ELSEVIER

Parkinsonism and Related Disorders 13 (2007) 115–121

Parkinsonism & Related Disorders

www.elsevier.com/locate/parkreldis

Effectiveness of physiotherapy in Parkinson's disease: The feasibility of a randomised controlled trial

S.H.J. Keus[a,*], B.R. Bloem[b], J.J. van Hilten[c], A. Ashburn[d], M. Munneke[b,e]

[a]*Department of Physiotherapy, Leiden University Medical Center (LUMC), H0Q, P.O. Box 9600, 2300RC Leiden, The Netherlands*
[b]*Department of Neurology, Radboud University Nijmegen Medical Centre (UMCN), Nijmegen, The Netherlands*
[c]*Department of Neurology, LUMC, The Netherlands*
[d]*Rehabilitation Research, University of Southampton, Southampton, UK*
[e]*Department of Physiotherapy, Research Centre of Allied Health Care, UMCN, The Netherlands*

Received 27 September 2005; received in revised form 30 June 2006; accepted 8 July 2006

Abstract

To study the feasibility of a large randomised controlled trial (RCT) evaluating the effectiveness of physiotherapy in Parkinson's disease (PD), 173 patients were asked to participate in a study with random allocation to best practice physiotherapy, or to no physiotherapy. The primary outcome measures were the Parkinson's disease questionnaire-39, the Parkinson activity scale, and a patient preference outcome scale (PPOS). Only 14% of the patients could be included in the study. The PPOS showed the largest effect size (0.74) with a significant group effect ($p < 0.05$). Specific alterations to the study design to ensure successful RCTs in this field are recommended.

Keywords: Feasibility studies; Parkinson disease; Patient selection; Physical therapy; Randomised controlled trials

0. Introduction

In the course of their disease, most patients with Parkinson's disease (PD) face mounting mobility deficits, including difficulties with transfers, posture, balance, and walking. This frequently leads to (fear of) falls, injuries, loss of independence, and inactivity, which causes social isolation and increases the risk of osteoporosis and cardiovascular disease [1]. These mobility deficits are difficult to treat with drugs and neurosurgery [1,2]. There are encouraging indications that physiotherapy may be effective in improving these mobility deficits in PD [3–5], and possibly for patients in all stages of the disease [6]. However, due to methodological shortcomings and insufficient power of published studies, evidence is not yet conclusive [4]. Furthermore, the methods of physiotherapy applied in these studies varied widely. To improve the uniformity and effectiveness of care, and to clarify the possibilities and impossibilities of physiotherapy for PD, we developed an evidence-based clinical practice guideline [7,8]. This guideline was developed according to international criteria for guideline development [9,10] by expert physiotherapists and a neurologist between January 2002 and April 2004. The guideline is based on a systematic literature review, and contains problem-specific recommendations graded according to the levels of the evidence. Physiotherapy is primarily focused on limitations in activities. Physiotherapy aims to improve functioning in daily life without necessarily changing the disease process. Therefore, the recommendations in the guideline are arranged around everyday functional problems that can be treated by physiotherapists. Frequency and duration of treatment depend on the

*Corresponding author. Tel.: +31 71 526 1514; fax: +31 71 526 6789.
E-mail address: s.h.j.keus@lumc.nl (S.H.J. Keus).

1353-8020/$ - see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.parkreldis.2006.07.007

patient-specific goals and possibilities for intervention. Whenever possible, the goal of the intervention is to ascertain that patients (continue to) carry out the exercises individually, e.g., at home with instruction and feedback provided by the physiotherapist. As research on the efficacy or effectiveness of physiotherapy in PD is a quickly evolving field, the guideline needs and will be updated with new evidence every five years.

Furthermore, an international team of experts has prepared a randomised controlled trial (RCT) to evaluate the effectiveness of 'best practice' physiotherapy in PD, as described in this new guideline [11]. The RCT takes into account all recommendations of a Cochrane review of physiotherapy in PD [4].

Here, we describe the outcome of a feasibility study for this trial. Our specific objectives were to examine the recruitment rate of patients, to determine the feasibility of the proposed outcome measures, to evaluate the new guideline as a tool to standardise the intervention within the experimental group, and to estimate the effect size of the intervention in order to adequately power the RCT.

Table 1
Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
• Idiopathic Parkinson's disease according to the UK PDS Brain Bank criteria [13] • Stable reaction to anti-Parkinson medication[a] • At least one mobility-related activity limitation within the core areas of physiotherapy practice in PD (gait, balance, posture and transfers), experienced by the patient as important [14]	• Hoehn and Yahr 5 during the ON-period • Physiotherapy within four months prior to randomisation • Severe co-morbidity: influencing mobility or life threatening (e.g., cancer) • Not motivated to participate in physiotherapy • Severe cognitive impairment, defined by a MMSE score ≤ 24 [15], or presence of psychiatric impairments

UK PDS = United Kingdom Parkinson's Disease Society; MMSE = mini-mental state examination.

[a]Not experiencing recent changes in reaction to medication (e.g., recent start of unpredictable on–off fluctuations) and not currently seeing a neurologist to stabilize medication regime.

1. Methods

1.1. Recruitment procedure

The aim of this feasibility study was to randomly allocate 40 patients with PD to either (A) medical treatment plus 'best practice' physiotherapy (experimental group) or to (B) medical treatment without physiotherapy (control group).

Recruitment of patients started in September 2002. Patients were selected from a database of the Department of Neurology of the Leiden University Medical Center (LUMC). The database contained addresses of patients with PD who had visited the neurology department from 1999 onward and who had given permission to be contacted for future research. All patients with idiopathic PD who lived within 30 km from the study centre were informed in writing about the study by their treating neurologist (JJvH). Enclosed was a two-page questionnaire about problems experienced in daily living, prior and ongoing use of physiotherapy services, the willingness to be contacted by a researcher for participation in the study, and reasons for unwillingness to participate. We explicitly asked patients who were not interested to participate to at least return the questionnaire. To optimise response [12], a postage free return envelope was included. A reminder was sent after four months.

All patients who gave permission were contacted by telephone. Patients willing to participate and who fulfilled the inclusion and exclusion criteria (Table 1) were invited to visit the department of physiotherapy at the study centre. To increase the number of participants, additionally patients were recruited through advertising in the members' magazine of the Dutch Parkinson's Disease Society. Eligible patients were asked to sign an informed consent.

Participants were randomised in blocks of four in order of enrolment by one of the researchers (M.M.). Another researcher (S.H.J.K.) enrolled all patients. An independent research assistant assigned patients to their groups. The sequence of allocation was concealed until the interventions were assigned. The Medical Ethics Committee of the LUMC approved the study.

2. Measurements

In clinical rehabilitation trials, primary outcome measures linked to the International Classification of Functioning, Disability and Health (ICF) domain of activities are advised [16]. In this trial, we chose as primary outcome measures a patient preference outcome scale (PPOS) [17]; the Parkinson activity scale (PAS) [18]; and the mobility domain of the Dutch validated version of the Parkinson's disease questionnaire (PDQ-39) [19].

PPOSs are widely accepted measures for outcome assessment in RCTs [17,20,21]. In the PPOS, patients select three main complaints in a structured interview, taken at baseline. For this interview, a standardised list of possible main complaints with an additional option 'other main complaint, namely.... is used'. 'Main complaints' are defined as activity limitations (e.g., walking and rising from a chair) or restrictions in participation, which are frequently encountered in daily life, and are perceived as important by the patient. Patients rate how troublesome these main complaints were during the foregoing week on a 100 mm VAS (0 = executable without effort; 100 = impossible to execute). The sum of the three VAS scores constitutes the overall score. For evaluation purposes, the same three complaints are rated.

The PAS contains 10 test items covering activity limitations within the core areas of physiotherapy treatment in the middle and late stages of the disease: balance when rising from a chair and sitting down; hesitation, festination, and freezing when starting to walk and turning 180°; impaired axial mobility causing problems when rolling over in bed; and executing complex movements when getting into or out of bed, especially when bedcovers need to be handled (and multitasking is required) [18]. The PAS is specifically designed for physiotherapy screening and evaluation in PD.

The PDQ-39 is a PD-specific quality of life questionnaire, containing 39 items on eight domains [19]. For the feasibility study, the 10-item mobility domain was used, because this domain is best related to the treatment goals of physiotherapy in PD.

Measurements were completed at baseline (before randomisation, t_{pre}), and 10 weeks thereafter, immediately after the intervention (t_{post}). Patients were always measured during their subjectively best ON phase, and at a consistent time after medication intake. Assessments were partly completed at the participant's home and partly in the study centre. Several self-assessment questionnaires were sent to the patient's home. One of the researchers, blinded to the group allocation of participants, carried out all measurements at the study centre. At t_{post}, participants and therapists were interviewed. All participants were asked about participation in exercise classes provided by or referral to a physiotherapist not connected to the study, and about their satisfaction with participation. Furthermore, participants allocated to the experimental group completed a questionnaire on satisfaction with the treatment and therapist. Therapists underwent structured interviews about strong and weak aspects of the guideline, and about their satisfaction with the guideline.

2.1. Intervention

Two physiotherapist, who were trained in correct use of the evidence-based clinical practice guideline [7,8], provided the treatment. In this training, elements of a multifaceted implementation strategy [10] were used: education, discussion, and feedback (before the start of the study), and feedback and reminders (during the study). Participants allocated to the experimental group received once or twice weekly individual physiotherapy during 10 weeks. According to the guideline, treatment was aimed at improving balance, transfers (such as rising from a chair or rolling over in bed), posture, balance, or walking, depending on the patient's main complaint. The interventions included PD-specific techniques, such as cueing and cognitive movement strategies, as well as general techniques such as training of balance, leg strength and physical fitness [7]. Participants were not allowed to receive physiotherapy outside the study.

2.2. Data-analysis

We used the statistical packages for social sciences (SPSS) 10.0.7. Depending on data distribution, tests for data with normal distribution (ANOVA and independent samples T-test) or skewed distribution (Chi-square and Mann–Whitney U-test) were applied. The magnitude of the effect was expressed in effect sizes (d), calculated by dividing the difference in mean effect between experimental (M_1) and control (M_2) group by the square root of the pooled variance of the baseline scores: $d = M_1 - M_2 / \sqrt{[((N_1-1)\mathrm{sd}_1^2 + (N_2-1)\mathrm{sd}_2^2)/(N_1 + N_2 - 2)]}$ [22]. In this, sd_1 and sd_2 are the standard deviations of experimental and control groups at baseline, and N_1 and N_2 are the number of participants in experimental and control groups. Data were analysed according to the intention-to-treat principles [23]. Single missing items were replaced by group mean values of that item. By using 'no effect' as imputation method for participants who failed to show up for t_{post}, a conservative estimate of treatment effect between experimental group (improvement expected) and control group (deterioration expected) is secured.

3. Results

The study period lasted from September 2002 (start recruitment) until November 2003 (last t_{post}).

3.1. Feasibility of the recruitment

Information about the study was sent to 173 patients, of whom only 25 (14%) were eligible and willing to participate, and could therefore be included in the study (Fig. 1). Additionally, two out of eight patients who responded to the advertisement in the members' magazine of the Dutch Parkinson's Disease Society could be included in the study. All 27 included patients gave their informed consent prior to their inclusion in the study.

Non-responders to the information letter were older (interquartile range [IQR] 63–79 years) than responders (IQR 60–76 years), and had a higher Hoehn and Yahr stage, with 75% of the non-responders in Hoehn and Yahr 3 or 4 versus 75% of the responders in Hoehn and Yahr 2 or 3 ($p<0.05$). There were no differences in gender or distance to the study centre between non-responders and responders.

Complete information on prior and ongoing use of physiotherapy services, and willingness to random allocation was available for 109 patients. Nearly 60% of these patients ($n = 63$) was already referred to a

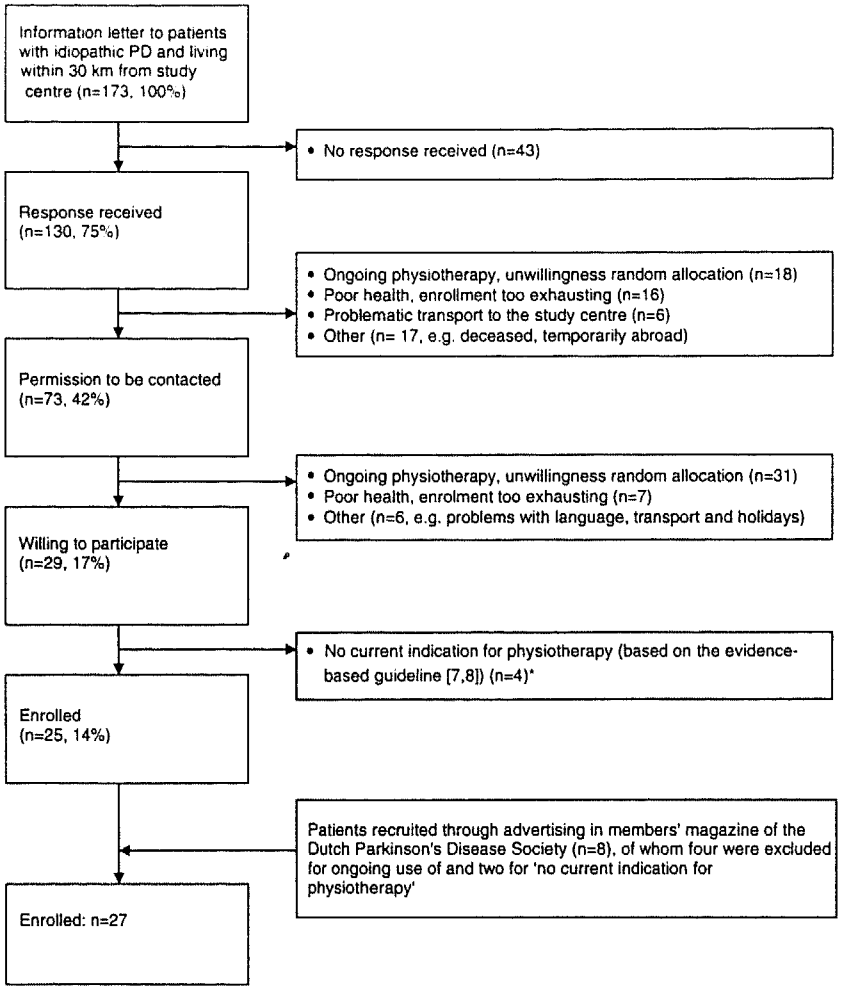

Fig. 1.

physiotherapist and did not want to stop this therapy for four months in order to fulfil the inclusion criteria. Only 10% of patients with current physiotherapy was willing to be randomly allocated, in contrast to 65% of the patients without current physiotherapy. Seven patients who reported current use of physiotherapy, terminated their treatment in order to fulfil the exclusion criteria.

At baseline, participants in experimental and control groups were similar regarding age, gender, disease duration, Hoehn and Yahr score, use of levodopa, and main complaints.

Participants' main complaints, as reported on the PPOS, included problems in walking (e.g., starting), bed mobility, and rising from a chair (Table 2).

3.2. Effectiveness

The experimental group (with physiotherapy) improved on all three outcome measures, whereas the control group (not treated) deteriorated (Table 3). The differences between the experimental group and control group were significant for the PPOS, but not for the PAS and PDQ-39.

The effect sizes were small for the PDQ-39 and the PAS, and large for the PPOS. Effect sizes on all three outcome measures showed large (95%) confidence intervals. One patient in the experimental group showed an outlying negative result on the PPOS (explaining the large standard deviation of the treatment effect). When this outlier was removed, the effect size on the PPOS increased to 0.94 (95% confidence interval 0.33–1.55). Another patient in the experimental group showed an outlying positive result on the PAS. When this outlier was removed the effect size for the PAS decreased to 0.

3.3. Feasibility of the outcome measures

Total test time at home averaged about 38 min for participants and about 7 min for their partners. Total

Table 2
Patient characteristics

	Experimental ($N = 14$)		Control ($N = 13$)	
	Median (IQR)	n/N	Median (IQR)	n/N
Age	65.4 (60.6–69.7)		70.5 (58.9–77.2)	
Gender (men)		11/14		11/13
Disease duration (years)	7 (3.3–12.0)		6 (2.3–8)	
Hoehn and Yahr 1		2/14		2/13
Hoehn and Yahr 2		6/14		5/13
Hoehn and Yahr 3		5/14		5/13
Hoehn and Yahr 4		1/14		1/13
PD Medication				
• Amantadine		4/14		6/13
• Dopamine-agonists		11/14		6/13
• MAO-B inhibitor		4/14		0/13
• Anticholinergics		1/14		1/13
• Levodopa		10/14		9/13
Main complaint				
• Walking (outside)		10/14		11/13
• Bed mobility (rolling over)		6/14		5/13
• Rising from chair		6/14		5/13
• Bending over		4/14		3/13
• Cycling		3/14		4/13

IQR = interquartile range.

Table 3
Treatment effect: mean of absolute change (sd) and effect sizes as measured by the PPOS, PAS and PDQ-39 Mobility

	With physiotherapy ($N = 14$)	Without physiotherapy ($N = 13$)	Effect size (95% confidence interval)
PPOS[a] (range 0–300)	41.86 (52.8)	−1.92 (36.4)	0.74 (0.13–1.36)
PAS (range 0–40)	1.71 (8.1)	−0.38 (2.6)	0.22 (−0.29 to 0.73)
PDQ-39 mobility (dimension range 0–100)	4.11 (14.5)	−2.12 (12.2)	0.26 (−0.19 to 0.72)

PPOS = patient preference outcome scale; PAS = Parkinson activity scale; PDQ-39 mobility = mobility domain of the Dutch Parkinson's Disease Questionnaire.

[a]Statistically significant ($p < 0.05$) between groups. Positive scores indicate improvement, whereas negative scores indicate deterioration.

test time in the study centre averaged about 75 min. Most participants regarded the assessments as time-consuming, but this did not discourage individuals from participating. Only one participant dropped out of the trial (control group), due to death following pneumonia after injuries. Missing items were scarce: one participant showed one missing item on the PDQ-39 mobility domain at t_{pre}. Six participants showed one missing item, and one participant showed two missing items on the PDQ-39 mobility domain at t_{post}.

Many participants scored very high on the PAS at baseline, with a median score of 36, suggesting a ceiling effect. Two patients even had a maximum score of 40.

3.4. Feasibility of the intervention

Most participants received six to 13 sessions of physiotherapy in a nine-week period. However, two out of 14 participants received only three sessions. Excluding these participants, most participants received eight to 14 sessions of physiotherapy. Median duration was 60 min for the first session, and 42.5 min for the sessions thereafter.

The main complaints matched with the core areas of physiotherapy as described in the guidelines. Participants were satisfied with the intervention. All participants reported they would recommend the intervention to other PD patients, because the treatment given was clearly tailored to their problems, and the strategies used to reach their goals were different from what they had experienced before. The mean satisfaction score, on a scale of 1–10, was 8.25 (sd 1.4). There was one protocol violation during the study period: one patient in the control group entered a class for group exercise led by a physiotherapist.

Therapists reported several benefits of working with the guideline: a better-structured assessment and treatment, a more patient-tailored treatment, the use of disease-specific training strategies, and useful outcome

measures. No adverse effects were observed. Drawbacks of the guideline, as reported by the therapists, were: the lack of outcome measures and training strategies for reaching and grasping, the language used was too scientific, the description of outcome measures and training strategies was too concise. Based on these results, and on the results of a systematic field check of the guideline by 70 therapists, the guideline has been optimised.

4. Conclusion and discussion

The results of our study demonstrate that the newly developed guideline for physiotherapy in PD is a feasible tool which can be used to define physiotherapy in an efficacy or effectiveness trial, that the evaluated outcome measures were feasible and responsive, and that the comparison between the experimental and control groups resulted in a large effect size for one outcome measure (the PPOS). An alarming finding was the low recruitment rate of patients.

We tried to eliminate all avoidable barriers to participation in a trial, including providing sufficient and simply presented information, promotion for the study by the consultant neurologist, sufficient time to consider participation, limited travel time and compensation of travel costs [12]. Nevertheless, the recruitment of patients proved problematic. And because of this we may have underestimated the size of our effectiveness findings. The main obstacle to participate was current physiotherapy treatment. In the Netherlands, physiotherapy is widely prescribed for patients with PD: nearly 60% of patients is treated at a given time, and only 20% has never been referred to a physiotherapist [24]. The 50% chance to be allocated to the control group without physiotherapy was deemed unacceptable by many patients, not only by those who were currently receiving physiotherapy. Patients preferred to continue their current physiotherapy instead of being allocated to either 'best practice' physiotherapy or no physiotherapy. These results are applicable to any RCT assessing the effectiveness of a widely used intervention. Therefore, future studies assessing the effectiveness of such an intervention should accommodate these findings, e.g., by including multiple study centres or by offering participants in the control group an alternative therapy.

Furthermore, older patients and patients with more advanced Hoehn and Yahr stages, showed lower response rates to the initial information letter and questionnaire. Possibly, travel distances are problematic for these patients. By offering the possibility to physiotherapy in the community this problem in recruiting patients can be overcome. On the other hand, the problem might be that these patients are less willing to respond to a postal questionnaire. This can be overcome by recruiting patients in person by a research assistant, following a scheduled appointment with their treating neurologist.

The observed effect sizes in our small sample are promising, both for the treatment and for the outcome measures. However, the small sample size may impact the generalisability of the results to other groups of PD patients. The largest effect size and a significant difference in change between the experimental and control groups were found for the PPOS. This was expected, as patient specific outcome measures fully match the goal of treatment, and will therefore be most sensitive to change as a result of the treatment. Most other outcome measures address more than this specific goal of treatment and are therefore less sensitive to change. When for example treatment is aimed at improving rolling over in bed, only two of the 10 items of the PAS address this goal.

The ceiling effect found on the PAS might be explained by our inclusion criteria, because some enrolled patients reported problems that were not measured by the PAS (e.g., problems with cycling). The small effect size observed for the PAS did not approximate the effect size for ADL reported in the meta-analysis by de Goede et al. [5]. By using more strict inclusion criteria, we suspect higher effect sizes for the PAS. Furthermore, in PD, activity limitations are to a large extent context dependent. Therefore, by completing the PAS in the patient's home, problems in functional mobility as experienced by the patient in daily life might be more adequately tested. Conversely, it might be that the PAS was not sensitive enough for mildly affected patients. In order to increase to sensitivity to change, the PAS needs to be modified, e.g., by making several tests more difficult. A reliability study on this modified PAS is currently undertaken.

The effect size for the PDQ-39 was only 0.26. However, a minimal clinically important difference on this dimension of the PDQ-39 has been determined at an effect size of 0.11 [25]. This suggests that the intervention afforded a small but clinically relevant improvement of the mobility related quality of life.

Our feasibility study cannot differentiate between intrinsic treatment effects on the one hand versus placebo or Hawthorne effects on the other hand. However, we have purposely chosen to perform this pragmatic study comparing 'best practice physiotherapy' with 'no physiotherapy', and not with some form of placebo treatment, in order to first examine the overall effect of physiotherapy. Should a larger trial demonstrate effectiveness, then the contribution of placebo should be addressed in follow-up studies.

With a modified PAS, an optimised evidence-based clinical practice guideline, sufficient power, and an optimised design of the RCT, we expect the effect sizes to increase and their confidence intervals to narrow. The

results of this feasibility study were used to design a multiple centre trial evaluating the short- and long-term efficiency and effectiveness of physiotherapeutic care in PD. This trial (ParkNet Trial) has started in 2005 [26].

Acknowledgements

We thank Raymund AC Roos, MD, PhD (Department of Neurology, Leiden University Medical Center, Leiden (LUMC), The Netherlands) for revising the article; Joke M Timmermans, PT, and Caroline M Stassen, PT, Pienie Kamphuis, Marianne S van Ommering, Hetty L Bartels-Winkster, Astrid H Luiten-Rueckert (Department of Physical Therapy, LUMC), and Martine Visser, PT, MSc (Department of Neurology, LUMC) for their work during data collection; Rowena Plant, PhD (Institute of Rehabilitation, Hunters Moor Regional Neurological Rehabilitation Centre, Newcastle upon Tyne, UK) for her advice in the planning phase of the trial.

The Health Care Efficiency Research Program of the Association of University Hospitals (NFU: VAZ-Doelmatigheid) funded this study.

References

[1] Bloem BR, van Vugt JP, Beckley DJ. Postural instability and falls in Parkinson's disease. Adv Neurol 2001;87:209–23.
[2] Bloem BR, Bhatia KP. Basal ganglia disorders. In: Bronstein AM, Brandt T, Nutt JG, Woollacott MH, editors. Clinical disorders of balance, posture and gait. London: Arnold; 2004. p. 173–206.
[3] Smidt N, de Vet HC, Bouter LM, Dekker J. Effectiveness of exercise therapy: a best-evidence summary of systematic reviews. Aust J Physiother 2005;51(2):71–85.
[4] Deane KH, Jones D, Playford ED, Ben Shlomo Y, Clarke CE. Physiotherapy versus placebo or no intervention in Parkinson's disease. Oxford, UK: The Cochrane Library Update Software; 2002 [accessed 20 September 2004].
[5] de Goede CJ, Keus SH, Kwakkel G, Wagenaar RC. The effects of physical therapy in Parkinson's disease: a research synthesis. Arch Phys Med Rehabil 2001;82:509–15.
[6] Olanow CW, Watts RL, Koller WC. An algorithm (decision tree) for the management of Parkinson's disease (2001): treatment guidelines. Neurology 2001;56(11 Suppl. 5):S1–S88.
[7] Keus SHJ, Hendriks HJM, Bloem BR, Bredero-Cohen AB, de Goede CJT, van Haaren M, et al. KNGF-guidelines for physical therapy in patients Parkinson's disease. Ned Tijdschr Fysiother 2004;114 (Suppl.) [in Dutch]. In Dutch and English available at: ⟨www.kngf.nl and www.cebp.nl⟩.
[8] Keus SHJ, Bloem BR, Hendriks HJM, Bredero-Cohen AB, Munneke M. Evidence-based ananlysis of physical therapy in Parkinson's disease with recommendations for practice and research. Mov Disord 2006 (in press).
[9] AGREE Collaboration. Appraisal of Guidelines for Research & Evaluation (AGREE) Instrument, 2001. Available at: ⟨www.agreecollaboration.org⟩ [accessed January 13 2005].
[10] Bekkering GE, Engers AJ, Wensing M, Hendriks HJM, van Tulder MW, Oostendorp RAB, et al. Development of an implementation strategy for physiotherapy guidelines on low back pain. Australian Journal of Physiotherapy 2003;49(3): 208–14.
[11] Bloem BR, Munneke M, Plant R. A randomised controlled trial of physiotherapy in PD—the PROMISE trial. Conference for multidisciplinary care in Parkinson's disease and Parkinsonism: from science to practice. London, UK: Royal College of Physicians; 2001.
[12] Ross S, Grant A, Counsell C, Gillespie W, Russell I, Prescott R. Barriers to participation in randomised controlled trials: a systematic review. J Clin Epidemiol 1999;52:1143–56.
[13] Hughes AJ, Daniel SE, Kilford L, Lees AJ. Accuracy of clinical diagnosis of idiopathic Parkinson's disease: a clinico-pathological study of 100 cases. J Neurol Neurosurg Psychiatry 1992;55:181–4.
[14] Ashburn A, Jones D, Plant R, Lovgreen B, Kinnear E, Handford F, et al. Physiotherapy for people with Parkinson's disease in the UK: an exploration of practice. Int J Ther Rehabil 2004;11:160–7.
[15] Folstein MF, Folstein SE, McHugh PR. "Mini-mental state" a practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 1975;12:189–98.
[16] Wade DT. Outcome measures for clinical rehabilitation trials: impairment, function, quality of life, or value? Am J Phys Med Rehabil 2003;82:S26–31.
[17] Beurskens AJ, de Vet HC, Koke AJ, Lindeman E, van der Heijden GJ, Regtop W, et al. A patient-specific approach for measuring functional status in low back pain. J Manipulative Physiol Ther 1999;22:144–8.
[18] Nieuwboer A, De Weerdt W, Dom R, Bogaerts K, Nuyens G. Development of an activity scale for individuals with advanced Parkinson disease: reliability and "on-off" variability. Phys Ther 2000;80:1087–96.
[19] Peto V, Jenkinson C, Fitzpatrick R. PDQ-39: a review of the development, validation and application of a Parkinson's disease quality of life questionnaire and its associated measures. J Neurol 1998;245(Suppl. 1):S10–4.
[20] Verhoeven AC, Boers M, van der LS. Validity of the MACTAR questionnaire as a functional index in a rheumatoid arthritis clinical trial. The McMaster Toronto Arthritis. J Rheumatol 2000;27(12):2801–9.
[21] Wright JG, Young NL, Waddell JP. The reliability and validity of the self-reported patient-specific index for total hip arthroplasty. J Bone Joint Surg Am 2000;82(6):829–37.
[22] Hedges LV, Olkin I. Statistical methods for meta-analysis. Orlando, FL: Academic Press; 1985.
[23] Hollis S, Campbell F. What is meant by intention to treat analysis? survey of published randomised controlled trials. Br Med J 1999;319:670–4.
[24] Keus SHJ, Bloem BR, Verbaan D, de Jonge P, Hofman AM, van Hilten JJ, et al. Physiotherapy in Parkinson's disease: utilisation and patient satisfaction. J Neurol 2004;251:680–7.
[25] Peto V, Jenkinson C, Fitzpatrick R. Determining minimally important differences for the PDQ-39 Parkinson's disease questionnaire. Age Ageing 2001;30:299–302.
[26] Keus SH, Bloem BR, Nijkrake M, Lim LI, Munneke M. The ParkNet trial: implementation of an evidence-based guideline for physical therapy in Parkinson's disease. Mov Disord 2006; 21:S122.

A086852450 (70)

NCC/IBL AANVRAAGBON **KOPIE PERIODIEK EGB** 01-02-2008

Datum indienen : 31-01-2008 11:44 25331-1 Clearing House
Datum plaatsen : 31-01-2008 11:44
Aanvrager : 0036/2005
Aanvraagident :
Aanvrageridentt : 0036/9999
Eindgebruiker : UM106915

Telefoonnummer :
Cooperatiecode : R

Leverwijze : Elektronisch
Fax :
Ftp :
E-Mail : MJG.Moll@EPID.Unimaas.nl

Plaatscode : 213896656 ; QA ; ; 1995 V1 -

(1) [ ] Origineel gestuurd
(2) [ ] Copie gestuurd
(3) [ ] Overige
(4) [ ] Nog niet aanwezig
(5) [ ] Niet aanwezig
(6) [ ] Niet beschikbaar
(7) [ ] Uitgeleend
(8) [ ] Wordt niet uitgeleend
(9) [ ] Bibliografisch onjuist
(0) [ ] Bij de binder

7

A086852450
NCC/IBL AANVRAAGBON **KOPIE PERIODIEK EGB** 01-02-2008

Verzamelnota volgt.

Datum indienen : 31-01-2008 11:44 37910-1 mw.M.J.G.Moll-Zwart Voorspuijntal
Datum plaatsen : 31-01-2008 11:44 Universiteit Maastricht
Aanvrager : 0036/2005 Epidemiologie, Postbus 616 (DEB I)
Aanvraagident : 6200 MD MAASTRICHT
Aanvrageridentt : 0036/9999
Eindgebruiker : UM106915 tav

7

PPN Titel : 213896656,1
Titel : Parkinsonism & related disorders
:
Auteur :
Deel/Supplem. :
Corporatie : Externe database:
Jaar/Editie : 199X Extern nummer :
Uitgave : [S.l.] Elsevier Science
Serie/Sectie :
Pag-ISSN/ISBN : 1873-5126

Plaatscode : 213896656 ; QA ; ; 1995 V1 -

Jaar : 2007-00-00
Volume : 13
Aflevering : 2
Auteur : Keus, S. et al Aanvrageridentt. : MW.M.J.G.MOLL-ZWART VOORSPUI
Artikel : Effectiveness of physiotherapy in Parkinson`s disease: the.....
Bladzijden : 115-121
Bron :
Opmerking :