



## Multidisciplinary care for patients with Parkinson's disease

M.A. van der Marck<sup>b,c</sup>, J.G. Kalf<sup>a,b,c,e</sup>, I.H.W.M. Sturkenboom<sup>b,c,e</sup>, M.J. Nijkrake<sup>a,b,c,e</sup>, M. Munneke<sup>b,c,d,e</sup>, B.R. Bloem<sup>a,c,\*</sup>

*Radboud University Nijmegen Medical Centre, Donders Institute for Brain, Cognition and Behaviour<sup>d</sup> & Nijmegen Centre for Evidence Based Practice<sup>b</sup>, Departments of Neurology<sup>c</sup>, IQ Health Care<sup>d</sup> and Rehabilitation Medicine<sup>e</sup> Nijmegen, The Netherlands*

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### SUMMARY

Parkinson's disease (PD) is a chronic and progressive neurodegenerative disorder with a complex phenotype, featuring a wide variety of both motor and non-motor symptoms. Current medical management is usually monodisciplinary, with an emphasis on drug treatment, sometimes supplemented with deep brain surgery. Despite optimal medical management, most patients become progressively disabled. Allied health care may provide complementary benefits to PD patients, even for symptoms that are resistant to pharmacotherapy or surgery. This notion is increasingly supported by scientific evidence. In addition, the role of allied health care is now documented in recent clinical practice guidelines that are available for physiotherapy, occupational therapy and speech-language therapy. Unfortunately, adequate delivery of allied health care is threatened by the insufficient expertise among most therapists, and the generally low patient volumes for each individual therapist. Moreover, most allied health interventions are used in isolation, with insufficient collaboration and communication with other disciplines involved in the care for PD patients. Clinical experience suggests that optimal management requires a multidisciplinary approach, with multifactorial health plans tailored to the needs of each individual patient. Although the merits of specific allied health care interventions have been scientifically proven for other chronic disorders, only few studies have tried to provide a scientific basis for a multidisciplinary care approach in PD. The few studies published so far were not yet convincing. We conclude by providing recommendations for current multidisciplinary care in PD, while highlighting the need for future clinical trials to evaluate the cost-effectiveness of a multidisciplinary team approach.

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### 1. Introduction

Parkinson's disease is a chronic and progressive neurodegenerative disorder with a complex and diverse phenotype. Clinically discernable motor features include varied combinations of resting tremor, akinesia, rigidity, gait impairment and postural instability. In addition, most patients also experience a wide variety of non-motor symptoms, including neuropsychiatric complaints (depression, anxiety or cognitive decline), sleep disorders, autonomic dysfunction and sensory problems. These non-motor symptoms have a major impact on the quality of life and are an important source of disability.

### 2. Current medical management

The current therapeutic approach of PD is often 'monodisciplinary', i.e. only one medical discipline is involved in the care for patients. In most cases this is the medical specialist (neurologist or geriatrician) who focuses on minimising motor symptoms and reducing disease severity. Therapy is based primarily on symptomatic treatment with dopaminergic medication, and this is usually effective in reducing the classical motor features. However, there are drawbacks to current pharmacotherapy in PD. First, even levodopa is unable to sufficiently alleviate all motor symptoms. For example, ON-period freezing, falling and postural instability are usually not very responsive to dopaminergic treatment. Second, only few non-motor symptoms are responsive to dopaminergic treatment. Some non-motor symptoms may actually worsen due to dopaminergic therapy, including e.g. orthostatic hypotension or hallucinations in PD. Third, long-term use of dopaminergic treatment is complicated by development of dose-limiting response fluctuations, including sometimes disabling dyskinesias. Deep brain surgery can be considered when motor symptoms can no longer be controlled satisfactorily with drug treatment. These surgical procedures are

\* Corresponding author. Professor B.R. Bloem. Department of Neurology (935), Radboud University Nijmegen Medical Centre, Parkinson Centre Nijmegen (ParC), P.O. Box 9101, 6500 HB Nijmegen, The Netherlands. Tel.: +31 243 615202; fax: +31 243 541122.  
E-mail address: [b.bloem@neuro.umcn.nl](mailto:b.bloem@neuro.umcn.nl) (B.R. Bloem)

**Table 1**

Differences between medical management (pharmacotherapy and deep brain surgery) and allied health care

	Medical management	Allied health care
Focus	•Disease process	•Impact of disease process on daily functioning
Treatment goals	•Reduce symptoms •Minimise disease severity	•Reduce disability due to motor and non-motor symptoms •Improve participation in roles and activities in daily live •Improve level of activities
Working mechanism	•Correct nigrostriatal dysfunction	•Support compensatory (movement) strategies
Scientific evidence	•Moderate to strong	•Limited (occupational therapy) to moderate or strong(physiotherapy, speech therapy)

suitable for only a selected group of patients, and the symptomatic effects do not exceed those obtained with dopaminergic therapy. Hence, pharmacotherapy and neurosurgery alone are insufficient to meet the entire symptom complex of PD.

### 3. Allied health care

Allied health care may complement these standard medical treatments, both in terms of focus, treatment goals and working mechanisms (Table 1). Allied health care includes physiotherapy (PT), occupational therapy (OT) and speech-language therapy (SLT), as well as treatment by dieticians, social workers or sexologists. While the neurologist determines disease severity and optimizes medical treatment to reduce symptoms, allied health therapists aim to minimize the impact of the disease process and improve the patient's participation in everyday activities. The underlying working mechanism is also different. Both pharmacotherapy and neurosurgery aim to correct nigrostriatal dysfunction in PD. In contrast, allied health therapists try to bypass the defective basal ganglia by engaging alternative neural circuitries that are still intact (cortical pathways and sensory systems). This generic principle can be applied to support a broad variety of motor functions, such as increasing the stride length while walking, or phonating louder when talking. There are three motor strategies that are specific for patients with hypokinetic-rigid features and that can be applied for both PT, OT and SLT: (a) avoiding multitasking during daily activities, by instructing patients to focus on the primary task at hand; (b) using cues to initiate and maintain movements during activities; and (c) dividing complex movements into a series of simpler components of the overall task, such that each component now needs to be executed independently and sequentially [1].

Support for the possible merits of allied health care long came from mere clinical experience. Here we will discuss how allied health care is increasingly developing into an evidence-based profession.

#### 3.1. Physiotherapy

The therapeutic arsenal of physiotherapy in PD is outlined in an evidence-based guideline for clinical practice [1]. This guideline has been adopted by the Association of Physiotherapists in Parkinson's Disease Europe (APDDE) and is available online (<http://www.appde.eu>). The guideline incorporates all available scientific evidence, and is supplemented with expert opinion. Among the 39 recommendations for clinical practice, there were several strong recommendations (i.e. based on randomized trials of good methodological quality): application of cueing strategies to improve gait, application of cognitive movement strategies to improve transfers (e.g. turning around in bed, and rising from a chair), and exercise therapy to improve balance (mainly strength and balance training).

An update of the guideline appeared in 2008 [2]. New findings included the notion that cueing strategies improved not only

undisturbed gait, but also gait while performing a secondary motor task. In addition, cues were found to be helpful for improving posture, transfers (performance of sit to stand), and the confidence to carry out functional activities without falling. Another relevant finding was that cueing strategies, although effective in the short term, had no long-term effects (as determined at 6 weeks of follow-up) [3]. However, cueing strategies may be more effective under real life circumstances when cues are needed most. There was also new evidence for exercise therapy: high-force eccentric resistance training of the lower extremities improved physical capacity, as reflected by improvements in stair descent, walking distance and muscle volume [4]. A meta-analysis provided a strong recommendation that exercise therapy can improve physical capacity (strength, balance), gait speed and health-related quality of life [5]. Two treadmill training studies provided supporting evidence that exercise therapy can improve gait parameters, lower extremity tasks and well-being [6,7]. Finally, one hour of Tango classes improved both balance (Berg Balance Score) and gait (backward stride length) [8]. This 'Tango study' also illustrates the challenge to scientifically identify the most effective component of such mixed and complex interventions: the music can act as an auditory cue, the consecutive steps of the dance can act as a movement strategy, and the activity itself can act as an exercise.

#### 3.2. Occupational therapy

PT and OT are closely related, but the treatment goals are different. PT aims to improve daily functioning by enhancing basic skills such as gait or transfers. In contrast, OT focuses on being able to use these skills, enabling patients to engage in meaningful roles and activities in the domains of self care, productivity and leisure activities. OT interventions can focus on changing person-related factors, on adopting the actual activities themselves, and on tackling the environment where the activities are being performed.

In 2008, an evidence-based guideline for OT in PD was published in the Netherlands (translation into English is underway) [9]. A total of 31 recommendations were made, covering referral, assessment techniques and treatment. Good scientific evidence for the effectiveness of OT in PD is lacking, hence recommendations were made based on indirect evidence obtained from PT. Specifically, the assumption was made that PD-specific compensatory strategies (shown previously to enhance basic skills) are also effective in optimizing activity performance. Additional indirect evidence was obtained from published experience with effective OT interventions for other chronic conditions (e.g. dementia and multiple sclerosis), whenever these interventions were felt to be relevant for PD.

Important elements of the guidelines are the focus on encouraging self-management skills and addressing the needs of caregivers on issues related to activities and participation. Another recommended OT intervention is coaching the patient in carefully planning daily and weekly routines, while considering factors such as energy level, medication effects and speed of task performance.

A daily or weekly activity plan may also provide a structure for patients with problems in initiating or planning activities. To optimize the use of motor or cognitive strategies and activity performance, the occupational therapist can advise the patient and caregiver about alternative equipment or changes to the physical environment.

The guideline also highlighted the need for well-designed intervention trials. No large scale OT intervention trials have been published since appearance of the guideline, but some relevant articles have been published. These articles concern the possible contribution of OT in self-management in PD [10], the use of assistive devices and mobility aids in PD [11], and approaches to optimize hand function in PD [12]. A pilot RCT in the UK supports the feasibility of evaluating OT in a randomised clinical trial [13]. In the Netherlands, an RCT has started this year to evaluate the impact of a 10-week OT intervention according to clinical practice guidelines.

### 3.3. Speech and language therapy

In 2008, an evidence-based guideline for SLT in PD was published in the Netherlands [9]. This guideline provides 60 recommendations that can assist speech-language therapists in clinical decision making, during both assessment and treatment. The treatment goals can be bundled into three main domains: speech impairment (hypokinetic dysarthria), swallowing disorders, and drooling. The recommendations are graded from strong ( $n=2$ ), moderately strong ( $n=41$ ) to weak (remainder). The two strong recommendations were made in the domain of speech. One recommendation is to limit dysarthria assessment in PD to establishing whether or not patients are indicated for specific intensive treatment (Lee Silverman Voice Treatment – LSVT- or Pitch Limiting Voice Treatment – PLVT) [14,15]. The other strong recommendation is to treat patients with an indication with PLVT or LSVT *at least* three times a week for *at least* four weeks [14], the highest treatment intensity that is currently realistic, at least for Dutch SLTs. Patients with severe hypokinetic dysarthria or mixed dysarthria (resulting from atypical parkinsonism) can profit from the same approach, but results are obviously limited.

Other work showed that videophone-delivered speech therapy can be cost-effective [16]. In the field of drooling there is new evidence that botulinum toxin injections can trim down saliva production, without improving swallowing physiology [17]. In the field of dysphagia, a small pilot study demonstrated that the daily use of effortful swallowing (assisted with biofeedback) for two weeks was helpful in reducing dysphagia in PD [18]. Another small study showed that expiratory muscle strength training can reduce aspiration while swallowing in PD [19]. Although evidence is still limited, it seems that high-energy treatments are not only effective in improving voice quality and intelligibility in PD [20], but also in improving swallowing and maybe also saliva control.

### 3.4. Drawbacks to current allied health care

Allied health care as it is currently used is not without shortcomings. More good quality randomized trials are needed to demonstrate the effectiveness of allied health care interventions. Furthermore, more work is needed to show if allied health approaches can be applied universally in all patients, or whether certain subgroups are less suitable for receiving these treatments. For example, the presence of cognitive impairment can interfere with the aforementioned treatment strategies, because patients may be unable to understand the recommendations or fail to memorise their new movement strategies. Patients with cognitive impairment may also fail to appreciate the risks of

walking disturbances or dysphagia. Hence, therapy should also focus on safety aspects. The caregivers should be involved whenever possible, because they can support the patient by applying the newly acquired strategies while performing daily activities.

Another problem is that allied health care interventions are typically used in isolation, despite partially overlapping treatment strategies and partially complementary goals. In current clinical practice, most health professionals are unfamiliar with the potential treatment options offered by other professionals [21]. For example, LSVT is such an intensive training that less emphasis on other treatments during those four weeks is highly advisable.

## 4. Multidisciplinary treatment of PD

Given the complexity of PD, a multidisciplinary approach would appear to be preferable. Indeed, allied health care interventions are effective for only part of the complex symptom spectrum in PD. A multidisciplinary team approach, combining pharmacological and non-pharmacological therapies, thus seems necessary to obtain optimal therapeutic efficacy. For this reason (and also increasingly driven by patient foundations), specialized PD centres have begun to implement integrated and multidisciplinary health care programs within their clinical practice. The UK-based NICE guideline also recommends regular access to a broad range of medical and allied health professionals. An obvious question is: who should be part of the team? There is no evidence whatsoever that has addressed this question, and our impression (based on discussions with colleagues) is that a considerable variation exists in team constitution across different treatment centres, depending on issues such as availability of expertise and funding. It is not known which clinical structure or team involvement is most effective, and the NICE guidelines give no recommendations as to how to organize the multidisciplinary care.

Theoretically speaking, multidisciplinary care teams for PD patients could include a wide range of different professionals, including medical specialists (neurologist, neurosurgeon, psychiatrist, geriatrician, urologist), specialised PD nurse specialists and allied health professionals (at least PT, OT and SLT). In addition, dieticians, social workers, sexologists and clinical neuropsychologists can be included in the team. Important elements of inter-professional team work are, among others, shared goal setting and shared contribution to treatment plans, effective communication and appropriate referrals to other team members. These aspects should all be incorporated when organizing multidisciplinary care for PD patients. Professionals should work according to evidence-based guidelines, when these are available. The goals should be defined not only around disease severity and symptoms, but should also consider mobility, independence and relationships. Importantly, the treatment plan should address the individual needs of each patient. In our Parkinson Centre Nijmegen, we routinely invite our patients to prioritize their own 'top five' complaints, and we have been struck by the wide variety in priorities set by different patients. Because this prioritization is done before the actual visit to our centre, we can adjust the team constellation according the unique needs of each patient. This client-centered approach improves the quality of care, while reducing the amount of redundant attention to issues that are less relevant for patients.

The treatment plan is incomplete without engaging the immediate caregiver, family and friends. Many caregivers have a crucial role in assisting more severely affected patients in using cues or cognitive movement strategies. Caregivers may also benefit from OT, by improving their ability to cope with complex situations and to gain more competence in supporting the patient. Moreover, an optimal multidisciplinary approach also addresses the needs of the caregivers. When the caregiver collapses, patients may lose

their independence, and must resort to much more expensive assisted care.

## 5. Evidence for multidisciplinary care in PD (and beyond)

Multidisciplinary care is used increasingly, but the question arises how well founded this approach is. Scientific evidence on the effectiveness of multidisciplinary care in PD is limited. Positive effects on health, disability, quality of life and well-being have been reported in several uncontrolled studies that used a pre-test versus post-test design [22–25]. Only few studies used a controlled design to evaluate the effectiveness of multidisciplinary care in PD [26,27]. One crossover RCT evaluated a multidisciplinary intervention that featured individualised PT, OT, SLT, specialized nursing, access to a social services care manager, and group educational support [27,28]. Improvements for patients and their caregivers were found directly after the program (using a pre-post test design), but these had disappeared after six months of follow-up. A recent RCT evaluated the effect of group education combined with personal rehabilitation delivered by a multidisciplinary team, including a specialized movement disorder neurologist, PT, OT, dietician, psychologist and a nurse [29]. Positive effects were found for quality of life, activities of daily living (UPDRS-II) and motor scores (UPDRS-III) at eight weeks after the intervention.

Given this limited availability of good quality research, we resorted to published evidence that supported the merits of multidisciplinary care for other chronic neurological or even non-neurological disorders. Generally speaking, some trends have been found towards positive effects of integrated care programs in the chronically ill [30]. In addition to positive effects for patients, team work may also improve process outcomes, such as compliance and adherence to guidelines, and lead to a higher degree of work satisfaction.

## 6. Future trials

Although sound scientific evidence is available for certain allied health care interventions, the evidence for an integrated multidisciplinary approach is still limited. Clearly, more work is needed to substantiate the general feeling that multidisciplinary care improves the quality of care and leads to a better outcome for patients. Research is needed to provide a more thorough basis for multidisciplinary care in PD (in case of positive findings), or to a critical reappraisal of this costly and time-consuming intervention (in case of negative findings). There is also a need to determine which specific elements should be part of the multidisciplinary approach, and whether a 'one size fits all treatment' is as good as an individually tailored approach. Even positive findings need to be weighed against the undoubtedly higher costs associated with multidisciplinary care: how much is the society willing to spend on quality of life for PD patients and their families? In the Netherlands, we are currently performing a large cluster controlled trial (the IMPACT study) to evaluate the effectiveness and costs of integrated, multidisciplinary care in PD, as compared to usual – i.e. largely monodisciplinary – care. Hopefully, the results of this trial and other studies will contribute to a better quality of care for PD patients and their families.

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## Conflict of interests

The authors have no conflicts of interest to report.

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