to floor to pick something up
15. Stepping foot onto and off block placed in front of or beside the patient on the floor

APPENDIX 1

Physiotherapy treatment schedule

A functional assessment identifies what the patient can and cannot do and why movement becomes difficult. From this a treatment plan is formulated which may address one or more of the following aims:

- Reeducation of functional mobility (eg sit to stand, walking)
- Increase range of movement in joints
- Strengthen muscles

Interventions are selected from the schedule to

D. Interventions to reeducate standing up and sitting down

16. Practise standing up and sitting down with or without facilitation from the physiotherapist or by reaching forward to stool, chair, gymball or object on table/floor before standing up
17. Standing up and sitting down, with or without the use of arms, by progressively decreasing the height of the chair/bed and/or progressively increasing the number of consecutive repetitions

E. Interventions to reeducate gait activities

18. Walking in parallel bars
19. Walking with appropriate aid or without support/aid
20. Obstacle course, eg moving between chairs, turning around objects, stepping over rope, walking backwards
21. Walking up and down stairs, supported and unsupported
22. Walking outside, supported and unsupported
23. Dancing, supported and unsupported

APPENDIX 2

Activities treatment schedule

The 30-minute activity sessions consist of a regular one-to-one interaction with the aim of stimulating interest in the environment through touch, verbal communication and social contact. No specific goals are identified.

Activities take place with the patient and physiotherapist sitting in a quiet area, preferably separate from the main ward environment.

Activities are:

1. Listening to the radio or a music tape
2. Reading or looking at newspaper/magazine/book/pictures/photographs
3. Playing with cards/draughts/dominos/jigsaws
4. Writing/drawing
5. Conversing with, talking to the patient
6. Stimulation of smell, eg peeling oranges
7. Eating and drinking, encouraging patient participation
8. Self-care, eg combing hair, doing nails
9. Looking out of the window
10. Encouraging patient to touch and feel, eg rummage bag