Upper-Limb Assessment in People with Parkinson Disease: Is It a Priority for Therapists, and Which Assessment Tools Are Used?

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ABSTRACT

Purpose: To investigate the frequency of physiotherapy and occupational therapy assessment of the upper limb (UL) in people with Parkinson disease (PD) and to identify the impairments and activity limitations assessed and the methods used. **Method:** A custom-designed questionnaire was used to survey physiotherapists and occupational therapists with previous experience in managing people with PD, using targeted recruitment to invite physiotherapy conference attendees, clinicians employed in movement disorders programmes, and practitioners in neurology and gerontology to respond either on paper or online. **Results:** Of the 190 respondents (122 physiotherapists, 68 occupational therapists), 54% reported consistently assessing the UL. A majority (>60%) assessed impairments specific to PD, but few quantified these using standardized measures. Activity limitations, largely relating to manual dexterity, were assessed using observational analysis (61%), non-standardized timed activities (46%), and standardized outcome measures (61%), most generic or developed for evaluating other neurological conditions. More than 10% of respondents could not identify an appropriate standardized measure. **Conclusions:** Slightly more than half of respondents regularly assessed the UL. Respondents reported widespread use of non-standardized methods to assess PD-specific impairments. Standardized measures were more frequently used to evaluate activity limitations, but despite the unique movement disorders associated with PD, the clinimetric properties of most of the tools identified have not been established in this population. Education and further clinimetric investigation of measures in use are needed to facilitate evidence-based practice in this area.

Key Words: occupational therapy; outcome assessment (health care); Parkinson disease; upper extremity.

RÉSUMÉ

Objectif : Étudier la fréquence de l'évaluation des membres supérieurs en physiothérapie et en ergothérapie chez les personnes souffrant de la maladie de Parkinson (MP) et préciser les invalidités et les limitations d'activité qui font l'objet d'une évaluation ainsi que les méthodes utilisées. **Méthodologie :** Un questionnaire a été spécialement préparé à l'intention des physiothérapeutes et des ergothérapeutes qui avaient déjà de l'expérience dans la gestion de personnes souffrant de la MP. Un mode de recrutement ciblé a été utilisé pour inviter les participants à des conférences en physiothérapie, les cliniciens travaillant à des programmes de troubles du mouvement et les praticiens en neurologie et gériatrie à répondre au sondage. Le questionnaire pouvait être rempli en version papier ou par Internet. **Résultats :** Des 190 répondants (122 physiothérapeutes, 68 ergothérapeutes), 54 % ont dit procéder en continu à des évaluations des membres supérieurs. Une majorité (>60 %) a évalué les incapacités propres à la MP, mais peu d'entre eux ont quantifié les résultats à l'aide de mesures normalisées. Les limitations d'activité, liées en grande partie à des problèmes de dextérité manuelle, ont été évaluées à l'aide d'analyses par observation (61 %), d'activités minutées non normalisées (46 %) et de mesures de résultats normalisées (61 %), génériques ou créées pour l'évaluation d'autres troubles neurologiques. Plus de 10 % des répondants ne sont pas parvenus à identifier une mesure normalisée appropriée. **Conclusions :** Un peu plus de la moitié des répondants évaluaient régulièrement les membres supérieurs. Les répondants ont fait état d'une utilisation répandue de méthodes non normalisées pour l'évaluation d'incapacités propres à la MP. Des mesures normalisées étaient plus fréquemment utilisées pour évaluer les limitations d'activité, mais malgré les troubles du mouvement particuliers associés à la MP, les propriétés clinimétriques des instruments les plus couramment identifiés n'ont pas été établies dans ce groupe de patients. De l'éducation et des recherches clinimétriques supplémentaires sur ces mesures seront nécessaires pour favoriser une pratique fondée sur les faits probants dans ce domaine.

Parkinson disease (PD) is a progressive disorder estimated to affect more than 7 million people worldwide.¹ Although the prevalence of PD is higher in the older

population, approximately 4% of people with PD are diagnosed before age 50.¹ PD is characterized by the presence of movement disorders that lead to limitations

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in function.² Upper-limb (UL) disorders including decreased speed and amplitude of movements,³ difficulty in performing sequential tasks,⁴ and disrupted execution of fine manipulative hand activities^{5,6} can restrict the lives of people living with PD and affect performance of daily tasks,⁷ leisure activities,⁸ and self-care.⁷

The goal of physiotherapy (PT) and occupational therapy (OT) management of people with PD is to improve functional activity.^{9,10} Therapies may be directed to address loss of mobility; falls; difficulties in reaching, grasping, and manipulating objects; and self-care activities such as eating and dressing.^{2,9,11} As part of the assessment process, clinicians gather information about impairments and activity limitations to inform treatment decisions; a combination of standardized and non-standardized methods may be used to collect this information,^{12,13} although the use of standardized measurement tools to quantify treatment outcomes is an important component of clinical best practice.¹⁴

Current PT and OT guidelines for managing people with PD provide recommendations on choosing standardized measurement tools for this clinical population.^{9–11,15,16} Suggested measurement tools include disease-specific measures such as the Unified Parkinson's Disease Rating Scale (UPDRS)¹⁷ and Parkinson's Disease Questionnaire-39 (PDQ-39),⁷ which include UL test items as part of a total composite score reflecting overall disability (UPDRS) or quality of life (PDQ-39). Clear guidelines are also provided for evaluating limitations in gait, balance, or global function, but there are few recommendations for UL measurement, even though managing UL disorders is an important focus in PD treatment.^{9–11,15,16,18}

Given the limited formal clinical guidelines for evaluating UL impairments and activities in PD, the purpose of the present study was to explore the assessment practices of Australian physiotherapists and occupational therapists in managing this clinical population. Our first aim was to investigate the frequency of UL assessment by physiotherapists and occupational therapists managing clients with PD; a second aim was to identify the impairments and activity limitations evaluated, and a third was to identify the methods and outcome measures used for assessment.

METHODS

Participants

Using a self-report questionnaire, we surveyed physiotherapists and occupational therapists to investigate their assessment practices. Participation was open to practitioners who had managed people with PD within the previous 5 years. The project was approved by the Human Ethics Sub-committee of the University of Melbourne, Australia.

We used a targeted recruitment method to identify therapists likely to meet the eligibility requirement, invit-

ing participation via e-mail, phone, or face-to-face contact from the following sources:

1. Physiotherapists attending a PD-related session at the 2009 Australian Physiotherapy Association Conference in Sydney
2. Private practitioners in neurology or aged care listed on the Australian Physiotherapy Association or Occupational Therapy Australia websites in the state of Victoria, Australia
3. Clinicians employed in Movement Disorders programmes providing in-patient or outpatient multidisciplinary management of people with movement disorders, including PD, in Victoria
4. "Snowball" recruitment (therapists known to the researchers were invited to complete the survey and pass on survey details to colleagues)

Questionnaire

The questionnaire (see online Appendix) was designed using the Web-based survey tool SurveyMonkey (www.surveymonkey.com) and was made available for completion in both paper and online formats. The 15 questions were primarily multiple choice; some allowed respondents to choose several responses. When appropriate, respondents were invited to provide alternative responses to those listed. The initial questions gathered demographic data on respondents, including workplace setting and reasons for contact with people with PD. The remaining questions addressed the study's aims, exploring the frequency of UL assessment and investigating the assessment and measurement of impairments and activity limitations. One question sought to identify standardized and non-standardized assessment methods used by respondents to assess UL activity limitations; response options for this question included PD-specific global assessment tools such as the UPDRS¹⁷ and PDQ-39,⁷ UL measurement tools commonly used for evaluation in PD or other neurological conditions,¹⁹ client-centred assessment scales, and non-standardized assessment methods such as observational analysis. Respondents were also asked to note any other measures administered that were not listed. The final question invited respondents to identify aspects of UL function they did not measure because of a perceived lack of suitable measurement tools. Before distributing the final survey, we piloted a draft version with three therapists experienced in PD management, who provided feedback to refine and clarify the survey questions. The questionnaire required <5 minutes to complete.

Data analysis

We calculated the number and percentage of respondents who selected each response option using SurveyMonkey; percentages for each question are based on the number of respondents who answered that question. For some questions not completed by all respondents, we also calculated response percentages manually

Table 1 Respondent Demographics

Demographics	No. (%) of respondents*	
	PT (<i>n</i> = 122)	OT (<i>n</i> = 68)
Recruitment method		
Conference delegate	50 (41)	0 (0)
Private practitioner register	13 (11)	29 (43)
Movement Disorders programme	12 (10)	4 (6)
Word of mouth (snowball recruitment)	47 (38)	35 (51)
Years worked since qualifying, mean (SD), range	16.3 (11.7), 1–52	13.9 (10.9), 1–41
Workplace†		
Movement Disorders programme	10 (8)	6 (9)
In-patient rehabilitation	44 (36)	26 (38)
Outpatient rehabilitation	34 (28)	23 (34)
Private practice	18 (15)	20 (29)
Acute hospital	12 (10)	7 (10)
Residential aged care facility	13 (11)	0 (0)
Home-based therapy	9 (7)	4 (7)
% of caseload involving PD management		
<25	106 (87)	63 (93)
26–50	4 (3)	0 (0)
51–75	3 (3)	1 (1)
>76	9 (7)	4 (6)
Reasons for management†		
Falls and balance issues	91 (75)	36 (53)
PD-specific management	85 (70)	35 (52)
Management of other conditions	58 (48)	34 (50)
Medication review	14 (12)	2 (3)
Other identified purposes (e.g., driving, home assessments, provision of equipment)	1 (1)	13 (19)

*Unless otherwise indicated.

† Respondents may select more than one category that applies.

PT = physiotherapists; OT = occupational therapists; PD = Parkinson disease.

based on the total number of survey respondents. Responses to open-ended questions were analyzed for common themes by one of the researchers (EP), and the frequency of each theme was recorded. Mean (SD) and minimum and maximum scores for respondents' years of practice were calculated using MS Excel 2003 (Microsoft Corp., Redmond, WA).

RESULTS

In all, 122 physiotherapists and 68 occupational therapists completed the survey (*n* = 190). Response rates differed among the targeted groups: we received responses from 34% of 147 conference attendees, 48% of 85 private practitioners, and 84% of 19 therapists employed in Movement Disorders programmes. Table 1 summarizes the demographic data.

A little over half the respondents (54%) reported regularly assessing UL function in people with PD (i.e., most

or all of the time). The remaining 46% assessed the UL sometimes, occasionally, or not at all (see Table 2). The most common reason given for not assessing the UL in people with PD was that it was not considered relevant to client management, as respondents saw most of their patients to address falls and balance concerns (see Table 1).

Impairments assessed by respondents included those specific to PD (see Table 3) and those present as a secondary consequence of PD or of other medical conditions (see Table 4). Three PD-specific impairments—tremor, bradykinesia, and dyskinesia—were assessed by the majority of respondents (see Table 3), but <25% quantified these impairments using standardized outcome measures. Observational analysis was the most commonly reported method of assessment, and the UPDRS was the most frequently used standardized outcome measure.

Table 2 Frequency of Upper-Limb Assessment and Reasons for Non-assessment

Frequency of assessment of UL function in people with PD	No. (%) of respondents		
	PT (<i>n</i> = 122)	OT (<i>n</i> = 68)	Total (<i>n</i> = 190)
Always	35 (29)	25 (37)	60 (32)
Most of the time	26 (21)	16 (23)	42 (22)
Sometimes	23 (19)	9 (13)	32 (17)
Occasionally	28 (23)	10 (15)	38 (20)
Never	10 (8)	8 (12)	18 (9)
Reasons for non-assessment*	PT (<i>n</i> = 41)	OT (<i>n</i> = 20)	Total (<i>n</i> = 61)
Not relevant to client management	21 (51)	14 (70)	35 (53)
Not enough time	17 (41)	2 (10)	19 (31)
Done by other health professional	15 (37)	9 (45)	24 (39)
Unable to find appropriate outcome measure / Don't know which measure to use	12 (29)	1 (5)	13 (21)
Other	11 (27)	5 (25)	16 (26)

*Respondents may select more than one category that applies.

UL = upper limb; PD = Parkinson disease; PT = physiotherapists; OT = occupational therapists.

Table 3 Assessment of Impairments Specific to Parkinson Disease

Impairment	No./ <i>n</i> (%)		
	PT	OT	Total
Tremor	91/118 (77)	53/61 (87)	144/179 (80)
Bradykinesia	78/116 (67)	51/62 (82)	129/178 (73)
Dyskinesia	78/116 (67)	43/56 (77)	121/172 (70)

No. = Number of respondents assessing impairment; *n* = total responses; PT = physiotherapists; OT = occupational therapists.

Table 4 Assessment of Secondary Impairments

Impairment	No. (%)		
	PT (<i>n</i> = 115)	OT (<i>n</i> = 57)	Total (<i>n</i> = 172)
Active movement	105 (91)	55 (97)	160 (93)
Passive movement	80 (70)	29 (51)	109 (63)
Strength	96 (84)	45 (79)	141 (82)
Tone/rigidity	102 (89)	40 (70)	142 (83)
Sensation	39 (34)	36 (63)	75 (44)
Muscle length	62 (54)	5 (9)	67 (39)

PT = physiotherapists; OT = occupational therapists.

Of 190 participants, 150 indicated the assessment methods and outcome measures they employed to examine UL activity limitations. Only 116 respondents (61%) reported at least one standardized measure; non-standardized assessment methods, including timed functional activities (41%) and observational analysis (61%), were the most frequently used. The Motor Assessment Scale (MAS)²⁰ (29%) was the most commonly identified standardized measure, and the UPDRS (26%) the most frequently identified PD-specific measure. Table 5 lists

the standardized measures most commonly reported by respondents. Other measures reported included Spiral Drawing²¹ (2%), the Disabilities of Arm, Shoulder and Hand questionnaire²² (1%) and the Upper Limb Functional Index²³ (1%). Primarily evaluated were limitations in gross and fine manual dexterity²⁴ and self-care activities.

Although this was not a main focus of the survey, we noted differences in the selection of assessment methods between the two disciplines: a higher percentage of

Table 5 Most Common Assessment Methods and Outcome Measures Used to Assess Activity Limitations

Assessment method*	No. (%) of respondents		
	PT (n = 99)	OT (n = 51)	Total (n = 150)
Observational analysis	58 (59)	33 (65)	91 (61)
Timed functional activities	46 (47)	16 (31)	62 (41)
MAS	35 (35)	9 (18)	44 (29)
UPDRS	33 (33)	6 (12)	39 (26)
Purdue Pegboard Test	19 (19)	20 (39)	39 (26)
Nine Hole Peg Test	19 (19)	8 (16)	27 (18)
COPM	2 (2)	20 (39)	22 (15)
GAS	12 (12)	7 (14)	19 (13)
PDQ-39	8 (8)	3 (6)	11 (7)
JTHF	5 (5)	3 (6)	8 (5)
Coin Rotation Task	2 (2)	5 (10)	7 (5)

*Respondents may select more than one method.

PT = physiotherapists; OT = occupational therapists; MAS = Motor Assessment Scale; UPDRS = Unified Parkinson's Disease Rating Scale; COPM = Canadian Occupational Performance Measure; GAS = Goal Attainment Scale; PDQ-39 = Parkinson's Disease Questionnaire—39; JTHF = Jebsen Test of Hand Function.

occupational therapists used the Canadian Outcome Performance Measure²⁵ (COPM; occupational therapists 39%, physiotherapists 2%) and the Purdue Pegboard Test²⁶ (occupational therapists 39%, physiotherapists 19%), whereas a greater percentage of physiotherapists identified use of the UPDRS (physiotherapists 33%, occupational therapists 12%), MAS (physiotherapists 35%, occupational therapists 18%), and timed non-standardized functional activities (physiotherapists 47%, occupational therapists 31%).

A total of 21 respondents (11%) reported being unable to evaluate performance of functional activities using available standardized measures; several reported an inability to quantify performance of specific personal ADLs such as eating or dressing. Other respondents were unfamiliar with UL outcome measures or with standardized measures developed to evaluate PD-specific impairments.

DISCUSSION

A little more than half of survey respondents reported regularly assessing the UL in clients with PD. Non-standardized techniques, commonly observational analysis or non-standardized timed tasks, were most often used to assess impairments and activity limitations. Most respondents did not quantify PD-specific UL impairments using standardized outcome measures but did use such measures to quantify UL activity limitations. The measurement tools reported were mainly generic UL measures or measures developed and validated in other neurological conditions, whose reliability and responsiveness remain to be established in a PD population.

A relatively large proportion of respondents did not assess the UL on a regular basis, and 9% never assessed

the UL in their clients with PD. The primary reason reported for not assessing the UL was a lack of relevance to individual client management. Because our respondents worked in varied settings where people with PD are referred for a range of presenting problems, these findings may reflect targeted decision-making processes that customize treatment goals to the individual client.¹² An alternative hypothesis is that UL disabilities are accorded a lower priority than gait and balance disorders. This hypothesis is supported by the findings of Nijkrake and colleagues,²⁷ who reported that although UL difficulties were important to people with PD, they were less likely than mobility and balance issues to be addressed during therapy. A focus on balance and mobility by therapists managing people with PD may reflect not only immediate safety concerns but also the substantial evidence available to inform and support the assessment and management of these areas of function in clinical practice.^{28–30} In contrast, there is a relatively modest volume of evidence to inform management of the UL in PD.^{28,31,32}

Standardized outcome measures provide a logical starting point for objective evaluation of changes associated with PT and OT interventions.¹² In people with PD specifically, these tools can also be used to quantify the effects of medical and surgical interventions and to chart disease progression. In our study, 61% of respondents identified at least one standardized measure of activity limitation; although this rate of standardized measurement compares favourably with previous surveys of OT practice in PD populations (46%),^{31,32} it falls short of Australian physiotherapy standards, in which collecting measurable data is an integral part of client assessment.³³ Quantification of PD-specific impairments by respondents was well below the required standards.

Inadequate knowledge of or unfamiliarity with available measurement tools has been identified as an obstacle to standardized outcome measurement.^{34,35} For most of our respondents, managing clients with PD represents only a small part of their caseload, and inexperience in PD management or insufficient knowledge of available outcome measures may have been a factor in our results. The fact that several respondents could not identify appropriate measures to quantify UL function adds weight to this hypothesis. The lack of guidelines for UL outcome measurement in PD^{9–11,16} is also a likely contributor. Our findings suggest that respondents lack knowledge of UL outcome measures, especially those developed to quantify PD-specific impairments, and indicate a possible need for further education to familiarize clinicians with these measures.

Our survey identified several outcome measures administered by respondents that were developed and validated in people with stroke, musculoskeletal conditions, and other conditions with different pathologies and movement disorders from PD. The most obvious example is the MAS, a measurement tool developed in Australia to assess motor function in people with stroke.²⁰ Familiarity with this scale may partially explain its popularity among respondents, as outcome measures tend to be used more extensively in their country of origin.³⁵ It is also plausible that respondents using the UL sections of this scale were unaware of the potential content validity and responsiveness issues associated with using scales developed for other conditions or that they were unfamiliar with the specific impairments and activity limitations commonly seen in people with PD. Knowledge of the reliability, validity, and responsiveness of a measurement tool in a given population is important for selecting appropriate measures and interpreting test results.^{13,36}

PD-specific and generic measures were identified by a considerable percentage of respondents for evaluating UL activity limitations. Respondents reported extensive use of the UPDRS, a composite scale developed to measure global change in disability due to PD¹⁷; individual items from this scale have also previously been used to quantify UL impairments.^{37,38} The UPDRS may be not be sensitive to improvements in UL functional activities following treatment, however, because of its global nature and the strong emphasis on impairments in the motor examination section of the scale.^{39,40} Few of the generic measures identified in our survey have been the subject of comprehensive clinimetric evaluation in a PD population. There is evidence to support the validity of the Purdue Pegboard Test⁴¹ and Nine Hole Peg Test⁴² in this population, given that people with PD achieve poorer scores than healthy adults.^{6,43} A relationship has also been found between worsening manual dexterity, as quantified by the Purdue Pegboard Test, and increasing disability.⁶ Further examination of the responsiveness of UL measures and their properties (e.g., possible

floor and ceiling effects) when used in this population would help clinicians interpret the significance of test results. Evaluating people with PD also presents unique challenges relating to the effects of medication on motor performance⁴⁴; as yet there has been little examination of the reliability of measurements taken at different points in the medication cycle. Further investigation of the reliability, validity, and responsiveness of measurement tools identified in our survey could assist clinicians in making informed choices for measurement tools to quantify treatment response and could contribute to future clinical guidelines.

Our study has several limitations. Because our survey sample was relatively small, the results may not be representative of all therapists involved in managing people with PD. Response rates for the survey varied, and the highest response rate was among clinicians employed in Movement Disorders programmes, who have regular involvement with people with PD and may therefore have been more motivated to complete the survey. Our targeted sampling technique may also have excluded some clinicians managing this client group. Finally, because the results are primarily from a single state in Australia, they may not be indicative of assessment practices in other parts of Australia or in other countries.

CONCLUSION

Although guidelines for the physiotherapy and occupational therapy management of people with PD include UL disorders as a treatment focus,^{2,9,11} UL assessment was not a priority for many respondents. Impairments and activity limitations were assessed, predominantly via non-standardized methods; this was most evident in the assessment of PD-specific impairments. Standardized measurement is integral to patient assessment^{12,13} and an important component in the management of UL functional limitations resulting from PD. Our survey results suggest that some respondents were unfamiliar with standardized measures appropriate for UL evaluation in this population or did not have a clear understanding of the UL disorders associated with PD. Further education could increase clinicians' knowledge of appropriate outcome measures for quantifying UL impairments and activity limitations that may be addressed in this population. There is also a need for additional clinimetric investigation of the outcome measures currently applied by clinicians, to investigate their efficacy in people with PD. The absence of clear guidelines for measuring UL disorders in PD may reflect the current lack of clinimetric evidence on which to base recommendations for the use of specific measurement tools.

KEY MESSAGES

What is already known on this topic

Upper limb (UL) disorders present in people with Parkinson disease (PD) can lead to difficulties with daily activities and self-care tasks. While these disorders may

be addressed during physiotherapy and occupational therapy treatment programmes, the PD literature suggests that a greater priority is placed on evaluating and treating gait and balance disorders.^{30,39} Clinical guidelines for PD management contain few recommendations for evaluation of the UL,^{7,17–19} and there is little understanding of current physiotherapy and occupational therapy assessment practice in this area.

What this study adds

This study provides insights into the prioritization and measurement of the UL in people with PD. Almost half of respondents did not assess the UL on a regular basis; among those who did, there was widespread use of non-standardized assessment methods and outcome measures not evaluated for use in PD. The findings suggest a need to familiarize clinicians with UL measures developed for quantification in PD and for further research to inform future measurement guidelines.

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