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[Intervention Review]

Occupational therapy for patients with Parkinson's disease

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ABSTRACT

Background

Despite drug and surgical therapies for Parkinson's disease, patients develop progressive disability. It has both motor and non-motor symptomatology, and their interaction with their environment can be very complex. The role of the occupational therapist is to support the patient and help them maintain their usual level of self-care, work and leisure activities for as long as possible. When it is no longer possible to maintain their usual activities, occupational therapists support individuals in changing and adapting their relationship with their physical and social environment to develop new valued activities and roles.

Objectives

To compare the efficacy and effectiveness of occupational therapy with placebo or no interventions (control group) in patients with Parkinson's disease.

Search methods

Relevant trials were identified by electronic searches of MEDLINE (1966-April 2007), EMBASE (1974-2000), CINAHL (1982-April 2007), Psycinfo (1806-April 2007), Ovid OLDMEDLINE (1950-1965), ISI Web of Knowledge (1981-April 2007), National Library for Health (NLH) (April 2007), Nursing, Midwifery and Allied Health (NMAP) (April 2007), Intute: Medicine (December 2005), Proquest Nursing Journals (PNJ, 1986 - April 2007); rehabilitation databases: AMED (1985-April 2007), MANTIS (1880-2000), REHABDATA (1956-2000), REHADAT (2000), GEROLIT (1979-2000); English language databases of foreign language research and third world publications: Pascal (1984-2000), LILACS (1982-April 2007), MedCarib (17th Century-April 2007), JICST-EPlus (1985-2000), AIM (1993-April 2007), IMEMR (1984-April 2007), grey literature databases: SIGLE (1980-2000), ISI-ISTP (1982-April 2007), DISSABS (1999-2000), Conference Papers Index (CPI, 1982-2000) and Aslib Index to Theses (AIT, 1716- April 2006), The Cochrane Controlled Trials Register (Issue 2, 2007), the CenterWatch Clinical Trials listing service (April 2007), the metaRegister of Controlled Trials (mRCT, April 2007), Current controlled trials (CCT) (April 2007), ClinicalTrials.gov (April 2007), CRISP (1972-April 2007), PEDro (April 2007), NIDRR (April 2007) and NRR (April 2007) and the reference lists of identified studies and other reviews were examined.

Selection criteria

Only randomised controlled trials (RCT) were included, however those trials that allowed quasi-random methods of allocation were allowed.

Data collection and analysis

Data was abstracted independently by two authors and differences were settled by discussion.

Main results

Two trials were identified with 84 patients in total. Although both trials reported a positive effect from occupational therapy, all of the improvements were small. The trials did not have adequate placebo treatments, used small numbers of patients and the method of randomisation and concealment of allocation was not specified in one trial. These methodological problems could potentially lead to bias from a number of sources reducing the strength of the studies further.

Authors' conclusions

Considering the significant methodological flaws in the studies, the small number of patients examined, and the possibility of publication bias, there is insufficient evidence to support or refute the efficacy of occupational therapy in Parkinson's disease. There is now a consensus as to UK current and best practice in occupational therapy when treating people with Parkinson's disease. We now require large well designed placebo-controlled RCTs to demonstrate occupational therapy's effectiveness in Parkinson's disease. Outcome measures with particular relevance to patients, carers, occupational therapists and physicians should be chosen and the patients monitored for at least six months to determine the duration of benefit. The trials should be reported using CONSORT guidelines.

PLAIN LANGUAGE SUMMARY

There is inadequate evidence to evaluate the effect of occupational therapy for people with Parkinson's disease.

Parkinson's disease is a progressive disabling neurodegenerative disease. Symptoms can include problems with movement such as being stiff, slow, and shaky, and sometimes non-motor symptoms such as problems with communication, mood, vision, and problem solving abilities. The role of the occupational therapist is to support individuals with Parkinson's disease and to enable them to maintain their usual level of self-care, work and leisure activities for as long as possible. The review found inadequate evidence from randomised controlled trials to evaluate the effect of occupational therapy for people with Parkinson's disease.

BACKGROUND

Following a diagnosis of Parkinson's disease, individuals and their families face many life changes; many practical and emotional re-adjustments are needed to allow the individual to maintain their everyday activities. In the early stages of the condition many of the symptoms can be controlled by medication, principally with levodopa combined with a dopa decarboxylase inhibitor. This allows individuals to continue in their usual everyday self-care, working and leisure activities. Self-care may include activities such as washing, dressing, feeding and shopping. Work activity may be paid work, voluntary work or family work, such as looking after children. However it is recognised that various impairments due to the disease can impact upon the patient's quality of life even at an early stage of the disease and coping strategies are needed to compensate for these.

It is now known that in long-term usage, levodopa precipitates motor complications such as involuntary movements and fluctuations in response. In spite of optimal pharmacological therapy, the underlying disease continues to progress. In the later complex stages of Parkinson's disease, individuals are faced with a considerable number of motor and possibly cognitive and communication impairments that can severely restrict their ability to continue their usual self-care, working and leisure roles. This can result in high levels of disability, handicap and a greatly reduced quality of life (Yarrow 1999).

"The main aim of occupational therapy is to maintain, restore or create a balance, beneficial to the individual, between the abilities of the person, the demands of her/his occupations in the area of self care, productivity and leisure, and the demands of the environment" (COT 2003). Occupational therapists are trained to support individuals with Parkinson's disease to maintain their usual level of self-care, work and leisure activity for as long possible (Reed 1992). Interventions may include support in re-organising the daily routine, learning new skills for alternative or adaptive ways to carry out activities, or providing and advising on specialist equipment or resources and patient education (Larson 1996). When it is no longer possible to maintain their usual activities, occupational therapists support individuals in changing and adapting their roles (Gauthier 1987b). The aims of intervention are to reduce stress, minimise disability and handicap and improve quality of life, despite the natural increase in impairment.

A postal questionnaire of 261 Parkinson's patients in touch with the Parkinson's Disease Society in 1982 found that 13% had seen an occupational therapist (Oxtoby 1982). In Mutch et al's 1986 community-based study of 267 patients, 25% had seen an occupational therapist (Mutch 1986). A survey of 72 Parkinson's patients attending a movement disorder clinic in 1995 found that 18% had seen an occupational therapist (Clarke 1995). A members survey of the Parkinson's Disease Society of the United Kingdom with a total of 1,693 respondents found that 17% of respondents had been assessed or treated by an occupational therapist (Yarrow 1999). The authors of all of these surveys considered that the provision of occupational therapy for Parkinson's patients was too low.

Traditionally patients have been referred to an occupational therapist in the late stages of the disease when they are experiencing significant levels of disability. A survey of current occupational therapy services for people with Parkinson's disease in the UK showed that occupational therapy was usually provided over a relatively short period of time (six 45-minute face-to-face sessions over two months), after which the person with Parkinson's disease was usually discharged (Deane 2003a). However in a Delphi survey of 150 UK-based occupational therapists, 99% of the respondents agreed that Parkinson's disease requires lifelong provision of occupational therapy, within multidisciplinary teams. They agreed that referral to occupational therapy at initial diagnosis, with an annual review and a review after every significant functional decline using an open access self -referral service is "best practice" (Deane 2003b).

UK therapists believe that addressing the social and psychological aspects of the disease was as important as addressing the physical aspects of Parkinson's disease. Four roles have been suggested for occupational therapists treating people with Parkinson's disease: problem solver, educator, networker, and supporter (Deane 2003b). The framework for intervention for occupational therapists treating people with Parkinson's disease is likely to be similar to that described for people with Multiple System Atrophy (a Parkinson-plus syndrome) (Jain 2005). Because of the deteriorating nature of both conditions it can be suggested that the main aim of occupational therapy for these clients is to promote and maintain satisfactory occupational performance. The process is directed by the client and the framework used involves three separate stages of intervention:
Stage 1: goal setting
Stage 2: (a) activity analysis and (b) access to other services
Stage 3: (a) enhance performance by improving skills, (b) support performance by increasing knowledge about how to modify the task and (c) change performance by modifying attitude and expectations.
At present all of the research into the specifics of occupational therapist's interventions has been done within the context of the National Health Service of the United Kingdom. As occupational therapy is by its very nature affected by cultural factors, it is important that care is taken when trying to apply these roles and activities to occupational therapy as performed within other cultures.

Occupational therapy is based on a core principle: that productive occupation is essential for a person's good health, and that productive occupation is everything that a person wants to do and everything they have to do in order to do what they want to do. The person's needs therefore shape the therapy required to achieve productive occupation for that person. This individualisation can clash with the design and interpretation of the results of an RCT. An RCT can determine only what response an 'average person' would be likely to have to a standardised intervention. No such 'average person' exists; but this idealisation is used to show the generalised effectiveness of an 'average' intervention in a given population. Such generalisations are standard in clinical practice and allow for the management of services. However this clash of principles, along with the difficulty is measuring holistic outcomes, such as improved occupational fulfillment, with standardised assessment tools has generated much debate within the profession as to whether RCTs studies are actually the most appropriate tool to measure the effect of occupational therapists on complex conditions such as Parkinson's disease (Tse 2000; Ottenbacher 2001; Hyde 2004). The authors of this review believe that if an RCT is designed pragmatically, with patient-relevant outcomes, and with care to reducing sources of bias (Deane 2006a), then the

efficacy and effectiveness of occupational therapy for people with Parkinson's disease can be determined.

This systematic review of randomised controlled trials will assess the efficacy and if possible the effectiveness of occupational therapy in Parkinson's disease patients.

OBJECTIVES

To compare the efficacy and effectiveness of occupational therapy with placebo or no interventions (control group) in patients with Parkinson's disease.

METHODS

Criteria for considering studies for this review

Types of studies

All randomised trials comparing occupational therapy with a placebo control intervention or no intervention were considered for inclusion in the study. Both random and quasi-random methods of allocation were allowed.

Types of participants

- Patients with a diagnosis of Parkinson's disease (as defined by the authors of the studies). .
- Any duration of Parkinson's disease.
- All ages.
- Any drug therapy.
- Any duration of treatment.

Types of interventions

Occupational therapy or a placebo control intervention, or no intervention.

Types of outcome measures

1. Motor impairment: (a) Global (e.g. United Parkinson's Disease Rating Scale (UPDRS) motor score, part III).
(b) Individual measures of bathing, dressing etc.
(c) Timed tests of activities (e.g. rising from chair).
2. Activities of daily living (e.g. UPDRS Activities of Daily Living (ADL) score, part II).
3. Handicap and quality of life measures, both disease specific (e.g. Parkinson's Disease Questionnaire - 39, PDQ-39) and generic (e.g. Short Form - 36, SF-36).
4. Depression rating scales (e.g. Hospital Anxiety and Depression Scale, HADS).
5. Adverse effects.
6. Carer outcomes (e.g. Carer strain index).
7. Economic analysis.
We examined both short term and long term (e.g. 6-12 months) effects of the intervention.

Search methods for identification of studies

This review is an update of the initial review (Deane 2001c). The majority of databases were re-searched in the process of this update but some databases were no longer available online or inaccessible to the current research team.

1. The review is based on the search strategy of the Cochrane Movement Disorders Group and also the following more general search strategy:
a. Occupational therapy OR rehabilitation
b. Parkinson OR Parkinson's disease OR Parkinsonism
c. #a AND #b
Relevant trials were identified by electronic searches of general biomedical and science databases: MEDLINE (1966-April 2007), EMBASE (1974-2000), CINAHL (1982-April 2007), Psycinfo (1806 - April 2007), Ovid OLDMEDLINE (1950-1965), ISI Web of Knowledge (1981-April 2007), National Library for Health (NLH) (April 2007), NMAP (April 2007), Intute: Medicine (April 2007), Proquest Nursing Journals (PNJ, 1986 - April 2007); rehabilitation databases: AMED (1985-April 2007), MANTIS (1880-2000), REHABDATA (1956-2000), REHADAT (2000), GEROLIT (1979-2000); English language databases of foreign language research and third world publications: Pascal (1984-2000), LILACS (1982- April 2007), MedCarib (17th Century-April 2007), JICST-EPlus (1985-2000), AIM (1993-April 2007), IMEMR (1984-April 2007) and hand searching of appropriate journals. Relevant trials were included on the Group's specialised register of randomised controlled trials. Further details are available in the Group's module within the Cochrane library.

2. The Cochrane Controlled Trials Register (Issue 2, 2007), the CentreWatch Clinical Trials listing service (April 2007), the metaRegister of Controlled Trials (mRCT, April 2007), Current controlled trials (CCT) (April 2007), ClinicalTrials.gov (April 2007), CRISP (1972-April 2007), PEDro (April 2007), NIDRR (April 2007) and NRR (April 2007), were also searched for relevant trials.

3. The reference lists of located trials and review articles were searched.

4. Grey literature (e.g. conference abstracts, theses and internal reports) were searched. This included The XIII International Congress on Parkinson's disease (1999), The International Congress of Parkinson's Disease and Movement Disorders (1990, 92, 94, 96, 97, 98), The American Academy of Neurology 51st annual meeting (1999). The following grey literature databases were searched: SIGLE (1980-2000), ISI-ISTP (1982-April 2007), DISSABS (1999-2000), Conference Papers Index (CPI, 1982-2000) and Aslib Index to Theses (AIT, 1716- April 2006).

5. National and regional professional associations were asked to search for relevant trials. Requests for help were placed on bulletin boards on their web pages.

6. Universities and colleges that carry out degree courses in occupational therapy were asked to search for any relevant unpublished projects.

7. Patient support groups (e.g. The UK Parkinson's Disease Society and The World Parkinson's Disease Association) were asked if they had funded any relevant trials. Requests for help were placed on bulletin boards on their web pages.

Data collection and analysis

The authors independently assessed the studies identified by the search strategy. Disagreements about inclusions were resolved by discussion.

All authors of eligible studies were contacted for further unpublished details of their trials. The full papers were assessed for

methodological quality by recording a number of items that could either introduce bias or could affect the assessment of the data presented in the study. This included the method of randomisation and blinding, whether an intention-to-treat analysis was used and the number of patients lost to follow up (see Table 1 Methodological Quality of Included Studies).

Eligible data was abstracted by two authors (KHO Deane and C Ellis-Hill) onto standardised forms independently, checked for accuracy and amalgamated. Disagreements about inclusions were resolved by discussion. Both trials included in this review were identified in the first version of this review, the authors of which are in the acknowledgements. A new team of authors found no additional trials but did identify significant publications that had impact on the background section and the recomendations for future research section.

Ordinal data such as UPDRS motor subsection scores were treated as if they were interval data (i.e. continuous), where we could make an assumption of equality of intervals e.g. UPDRS part II ADL and part III motor. Although we recognise that this is controversial, Popham 1973 reported that 'when parametric procedures have been employed with ordinal data, they rarely distort a relationship between variables which may be present in the data'. Other ordinal data such as UPDRS complications of therapy subsection (and thus total UPDRS) is based on summation of the scores from a series of equally weighted dichotomous questions, there is no 'equality of interval' and so this data was analysed in a nonparametric fashion. We made an assumption of equality of intervals for all of the ordinal data except the Nottingham Health Profile (NHP) and the Barthel Index. The NHP includes dichotomous questions (yes/no answers) so there could be no equality of interval. The Barthel Index had a number of questions that score either 5 or 10, this is equivalent to a dichotomous answer and so there could be no equality of interval.

RESULTS

Description of studies

See Table: Characteristics of Included Studies and Table 2 Key Characteristics of Included Studies.

Only two trials were found examining the efficacy of occupational therapy in patients with Parkinson's disease. Both trials were parallel group, single centre studies. There were significant differences in the methodologies of the two trials. Gauthier 1987a examined 64 patients, treated them individually with occupational therapy for 20 hours over 5 weeks and followed them for 1 year. Fiorani 1997 examined 20 patients, treated them with physiotherapy individually or with physiotherapy and occupational therapy in a group. They were treated for 12 hours over 1 month and assessed immediately at the end of the therapy.

PARTICIPANTS

The patients in the two treatment groups in Gauthier 1987a were similar at baseline for disease severity and age, although the distribution of men and women in the treatment and control groups was not stated. Fiorani 1997 did not state the characteristics of the patients according to treatment group, thus their similarity at baseline could not be determined. The average age of these patients was slightly older (70.6 years) than in Gauthier 1987a (63.1 years), although the disease severity as determined by their Hoehn and Yahr score, appeared to be similar in both studies (Fiorani 1997 median 3.0, Gauthier 1987a mean 2.7).

INTERVENTION

The occupational therapy component of the two trials differed significantly. Gauthier 1987a carried out general mobilisation activities, socialisation, dexterity, functional and educational activities. They included the use of visual and auditory cues. The therapy was conducted by an occupational therapist. Fiorani 1997 occupational therapy sessions consisted of handicrafts, picture drawing, basketry, folk singing, dancing and games. It is unclear whether this therapy was conducted by an occupational therapist or not.

Both randomised controlled trials were conducted on an open label, parallel group, single centre, outpatient basis including a total of 84 patients with Parkinson's disease. Fiorani 97 treated their 20 patients for a total of 12 hours over 1 month whereas Gauthier 87 treated their 64 patients for 20 hours over 5 weeks.

CONTROL DESIGN

The control arm differed significantly between the two trials. Gauthier 1987a stated that the control group were assessed in the same manner as the treated group, but did not describe what, if anything, was done with the control group. Fiorani 1997's control group were given physiotherapy alone whereas the treatment group were given physiotherapy and occupational therapy. However the control group were treated individually and the therapy group were treated as a group. This means that any differences detected could be due to the occupational therapy, or due to being treated in a group.

OUTCOME MEASURES

The outcome measures in the two trials were not comparable. Gauthier 1987a measured the change in the patients' Barthel Index over 1 year, and their changes in their Extrapyramidal Symptoms Rating Scale (ESRS) (physical and motor signs) immediately, 6 months and 1 year after therapy. The six items from the ESRS that Gauthier et al used were an assessment of facial expressiveness, bradykinesia, gait and posture, tremor and akathisia. Fiorani 1997 measured changes in outcomes immediately after the therapy using measures such as UPDRS (parts I, II & III), walking velocity, Brown ADL score, Nottingham Health Profile and Beck Depression Index.

EXCLUDED STUDIES

See Table: Characteristics of Excluded Studies.

Six other trials were found that included some occupational therapy interventions. However these trials were all determined to be mostly physiotherapeutic in their aims and so are all included in the Cochrane reviews ' Physiotherapy for patients with Parkinson's disease' or 'A comparison of physiotherapy techniques for patients with Parkinson's Disease'.

Risk of bias in included studies

See Table 1 for Summary of Methodological Quality of the Trials.

It would be difficult to blind patients and therapists in trials examining the efficacy of occupational therapy. This leaves such trials open label and thus liable to performance and attrition bias. Performance bias could be due to factors such as the patients in the therapy group performing better due to placebo and Hawthorn effects, whilst attrition bias could be due to factors such as the

patients in the placebo group potentially being more likely to withdraw from the trial due to disappointment at not being placed in the active therapy arm. Detection bias is also a concern if the assessors are not blinded as to the allocation of the patients, and obviously it is a factor in any patient assessed scales.

GAUTHIER 1987

Gauthier 1987a contains no details about the method of randomisation or concealment of allocation, thus selection bias cannot be excluded. The assessors were blinded so detection bias is unlikely, however there were no details on how this was achieved.

There is a discrepancy in the reporting of the number of patients who completed the trial. It is stated that 3 patients dropped out of the occupational therapy arm (leaving 29 patients) and 2 out of the control arm (leaving 30 patients). However the data tables all have the therapy arm with 30 patients and the control arm with 29.

The control group were assessed in a similar manner to the therapy group, however no description of the control intervention was given. It is therefore assumed that they were untreated. This is an inadequate placebo control as the therapy group were treated like outpatients and therefore had to get up for a set time, dress, travel, spend time in the company of other patients etc., none of which is occupational therapy but which may have had an effect on the patients' well-being. (See discussion for fuller description of an 'ideal' placebo therapy arm).

The method of occupational therapy used was described in a very broad manner. It would have been useful if a fuller description of the method of therapy had been given so that it would be easier to compare this trial with others. Further details were not available from the authors.

The data was analysed on a per protocol basis (i.e. withdrawn patients were excluded from the analysis). This may have introduced bias as it is possible that the drop-outs occurred due to the therapeutic input, or the lack of it. The data should have been analysed in an intention-to-treat manner to avoid such bias. Also there were no between group comparisons of the data reported, although this could be derived from the information provided.

Not all of the data potentially available was reported as means and standard deviations. For example the Purdue Pegboard test was carried out at baseline, 6 and 12 months later, and the Bradburn Index of Psychological Well-Being was administered before and after the therapy, but only significance values were reported. This meant that this data could not be assessed and there may be publication bias in favour of full reporting of the positive results as the Purdue pegboard test was stated to be unchanged after therapy.

Gauthier 1987a measured outcomes over a one year period. This long term follow-up is most helpful in determining the duration of benefit from occupational therapy. However the outcome measures used have a number of limitations and validity issues that are considered further in the Discussion.

FIORANI 1997

Communication with the authors revealed that patients were listed alphabetically and randomised according to a random number list; even and odd numbers were assigned to group A or B respectively. This is an acceptable method of randomisation which would have been difficult to tamper with, so concealment of allocation is adequate. It was not stated whether the assessors were blinded.

The baseline characteristics of each group of patients was not given although it was stated in a poster communication that no inter-group differences were found at baseline with respect to impairment and disability measures. The number of drop-outs was not stated.

The control group were treated with physiotherapy individually, whereas the therapy group received physiotherapy and occupational therapy as a group. Thus, although the physiotherapy is an acceptable placebo control treatment, it would have been better if it had been performed in a group as in the occupational therapy arm so as to rule out any psychological effects of being in a group of patients. Overall we regarded this placebo control treatment as being inadequate.

The method of physiotherapy was not described at all and, as can be seen in the Cochrane reviews of physiotherapy in Parkinson's disease, there are many methods available and no consensus as to what is 'standard' physiotherapy for Parkinson's patients. It would therefore have been difficult to replicate this protocol.

The method of occupational therapy was described as including handicrafts, picture drawing, basketry, folk singing, dancing and games. Our definition of occupational therapy states that occupational therapists are trained to support individuals with Parkinson's disease to maintain their usual level of self-care, work and leisure activity for as long possible (Reed 1992). Whilst the activities described in Fiorani 1997 may help do this, we do not believe they are targeted to the specific needs of Parkinson's disease patients or the aims of occupational therapy as we have defined them.

Fiorani 1997 only assessed their patients at baseline and immediately after therapy thus allowing no determination of the duration of benefit. However the outcome measures that were chosen by Fiorani were better evaluated for reliability and validity, e.g. UPDRS, walking velocity, ADL and QOL scores, Beck Depression Index (see Discussion for full examination of these outcome measures).

Effects of interventions

See Summary of Results: Table 3.

Neither trial examined the change in an outcome measure in response to occupational therapy or the control intervention between the two groups. Instead the authors of the other studies provided the mean and SD at baseline and after treatment for each therapy group and the significance level of the change due to therapy for each group. We are awaiting advice from the Cochrane Collaboration and other statistical departments on a valid method of calculating the standard deviation of the change from the baseline and final data. Upon receiving this advice we will update this review.

Gauthier 1987a showed that those patients treated with occupational therapy maintained their Barthel Index score over one year, whilst the untreated control group lost an average of 4.7 points. The extrapyramidal symptoms rating scale (ESRS) items were measured post treatment and six months and one year later. However the items measured did not seem relevant to the aims

of occupational therapy for Parkinson's disease and the scoring system was crude (decrease or increase in severity of symptoms) so the data were not included in this review (see Discussion for further details). No numerical data was available for the Purdue Pegboard test or the Bradburn Index of Psychological Well-Being. Although the text did mention t-tests being carried out on this data, the comparisons were within arm (before versus after) rather than between the arms (treatment improvement versus control group improvement).

Fiorani 1997 used a number of outcome measures to evaluate the impact of occupational therapy. Numerical data were only available after personal communication with the authors. The difference in the mean changes between the two groups were all small in all of the outcome measures, see Table 3. No numerical data was available for the Hoehn and Yahr score, the postural adjustment capacity or the Beck Depression Inventory.

Neither study provided any information on adverse events, carer outcomes or performed an economic analysis.

DISCUSSION

PRINCIPAL FINDINGS

- Only 2 randomised controlled trials were found comparing occupational therapy with control group (84 patients). These two studies varied significantly in their methodology. Gauthier 1987a compared occupational therapy with an untreated control group, whereas Fiorani 1997 compared group occupational therapy and physiotherapy with individualised physiotherapy.
- Both trials claimed a positive effect of occupational therapy in Parkinson's disease, however the improvements were small, and it is doubtful whether they were clinically or statistically significant. Considering the serious methodological flaws in the studies, the small number of patients examined, and the possibility of publication bias, it is unsafe to draw any conclusions regarding the efficacy of occupational therapy.
- Whilst the two RCTs had very different styles of intervention, a consensus on standard occupational therapy practice has been identified for therapists working within the National Health Service of the United Kingdom (Deane 2003a; Deane 2003b).
- Large well designed RCTs are needed to demonstrate occupational therapy's efficacy and effectiveness in Parkinson's disease. It is hoped that the current pilot RCT of occupational therapy for Parkinson's disease (Clarke 2005) will provide data to allow the power calculation to be conducted for a full size trial, and that funds will be forthcoming to enable this important trial to be conducted.

METHODOLOGICAL QUALITY OF TRIALS

Overall the methodological quality of the trials and the standard of the reporting was poor. However it is recognised that the Gauthier study (1987) was published before the CONSORT guidelines (1996), when trial reporting was not as formalised as it is today. The Fiorani study was only published as an abstract although a copy of the associated poster and further data was available from the authors upon request.

The method of randomisation and concealment of allocation was not stated in Gauthier 1987a, and was only obtained in Fiorani 1997 after communication with the authors. It is vital that eligibility criteria are well defined so that it is understood what sort of a population were treated. For example it is important that the Parkinson's disease accords with the UK Brain Bank Parkinson's Disease criteria (Gibb 1988).This will reduce the likelihood of including patients with Parkinson's plus syndrome which have a significantly different clinical course compared to idiopathic Parkinson's disease. The eligibility criteria should also define the severity of the Parkinson's disease in the patients eligible to participate, and state clearly any exclusion criteria. This would allow an easier assessment of which Parkinson's disease patients the trial's results apply to.

The occupational therapy and physiotherapy methods were poorly described, which means that it would be very hard to replicate these trials accurately. We also noted that our view of 'standard' occupational therapy was not shared by Fiorani et al. We have some concern that their method of occupational therapy was not specifically directed at the rehabilitation of Parkinsonian disabilities. However neither trial examined the impact of altering the home environment or providing equipment which are central aspects of modern occupational therapy (Deane 2003a; Deane 2003b). It is impossible to determine which form of occupational therapy is most effective from the data available here. It was unclear whether an occupational therapist was involved in the Fiorani 1997 study.

The control therapy in Gauthier 1987a was not described. Fiorani 1997's control group received physiotherapy alone but as they were treated individually as compared to the intervention group that were treated as a group, this placebo was inadequate. Potentially the psychological impact of group versus individual therapy is great. In the group, patients meet others like themselves but have relatively less access to the therapist whilst those treated individually meet no other Parkinsonian patients but do have one-to-one access to their therapist. It is recognised that a placebo therapy in rehabilitation therapy trials is more difficult to arrange than in a drug trial where placebo pills can be prescribed. In a rehabilitation therapy trial both the therapist and the patient are unblinded which could lead to bias. It is important that those patients in the control group do receive as much attention from someone and in the same surroundings as the active therapy group. Patients with Parkinson's disease are frequently socially isolated and the attention paid to them could have significant impact upon their mood and perception of their disability. However it is recognised that a 'placebo' therapy may be impractical to apply in large multicentre trials and that an untreated 'best medical practice' group would represent a less adequate comparator. Although the estimate of the size of improvement due to therapy would be more difficult to determine because of the placebo effect which is estimated at between 10-30% in Parkinson's disease, this design may be more reflective of current therapy provision and practice.

There were components of physiotherapy in both of these trials; explicitly in Fiorani 1997 where both groups received physiotherapy, and implicitly in Gauthier 1987a where the treatment group received mobility and dexterity training. We recognize that there is a significant overlap in the fields of physiotherapy and occupational therapy. This was emphasised by the six trials that we excluded. They all had occupational therapy components to their therapy regimes but overall their aims appeared to be physiotherapeutic and so these trials were included

in the 'Physiotherapy for patients with Parkinson's disease' and 'A comparison of physiotherapy techniques for patients with Parkinson's disease' Cochrane reviews (see excluded trials) (Deane 2001a and Deane 2001b).

It was not clear if the assessors were blinded in Fiorani 1997 which could lead to detection bias. Although Gauthier 1987a stated that the patients were assessed in the morning their 'on' or 'off' status was not described. Considering the major impact that this could have had on their abilities this omission makes the data harder to interpret and compare with other studies.

OUTCOME MEASURES

The outcome measures used varied greatly between the trials and may not have been the most sensitive or appropriate. All of the outcome measures used showed a small improvements after a course of occupational therapy. The outcome measures used in Fiorani 1997 were only assessed at baseline and immediately after therapy. This reduces the impact of the study as it would have been valuable to know the duration of any improvement following therapy. Although Gauthier 1987a assessed their patients over 1 year the only useful outcome measure was the Barthel Index which has a significant ceiling effect (see below) and may not measure small differences in patients abilities. We would recommend that future trials follow their patients for at least six months. This would enable the investigators to determine if the initial improvement directly after therapy persisted for a reasonable period of time. Longer periods of follow-up would be more prone to significant proportions of the patients being lost or withdrawing from the trial.

Summary Measures of Impairment and Disability

The UPDRS was designed to assess the disability and handicap of Parkinson's disease patients. UPDRS has been validated for Parkinsonian patients and has been extensively used in a wide variety of settings. Increasing scores indicate increasing impairment. The only data available from Fiorani 1997 summarised subsections I, II and III (mental, ADL and motor). It would have been more useful to have had a breakdown of the scores for each subsection, as occupational therapy may have most effect on ADL. However UPDRS does have the advantage that it has been validated in Parkinson's disease. The difference in the mean change between the two groups was only 0.2 points. It is unlikely that this was either clinically or statistically significant.

The Extrapyramidal Symptoms Rating Scale (ESRS) used in Gauthier 1987a was originally designed for the measurement of tardive dyskinesia in schizophrenic patients and was validated in this patient group. This leads to questions about the validity of using ESRS in Parkinsonian patients and whether the items examined could reasonably be expected to improve with this course of occupational therapy. The numerical data was also presented in a poor manner only giving the number of patients that had got worse or improved for any given measure, and no indication of the degree of change. Therefore we did not use this data in the analysis of this study.

Motor Impairments - Individual Tests

Walking velocity was the only individual test of motor impairment for which data was available. This improved by only 0.04 m/sec after occupational therapy. Although walking speed is important to patients, other measures may better indicate the improvements that occupational therapy can bring to Parkinsonian patients. For example the incidence of falls in Parkinson's patients is very important as they are five times more likely to suffer fall-related fractures (Johnell 1992) and nine times more likely to fracture their hips than healthy older adults (Grisso 1991).

Activities of Daily Living

ADL can be divided into two sections; personal care e.g. toileting, and day-to-day activities e.g. use of equipment. The Barthel Index was designed to assess geriatric patients in nursing homes to see if they were capable of returning home (a score of 100) or still required nursing care (<100), as such it is biased towards continence and self-toileting. Many of the disabilities of Parkinson's disease have an impact on the quality of life of a patient well before they actually require nursing assistance, and this scoring system would not be able to detect these milder problems. Gauthier 1987a showed that those receiving occupational therapy maintained their Barthel Index over one year whilst those having no treatment dropped by 4.6 points, this difference is unlikely to be statistically significant. However a fall of 5 points may be clinically significant as it could be brought about by individuals changing to being able to eat, wash or use the toilet. Any one of these changes will have a major effect on the quality of life for an individual.

The Brown ADL score (Brown 1989) measures 11 items of gross mobility and 13 items of fine coordination on a 5 point scale for each item, 115 points in total. An increase in score indicates an increase in difficulty in performing ADL. This scale is not fully comprehensive as aspects such as toileting are not included. It assesses specific motor tasks, such as inserting an electrical plug, whereas in real life patients may make use of aids and adaptations and so not be handicapped by their disability. It has been validated in Parkinson's disease. It was originally described as a self-evaluation score, and so it is assumed that the patients themselves completed the questionnaire in the Fiorani 1997 study. A course of occupational therapy increased this ADL score by 6.5 points. Again this improvement may be clinically significant.

Quality of Life

The Nottingham Health Profile (NHP) was originally developed as a survey instrument to measure ill-health status among a population, and it was also proposed to be useful as a means of evaluating the outcome of medical interventions (Hunt 1985). An increasing score indicates increasing handicap and decreasing quality of life. The six subsections (sleep, physical mobility, energy, pain, emotional reactions and social interactions) were not originally intended to be added together as was done in Fiorani 1997, but Kind et al (Kind 1987) argue that the NHP subsection scores can be summated. There are concerns about the weighting of the NHP scores, whether the categories are qualitatively distinct, and its ability to distinguish improvements after therapy (Kind 1987). There are also concerns that as it was developed to determine the health status of the general population, there may be a floor effect and those patients with severe disability may have a quality of life below that which can be detected with this scale. A course of occupational therapy in Fiorani 1997 improved this score by 2.5 points. It is unclear whether this is improvement is of use to the patients.

Depression

Depression was measured in Fiorani 1997 with the Beck Depression Inventory, but unfortunately this data was not available. The effectiveness of the therapy could potentially be affected by depression. Depressed patients could be less compliant both during the therapy sessions and also in the practice at home. The therapy itself might affect depression. The patient's mood

may improve due to the attention they are being paid by the therapist, by getting out of the house and meeting other people. A well designed placebo intervention would control for the non-therapeutic confounders. If the therapy affected the patient's physical well-being so that they feel more in control and able to carry out more of their ADL independently, this could improve the patient's mood. Also it is important to measure depression as the a number of surveys (Karlsen 1999, GPDS 2000) have shown that depression accounts for 40% of the reduction in quality of life due to Parkinson's disease.

Carer Outcomes

Approximately 75% of patients with Parkinson's disease live with a partner, who is usually of a similar age and may have disabilities of their own (Lloyd 1999). The impact of caring for a person with Parkinson's can be severe (O'Reilly 1996), and it would be hoped that an intervention such as occupational therapy could have a positive effect on the carer's life as well as the patient's.

Health Economics

No health economics analysis of occupational therapy has been performed which precludes an understanding of the economic value of this therapy. If we can prove that occupational therapy is effective, we then need to persuade health care purchasers to buy the service. They need to know whether it is cost neutral or whether it increases or decreases the overall costs of care.

PUBLICATION BIAS

The authors of the Fiorani 1997 trial stated that they did not feel that the trial was large enough to justify a full publication. With only 20 patients the Fiorani study should have been regarded as a pilot study and published to provide useful data to enable sample size calculations to be performed to determine the size of study that would be required to obtain statistically significant results. The authors of this review are also aware of two other negative trials of physiotherapy that are unpublished. This supports our suggestion that there is publication bias in the rehabilitation therapy field with small and/or negative trials not being published in peer-reviewed journals.

THE USE OF RCT METHODOLOGY IN OCCUPATIONAL THERAPY

The absence of any randomised controlled trials in the five years since this review was last carried out may be significant. There does appear to be a debate within occupational therapy as to whether the medical model, with it's '"hierarchy of methodologies best suited to the clinical testing of the efficacy of drugs" (Bithell 2000) is the most appropriate research method to capture the effectiveness of occupational therapy (Hammell 2001; Ottenbacher 2001; Hyde 2004). Tse 2000 argues persuasively that in occupational therapy it is not always possible or appropriate to use randomised controlled trials as either a source of evidence or to support the everyday practice of occupational therapy. Instead, they propose high quality observational and single system studies as alternatives to RCT's. Other authors, (Hagner 1994; Custard 1998; Whalley-Hammell 2002; Hyde 2004) appear to feel that qualitative approaches often offer more appropriate methods to capture the effect of complex interventions on complex conditions. This debate may have led to some occupational therapists being reluctant to conduct RCTs to evaluate their therapy. The authors of this review respect the informed opinions of these authors, but feel that the modern view of RCT design i.e. that RCTs should reflect current practice, be pragmatic, respect the therapists clinical skills, and focus on patient-important outcomes, can overcome many of these concerns (Deane 2006a; Deane 2006b). Indeed, this does appear to be the ethos informing the design of the pilot RCT currently ongoing (Clarke 2005).

AUTHORS' CONCLUSIONS

Implications for practice

Although both trials report a positive outcome for occupational therapy, the significant methodological problems present in both studies and the small numbers in both of the trials prevent us from drawing any firm conclusion regarding the efficacy and effectiveness of occupational therapy in Parkinson's disease.

Implications for research

There is now a consensus as to the 'standard' form of occupational therapy to use to treat Parkinson's disease within the National Health Service of the UK (Deane 2003a; Deane 2003b). This information has been used in the design of a pilot RCT that is currently ongoing (Clarke 2005) which should provide data for a power calculation to be conducted for a full sized trial.

To obtain proof of the efficacy and effectiveness of occupational therapy in Parkinson's patients large randomised controlled trials are required. A rigorous method of randomisation should be used and the allocation adequately concealed. Data should be analysed according to intention-to-treat principles. These trials should be reported according to the guidelines set out in the CONSORT statement (CONSORT 1996). The principles and practice of the intervention must be described in sufficient detail for it to be possible for other therapists to deliver a similar intervention (Deane 2006b).

This review emphasises many methodological shortcomings in the two trials of occupational therapy versus placebo in Parkinson's patients. The issues arising from this review have a significant bearing on the conduct of future occupational therapy trials in Parkinson's disease and other conditions:-

- Firm diagnostic criteria should be used (e.g. UK Parkinson's Disease Brain Bank Criteria, Gibb 1988).
- Inclusion and exclusion criteria should be clear and trials should aim to enrol uniform cohorts of Parkinson disease patients.
- Investigators should clarify at what stage of the disease occupational therapy is being evaluated.
- Trials must have sufficient numbers of patients to avoid false negative conclusions.
- Ideally trials should include an adequate placebo control group, however it is recognised that an untreated 'best medical practice' group may be more practicable.
- Trials must include a clear description of the therapeutic intervention.
- The patients should be followed for at least 6 months after treatment to assess the duration of any benefit derived from the occupational therapy intervention.
- Regardless of the assessment scale used, trials should report whether scores of impairment and disability refer to the 'on' or 'off' phase.
- Suitable outcome measures should be chosen so that the efficacy and effectiveness of occupational therapy can be assessed and an economic analysis can be performed.

Outcomes which have meaning to patients should be used wherever possible since they need to know the value of occupational therapy in practical terms.

- The data must be analysed on an intention-to-treat basis and the change in an outcome measure must be compared statistically across the two therapy groups.

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Many thanks to all of the authors of the included studies who assisted in providing unpublished data and clarification of their methods. Also thanks to all of the people contacted whilst trying to locate any other unpublished randomised controlled trials.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Fiorani 1997

Methods	Parallel group design. Randomised by listing the patients alphabetically and randomising according to a random number list. Not stated whether the data was analysed on a per protocol or intention to treat basis. Treated as out-patients, for 12 hours over 1 month. Assessed at baseline and immediately after treatment. Not stated whether assessors were blinded.
Participants	10 patients per arm of study. Number of drop outs not stated. Patients mean age 70.6 years. Male/Female 13/7. Hoehn and Yahr median score of III. Inclusion criteria: Hoehn and Yahr score of between II and IV, pharmacological treatment unchanged. No exclusion criteria stated.
Interventions	Treatment group: Group physical exercises and occupational therapy sessions including handicrafts, picture drawing, basketry, folk singing, dancing and ball games. Control group: Individual physiotherapy sessions. Drug therapy was constant.
Outcomes	Hoehn and Yahr. UPDRS. Walking velocity. Postural adjustment capacity. Brown ADL self-evaluation score. Nottingham Health Profile (QOL questionnaire). Beck Depression Inventory. Assessed during 'on' period.

Fiorani 1997 *(Continued)*

Notes	Data available from abstract, poster and personal communications only.

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - Adequate

Gauthier 1987a

Methods	Parallel group design. Randomisation method not given. Data analysed on a per protocol basis. Treated as outpatients, for 20 hours over 5 weeks. Assessed at baseline and immediately after treatment, 6 and 12 months later. Assessors were blinded.
Participants	32 patients per arm. 3 drop outs from treatment group, 2 from control group. Patients mean age 60.9 years (treatment), 65.3 years (controls). Gender not given. Mean Hoehn and Yahr 2.8 (treatment), 2.7 (controls). Inclusion criteria: IPD for over 1 year, Hoehn and Yahr stage II-IV, living at home, being able to attend, residing in city limits or surrounding suburbs, signed consent form. No exclusion criteria stated.
Interventions	Treatment group: Groups of 8 patients. Mobility activities using visual and auditory cues, aiming at improving balance, posture, gait, range of motion and facial mobility. Dexterity activities such as games & writing exercises, aimed at improving finger manipulation, accuracy and speed. Functional activities discussing practising problematic ADL. Educational talks from occupational therapists, physiotherapists, speech pathologists, social worker, dietician and nurse. Socialisation. Given list of activities to practise at home. Control group: No treatment described. Drug therapy was not described.
Outcomes	Barthel Index. Extrapyramidal symptoms rating scale - physical and motor signs. Purdue Pegboard Test. Bradburn Index of Psychological Well-Being. Assessed before noon - but 'on' or 'off' state of patients was not stated.
Notes	Occupational therapy complemented by talks from physiotherapist & speech pathologists.

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Chandler 1999	This RCT had components that could be described as occupational therapy although they were administered by a physiotherapist. However overall the study had physiotherapeutic aims. This trial is included in the review ' Physiotherapy for patients with Parkinson's disease'.

Study	Reason for exclusion
Comella 1994	This RCT had exercises that were administered by a physiotherapist and by an occupational therapist. However overall the study had physiotherapeutic aims. This trial is included in the review ' Physiotherapy for patients with Parkinson's disease'.
Gibberd1981	In this RCT the patients were assessed by an occupational therapist. However no details were given as to the nature and extent of the occupational therapy in the treatment. Overall the study had physiotherapeutic aims. This trial is included in the review ' Physiotherapy for patients with Parkinson's disease'.
Jain 2004	This RCT examined occupational therapy for people with Multiple System Atrophy.
Meshak 2002	This RCT compared two forms of an occupational therapy intervention - participants were randomised as to the order in which they used the differently weighted spoons and wrist cuffs often supplied by occupational therapists in an attempt to decrease hand tremor.
Mohr 1996	In this RCT the patients in the behavioural therapy group were given relaxation training, specific training of motor performance tailored to patients problems using visual and auditory cues, and training in social interactions by role playing. The therapy was conducted by clinical psychologists. However these types of interventions are also used by occupational therapists. Overall the trial had physiotherapeutic and psychological aims. This trial is included in the review ' A comparison of physiotherapy techniques for patients with Parkinson's Disease'.
Patti 1996	In this RCT the patients had an individual rehabilitation program tailored to their needs, and this included the input of an occupational therapist. However no details were given as to the nature and extent of the occupational therapy in the treatment. Overall the study had physiotherapeutic aims. This trial is included in the review ' Physiotherapy for patients with Parkinson's disease'.
Shiba 1999	In this RCT a comparison was made of visual and auditory stimulation on the gait of patients. These types of stimulation are used by occupational therapists. Overall the study had physiotherapeutic aims. This trial is included in the review 'A comparison of physiotherapy techniques for patients with Parkinson's Disease'.

Characteristics of ongoing studies *[ordered by study ID]*

Clarke 2005

Trial name or title	The PD OT trial: A pilot randomised controlled trial of Occupational Therapy to optimise independence in Parkinson's disease. ISRCTN 27871743
Methods	
Participants	50 patients with PD who have significant physical problems. Inclusion criteria: Idiopathic Parkinson's disease defined by the UK PDS Brain Bank Criteria. The trial will focus on PD patients with Hoehn and Yahr stages II to IV. Exclusion criteria: Dementia (as usually defined clinically by the investigator) - the patient must be capable of completing the self-assessment forms Received occupational therapy in last 2 years and/or physiotherapy in last year.
Interventions	The 25 patients who are allocated at random to receive therapy will be visited at home by a qualified occupational therapist who will assess their needs and arrange for treatments, aids and adaptations as necessary. The 25 untreated patients will receive standard NHS care and occupational therapy will be deferred until after the end of the trial. In broad terms, the 25 patients randomised to occupational therapy will receive 6 x 45 minute sessions over 2 months in their own home. This will include an initial assessment followed by occu-

Clarke 2005 *(Continued)*

	pational therapy interventions targeting functional independence and mobility goals identified in partnership with the participant. Aids and appliances will be supplied. The primary interventions will address activities of daily living, both self-care and instrumental; mobility, indoor and outdoor; and home safety. These will include skills practice, feeding, dressing, toileting, domestic skills and shopping; transfer and mobility training; seating and wheelchair provision; aids and appliances provision; caregiver training; education and information; referral to other health care workers; and if appropriate, return/ maintenance at work. Where time allows, secondary interventions will address fatigue management, leisure therapy, continence, speech and communication interventions and relaxation techniques.
Outcomes	Primary Outcome: Nottingham Extended Activity of Daily Living Scale Secondary Outcomes: Rivermead Mobility Index Patient completed version of the Unified Parkinson's Disease Rating Scale ADL scale Parkinson's Disease Questionnaire 39 (PDQ 39) EuroQol-5D (EQ-5D) Hospital Anxiety and Depression Scale (HADS)
Starting date	April 2005
Contact information	Trial Manager Miss Alex Furmston Department of Neurology City Hospital Dudley Road Birmingham, B18 7QH Tel: 0121 5075655/ 07799 430495 Email: a.t.furmston@bham.ac.uk
Notes	Expected end date: December 2006

ADDITIONAL TABLES

Table 1. Methodological Quality of Included Studies

Study	Specified Eligibility Criteria	Randomisation Method	Concealment of Allocation	Similarity at Baseline	Withdrawals Described	Missing Values	Cointerventions Constant (eg drugs)	Credible Placebo	Blinded Assessors
Fiorani 97	A	A	A	B	B	B	A	C	B
Gauthier 87	A	B	B	A	A	A	B	B	A
	KEY: A: Adequate B: Unclear (not stated) C: Inadequate	KEY: A: Good B: Unclear (not stated) C: Weak (eg alternate allocation)	KEY: A: Adequate B: Unclear (not stated) C: Inadequate	KEY: A: Good B: Unclear (not stated) C: Poor	KEY: A: Good, <10% B: Unclear (not stated) C: Poor, >10%	KEY: A: Good, <10% B: Unclear (not stated) C: Poor, >10%	KEY: A: Constant B: Unclear (not stated) C: Allowed Variation	KEY: A: Adequate B: Unclear (not stated) C: Inadequate	KEY: A: Adequate B: Unclear (not stated) C: Inadequate

Table 2. Key Characteristics of Included Studies

Study	Number of Patients	Mean Age (Years)	Mean Hoehn & Yahr Score	Duration of Therapy	Location	Individual or group	Additional therapy
Fiorani 97	20	71	3 (median)	12 hours/1 month	Outpatients	Group therapy; individual placebo	Physiotherapy in both groups
Gauthier 87	64	63	2.8	20 hours/5 weeks	Outpatients	Group	Talks from physiotherapist, speech pathologists, social worker, dietician, nurse.
TOTAL	84	67			Outpatient	Group	Physiotherapy in both

Table 3. Summary of Results - Fiorani 97 & Gauthier 87

Subsection	Outcome	Study	n OT/ Placebo	Mean Difference	Stat. Significance
Summary Assessments	UPDRS parts I, II & III	Fiorani 97	10/10	-0.2	Not available
Motor Impairment	Walking Velocity (m/sec)	Fiorani 97	10/10	0.04	Not available
ADL	Barthel Index	Gauthier 87	30/29	-4.6	Not available
	Brown ADL	Fiorani 97	10/10	-6.5	Not available
QOL	Nottingham Health Profile	Fiorani 97	10/10	-2.5	Not available

Mean Difference = (Mean change due to OT) - (Mean change due to placebo)

WHAT'S NEW

Date	Event	Description
14 November 2008	Amended	Converted to new review format.

HISTORY

Protocol first published: Issue 4, 2000
Review first published: Issue 2, 2001

Date	Event	Description
20 May 2007	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

L Dixon and KHO Deane carried out the majority of the searching for eligible studies. All reviewers were involved in discussions regarding the philosophy and aims of occupational therapy in teh context of Parkinson's disease. All reviewers were involved in the determination of which studies were eligible for the review. KHO Deane and C Ellis-Hill (author from the primary review - see acknowledgements) extracted the data from the two included studies. All reviewers were involved in the writing of the review. L Dixon and KHO Deane were the primary authors. KHO Deane is acting as guarantor of the review.

DECLARATIONS OF INTEREST

None.

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INDEX TERMS

Medical Subject Headings (MeSH)

*Occupational Therapy; Parkinson Disease [*rehabilitation]; Randomized Controlled Trials as Topic

MeSH check words

Humans