The Role of Rehabilitation in Parkinson's Disease: A Review of the Evidence

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Many clinicians, therapists and patients support the use of rehabilitation in the treatment of Parkinson's disease. However, systematic reviews reveal a lack of conclusive evidence to support the use of common forms of rehabilitation therapy in this movement disorder. Lack of evidence of efficacy is not proof of lack of effect. Large pragmatic randomized controlled trials are required to determine the effectiveness and safety of rehabilitation therapies for people with Parkinson's disease.

Key words: *Parkinson's disease, occupational therapy, physiotherapy, speech therapy, rehabilitation.*

Introduction

In spite of optimal medical and surgical therapy, people with Parkinson's disease suffer from increasing disability and handicap. In particular, axial signs such as rising from a chair, turning over in bed, posture, gait and postural equilibrium are known to respond less well to levodopa treatment.[1] Anecdotal evidence from patients, support groups and health professionals strongly supports the use of rehabilitation services in addition to optimal medical and surgical treatment.[2,3] However, access to rehabilitation services for Parkinson's disease is known to be poor.[4-7]

This review provides evidence-based guidance on the use of allied health professional interventions through the various stages of Parkinson's disease using the classification of MacMahon and Thomas (diagnosis, maintenance, complex and palliative stages).[8]

What is Rehabilitation?

"Rehabilitation is a process of active change by which a person who has become disabled acquires the knowledge and skills needed for optimal physical, psychological and social function".[9] This definition recognizes that the disabled person plays an active role in determining the endpoints of the rehabilitation process, and how they may be reached. The aims of rehabilitation will vary between individuals and between client groups. In general, the aim is to provide an individual and their family with the knowledge, skills and support necessary to maintain their autonomy, minimize disability and maximize the level of participation.[10] This includes prevention of complications and secondary disability.

Available Evidence

A series of systematic reviews were performed by the authors to evaluate the efficacy and safety of physiotherapy, occupational therapy and speech and language therapy in Parkinson's disease.[11-16] Randomized controlled trials examining the efficacy of conventional paramedical therapies and also of complementary therapies versus control intervention and all those comparing the efficacy of two forms of active rehabilitation therapy in Parkinson's disease were reviewed.

We identified 16 randomized controlled trials of physiotherapy (399 patients), two occupational therapy trials (84 patients), five speech and language therapy for dysarthria trials (154 patients) and three complementary therapy trials (113 patients). No studies examined non-pharmacological swallowing therapy for dysphagia. Trials had marked methodological flaws that could have introduced bias. We were unable to perform meta-analysis of the results as the trials used heterogeneous therapy methods and outcome measures. Summaries of the results available are presented in Tables 1 and 2.

We failed to find conclusive evidence of benefit for any form of rehabilitation therapy. However, this lack of evidence of efficacy is not proof of a lack of effect. At present, clinically useful recommendations can only be supported by various levels of subjective knowledge. Below we give our opinions, supported where possible by evidence from trials or formal consensus, on the usefulness of each therapy for a person with Parkinson's disease.

Physiotherapy

The trials of physiotherapy showed some limited evidence of efficacy, particularly with specific gait characteristics such as walking velocity and stride length.[17,18] Activities of daily living improved in the one trial in which they were measured,[17] whereas quality of life did not improve in the one trial in which it was measured.[19] Economic analysis was not undertaken in any of the trials. The trials used a wide variety of therapy methods, making it difficult to determine which type of physiotherapy should be used clinically. The Physiotherapy Evaluation Project (PEP) examined current physiotherapy practice using a Delphi technique, and developed a consensus approach for physiotherapy in Parkinson's disease.[20] Practice guidelines have just been completed by the same group.[21]

Physiotherapy is perceived to be effective in treating balance, gait, posture and mobility, particularly when cueing techniques are used. Early intervention is thought to improve the likelihood of success, followed by frequent (annual) interventions to ensure maintenance of fitness and flexibility. Physiotherapy is perceived to be effective up to the palliative stage of the disease, and even then, caregivers may require education in effective rolling and lifting techniques. Funding is

Table 1

Studies Comparing Rehabilitation Therapies with Control Intervention: Summary of Statistically Significant Results

Outcome	Intervention	Number of studies that measured outcome	Number of studies that calculated statistical significance or provided data in a form that could be analysed	Number of studies with statistically significant results	Calculated *p* values
Quality of Life	Physio	1	0	0	
	OT	1	0	0	
	S&LT	0	0	0	
	Osteo	0	0	0	
	AT	0	0	0	
	Massage	0	0	0	
Speech Intelligibility	S&LT	0	0	0	
Activities of Daily Living	Physio	2	1	1	p=0.016
	OT	2	0	0	
	S&LT	0	0	0	
	Osteo	0	0	0	
	AT	1	1	1	p=0.01
	Massage	1	1	0	
Impairments: summary scores	Physio	3	1	1	p<0.001
	OT	1	0	0	
	S&LT	2	1	1	p<0.005
	Osteo	0	0	0	
	AT	0	0	0	
	Massage	0	0	0	
Impairments: walking velocity	Physio	5	4	2	p=0.002 and p=0.001
	OT	1	0	0	
	Osteo	1	1	0	
Impairments: stride length	Physio	3	2	2	p=0.0045 and p=0.016
	OT	0	0	0	
	Osteo	1	1	1	p<0.022
Impairments: objective speech loudness	S&LT	2	1	1	p<0.005

Physio: physiotherapy; OT: occupational therapy; S&LT: speech and language therapy; osteo: osteopathy; AT: Alexander technique.

being sought for a large randomized controlled trial (PROMISE) to examine the effectiveness of physiotherapy compared to no therapy in Parkinson's disease.

Occupational Therapy

The two trials of occupational therapy in Parkinson's disease patients produced results of little value due to design problems that may have led to bias, small numbers of patients and marked heterogeneity of the two methods used.[22,23] Both trials examined group occupational therapy which is unlikely to address an individual's specific occupational aims and needs. A Delphi survey to develop a consensus on best occupational therapy practice for Parkinson's disease in the U.K. has just been completed.[24] Occupational therapists believed that their practices were generally effective in improving occupational fulfilment at all stages of the disease. As with the physiotherapists, they believed that early and frequent (annual) intervention maximizes potential benefits. This consensus will inform the development of practice

Table 2

Studies Comparing Two Forms of Rehabilitation Therapy: Summary of Results

	Physiotherapy (7 studies)	Speech Therapy (2 studies)
Quality of Life	behavioural = standard	LSVT® > respiration (p not stated)
Speech Intelligibility	NA	LSVT® > respiration (carers' assessment; p not stated) LSVT® = respiration (patient assessment)
Activities of Daily Living	strength and balance > balance (p<0.05) cued = standard behavioural = standard karate = standard	NA
Impairments: summary scores	cued > standard (p<0.02) behavioural > standard (p=0.01)	NA
Impairments: walking velocity	walking + auditory cues > walking (p=0.03)	NA
Impairments: subjective speech loudness	NA	LSVT® = respiration

> refers to greater efficacy on clinical outcome; = refers to no statistically significant difference.
LSVT®: Lee Silverman Voice Therapy; NA: not appropriate.

guidelines. Funding is being sought for a pilot of a large multicentre randomized controlled trial (PD-OT) to examine the effectiveness of occupational therapy compared with no therapy in Parkinson's disease.

Speech and Language Therapy

The results from the trials of speech and language therapy for dysarthria are encouraging. Improvements in parameters measured, such as loudness, monotonicity and pitch, do appear to be clinically significant.[25,26] However, improved intelligibility must be the primary aim in these trials, yet this was not measured in the placebo-controlled trials. It also should be noted that much of the data came from two trials of a unique treatment which is not widely used (Lee Silverman Voice Therapy®[27]).[25,28,29] Again, the lack of firm data suggests that a large multicentre randomized controlled trial is required.

Although the Royal College of Speech and Language Therapists in the U.K. has published consensus guidelines for the therapy of dysarthria, they are not specific for the treatment of Parkinson's disease and do not contain details of style, duration or intensity of therapy.[30] Speech and language therapists appear to be able to ameliorate some of the communication difficulties experienced by people with Parkinson's disease. Therapy should be provided soon after functional difficulties are noted, and followed up on an annual basis.

Speech and language therapy also may be effective in the treatment of dysphagia, but there is little evidence to support this.[16]

Table 3

Planned and Ongoing Large Randomized Controlled Trials in Parkinson's Disease

Trial Name	Comparison	Contact
PD-MED	Drug classes in de-novo and adjuvant therapy	Birmingham Clinical Trials Unit; bctu@bham.ac.uk
PD-SURG	Immediate surgery versus delayed surgery	Birmingham Clinical Trials Unit; bctu@bham.ac.uk
PROMISE	Physiotherapy versus no therapy	Dr. Ann Ashburn; a.m.ashburn@soton.ac.uk
PD-OT	Occupational therapy versus no therapy	Dr. Carl Clarke; c.e.clarke@bham.ac.uk
The Swallowing Trial	Thickened liquids versus chin down posture for liquid aspiration (includes non-Parkinsonian participants)	Dr. J.A. Hind; jahind@facstaff.wisc.edu Dr. Carol Caperton; (301) 897-5700, ext. 4237

Table 4

Recommendations to Improve the Quality of Future Trials of Rehabilitation Therapies

Recommendation	Benefits
Use firm diagnostic criteria (e.g., U.K. PD Brain Bank Criteria).[35]	Excludes patients with Parkinson-plus syndromes.
Use clear inclusion and exclusion criteria.	Allows enrolment of a uniform cohort of patients.
State disease severity of participants (e.g., Hoehn and Yahr score).	Allows assessment of which patients benefited most from the therapy and prediction of when best to start therapy.
Use large numbers of patients.	Reduces selection bias. Reduces the chance of false-positive or false-negative results. Increases the population of patients to which the results can be applied.
Define the therapy method in detail.	Allows method to be repeated accurately.
Use adequate placebo therapy.	Reduces size of placebo and Hawthorne effects and so strengthens any results.
Assess patients for at least six months after therapy.	Allows determination of the duration of effect and prediction of how frequently the therapy would have to be repeated to maintain benefits.
Note if the patients are "on" or "off" when outcomes are measured.	Allows clearer assessment of benefits.
Use outcomes that have value to patients (e.g., quality of life).	Allows clearer assessment of benefits.
Use outcome scales that are validated, reliable and sensitive in PD.	Gives more robust results.
Analyse data on an intention-to-treat basis.	Reduces bias.
Statistically compare changes in outcome measures between the therapy and placebo groups.	Correct analysis.

Dietary Advice

There is little evidence to support the role of nutritionists, although it is recognized that their expertise may be of value to patients with swallowing difficulties, constipation, dehydration and weight loss, and to those patients who find that moving their daytime intake of protein to the evening may aid the daytime absorption of levodopa.[2,3]

Complementary Therapies

Three forms of complementary therapies were found to have evidence from randomized controlled trials. The trial of osteopathy examined the impact of a single treatment session on a number of parameters of gait. Although the stride length and hip and shoulder velocities increased significantly, the trial was so small (n=20) that the results can only be used to generate hypotheses.[31] The results of the trial of the Alexander technique were encouraging, particularly in that the improvement in activities of daily living persisted for at least six months.[32] This technique educates people with the aim of restoring or maintaining desirable conditions of normality,[33] so it may be applicable across the disease spectrum. The trial of therapeutic massage showed no significant benefits.[32] Larger trials of complementary therapies that examine quality of life and cost effectiveness will allow a more credible assessment of the benefit of these techniques.

Multidisciplinary Therapy

Despite the consensus among allied health professionals that multdisciplinary working leads to optimal care for patients, there are no randomized controlled trials of coordinated multidisciplinary input. However, a recent uncontrolled prospective study of multidisciplinary care for 118 people with Parkinson's disease showed small and clinically insignificant changes in outcome measures such as mobility, gait, speech, depression and quality of life, although it was suggested that those with advanced disease at baseline derived more benefit from the treatment.[34] All single discipline trials that are presently planned (Table 3) more accurately reflect current health care provision in the U.K., where multidisciplinary Parkinson's disease clinics are the exception rather than the rule.

Future Research

Recommendations for the conduct of future trials are presented Table 4. A number of large pragmatic trials of various medical, surgical and paramedical therapies in Parkinson's disease are beginning or are being planned (Table 3). They are expected to deliver the information that is required by health care professionals, patients and governments as to what intervention is appropriate at the various stages of the disease, what size of benefit can be expected and for what duration, and a realistic estimate of the costs to the health care provider.

Conclusions

It is an exciting time in rehabilitation research in Parkinson's disease. The Cochrane reviews have delineated areas that require further research to provide an evidence base for rehabilitation. In the meantime, empirically it is appropriate for all patients to receive physiotherapy and occupational therapy at all stages of the disease. Complementary therapies such as the Alexander technique show promise. Speech and language therapy is of use to those who develop dysarthria and possibly for those who develop dysphagia. If future randomized controlled trials of rehabilitation interventions are positive, it is hoped that increased funding will provide greater access to rehabilitation services for people with Parkinson's disease. ◆

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