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Material / Article Name:
Parkinson's Disease Assessments Fact Sheet

Intended Sales Representative Audience (e.g., IMHC, Sales Reps, GPAEs):
DUOPA Account Executives

Objective/Need for Representative Education:
Educate representatives by providing an overview of how Parkinson's disease is assessed and the uses of these assessments.

Clinical or Educational Rationale supporting Objective/Need:
It is important for representatives to be aware of the important Parkinson's disease assessment scales and the information they provide to the physician to guide treatment choices, evaluate the efficacy of current treatments, and develop overall care plans.

Key Educational Message(s):
Assessment scales guide treatment choices and evaluate existing therapies so it is important that representatives understand what information the tools uncover and how they are used.
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Other corresponding Representative Education approved materials:
This is new material that has not been provided previously.

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Parkinson's Disease Assessment Scales Fact Sheet

Introduction

Parkinson's disease (PD) is a progressive neurodegenerative disease that leads to movement disorders and numerous nonmotor symptoms.[1] It is the second-most common neurodegenerative disorder after Alzheimer's disease. The exact prevalence of PD is unknown, but estimates have ranged from 630,000 to 1,000,000 in the US.[2–4] Patients with late-stage PD have substantial disability from symptoms such as freezing of gait, falls, speech dysfunction, difficulty swallowing, choking, and dementia. Last-stage PD often leads to admission to an institution and even death.[1]

Quantification of a patient's health status and severity of disease is vital for determining the need for treatment, the efficacy of existing treatment, and following the disease's course. PD progresses over time with symptoms increasing in number and severity leading to greater disability.[5] Although some aspects of PD can be measured by objective tests of physical factors—for example, computerized analysis of movement—these can be expensive and difficult to administer. Therefore, subjective assessments are the mainstay of assessment.[5]

This fact sheet begins with a short review of how rating scales are used to diagnose, assess, and monitor PD. The remainder of the piece provides an overview of three main scales in use today, including the signs and symptoms they assess, how they are scored, and the different ways they can be used to guide treatment.

Applications of rating scales

One of the driving forces for developing PD rating scales is the need to assess treatment efficacy. Rating scales can generally be divided into two types: those that reflect functional fluctuations (e.g., the Unified Parkinson's Disease Rating Scale [UPDRS] subscale 3 and the Hoehn and Yahr scale) and those that provide a general level of function based on patient or caregiver reports (e.g., the Hauser Home Diary).[6,7]

A significant problem in applying these rating scales to assess disease progression is controlling for variation in the effects of drugs used to treat the disease. Patients should be assessed at the same time each day since their medications may affect their assessment. This applies to both clinical trials and when ratings tools are used to assess disease progression in clinical settings.[6] Such effects must be taken into account when using these tools to assess PD.

PD rating scales have several applications.

Assessment of symptomatic effects

Rating scales have also been used to assess a patient's PD symptoms and how they affect the patient performing activities of daily living (ADLs), such as walking, eating, dressing, and bathing. Some scales also assess mood, ability to think, fatigue, and urinary/constipation problems and attempt to quantify dyskinesias. This gives a measure of how severe the patient's disease is and can guide treatment. For example, a patient who has minimal disability or discomfort but perhaps has significant constipation may simply be treated with a laxative, delaying the use of dopamine agonists until function and quality of life are affected. Similarly, if a patient has tremor as a primary symptom, they might be treated with an anticholinergic drug since tremor is inconsistently responsive to dopamine agonists.[1]

If a patient is repeatedly analyzed using the same test over a period of time, it is critical to control for variables in their response to doses of medication. For example, each assessment should take place the same number of hours after their most recent dose to try to ensure the same level of drug response. Assessment should also be done at the same time of day and ideally by the same rater each time to standardize the results as much as possible. Other factors including diet, fatigue, or other stresses that might alter the patient's PD signs and symptoms should also be noted.[6]

Monitoring disease progression

Rating scales are also used to monitor overall disease progression. This type of monitoring can be used by a physician to determine if current treatments are working to control the disease as a whole, instead of just specific symptoms. Dosing adjustments or addition of adjunctive therapy may be based on disease progression.[6]

Screening for parkinsonism

Parkinsonism refers to the clinical signs and symptoms typical of PD but does not infer their cause. Other conditions that cause parkinson-like manifestations include drug induced parkinsonism, multisystems atrophy, progressive supranuclear palsy, or strokes. The UPDRS can be used to screen for parkinsonism.[6]

Unified Parkinson's Disease Rating Scale (UPDRS)

Overview

The original UPDRS was developed in the 1980s to evaluate treatments and as a clinical tool to follow patients.[6] It was the most used PD scale from the time of its introduction. However, the scale had several shortcomings that prompted a revision by the Movement Disorder Society (MDS), which was unveiled in 2008. This revision, titled the MDS-UPDRS, has gradually been replacing the original version since then.[5]

Compared to the original UPDRS, the MDS-UPDRS covers a greater number of PD signs and symptoms, including better coverage of nonmotor symptoms; better discriminates between slight and mild manifestations of PD; gives clear instructions for raters and patients; and assesses all items uniformly.[8] An important difference is the updated scoring. Each item is scored on a 5-point scale.

- 0 = normal: no impairment
- 1 = slight: symptoms/signs with sufficiently low frequency or intensity to cause no impact on function
- 2 = mild: symptoms/signs of frequency or intensity to cause a modest impact on function
- 3 = moderate: symptoms/signs sufficiently frequent or intense to impact function considerably, but not prevent it
- 4 = severe: symptoms/signs that prevent function

For each question, a short description is included with each response to describe the criteria specific to the response. However, the progression from one to the next is based on a consistent structure, as shown.[9]

Compared to the original UPDRS, the slight and mild ratings are expanded from the previous mild score. To compensate, where the old system separated severe and marked ratings, these descriptors are now collapsed into the single rating of severe. This was done because of growing emphasis on early therapies and detection of small changes in early disease, and functional differences at the severe end of the spectrum may not be clinically relevant.[9]

The MDS-UPDRS consists of four parts.

- Part I: Nonmotor Aspects of Experiences of Daily Living
- Part II: Motor Aspects of Experiences of Daily Living
- Part III: Motor Examination
- Part IV: Motor Complications

Scores for each section can be summed to give a total score or analyzed separately to focus on a specific area.[9] If more detail is needed on a certain nonmotor disability, an appendix has been developed listing recommended scales for further analysis.[9]

Part I: Nonmotor Aspects of Experiences of Daily Living

Part I assesses the nonmotor impact of PD on patients' experiences of daily living. Part IA is administered by the rater and includes six questions on complex behaviors. Part IB contains seven questions as a patient questionnaire and are answered directly by the patient.[10]

Part IA begins with directions to be read to the patient that state that they should choose the best response that describes how they have felt *most of the time* during the *past week*. This provides a consistent parameter for each question. The subsequent six questions cover these complex behaviors.[10]

- Cognitive impairment
- Hallucinations and psychosis
- Depressed mood
- Anxious mood
- Apathy
- Features of dopamine dysregulation syndrome (urges that are hard to control)

The questions are structured as follows.[10]

1.1 COGNITIVE IMPAIRMENT

Instructions to examiner: consider all types of altered level of cognitive function including cognitive slowing, impaired reasoning, memory loss, deficits in attention and orientation. Rate the impact on activities of daily living as perceived by the patient and/or caregiver.

Instructions to patient [and caregiver]: *over the past week, have you had problems remembering things, following conversations, paying attention, thinking clearly, or finding your way around the house or in town?* [If yes, examiner asks patient or caregiver to elaborate and probes for information.]

0: Normal:	No cognitive impairment.
1: Slight:	Impairment appreciated by patient or caregiver with no concrete interference with the patient's ability to carry out normal activities and social interactions.
2: Mild:	Clinically evident cognitive dysfunction, but only minimal interference with the patient's ability to carry out normal activities and social interactions.
3: Moderate:	Cognitive deficits interfere with but do not preclude the patient's ability to carry out normal activities and social interactions.
4: Severe:	Cognitive dysfunction precludes the patient's ability to carry out normal activities and social interactions.

The questions in part 1A may require the rater to elaborate and probe for information to come to a conclusion.

Part 1B, on the other hand, consists of simple questions that can be answered by patients and their caregivers. Again, the directions specify that answers should capture the patient's average or usual function over the past week, including the day the questions are being answered.

Answers are rated on a scale of 0–4 to capture what the patient can do most of the time.[10]

Topics include:[10]

- Sleep problems
- Daytime sleepiness
- Pain and other sensations
- Urinary problems
- Constipation problems
- Light-headedness on standing
- Fatigue

1.7 SLEEP PROBLEMS

Over the past week, have you had trouble going to sleep at night or staying asleep through the night? Consider how rested you feel after waking up in the morning.

0:	Normal:	No problems.
1:	Slight:	Sleep problems are present but usually do not cause trouble getting a full night of sleep.
2:	Mild:	Sleep problems usually cause some difficulties getting a full night of sleep.
3:	Moderate:	Sleep problems cause a lot of difficulties getting a full night of sleep, but I usually sleep for more than half of the night.
4:	Severe:	I usually do not sleep for most of the night.

Part II: Motor Aspects of Experiences of Daily Living

Part II continues the same patient questionnaire that the patient started in part I. However, these 13 questions all pertain to the motor aspects of experiences of daily living, as opposed to the nonmotor effects of the previous seven questions. They are structured in the same way.[10]

Question topics for part II include.[10]

- Speech
- Saliva or drooling
- Chewing and swallowing
- Eating tasks
- Dressing
- Hygiene
- Handwriting
- Doing hobbies and other activities
- Turning in bed
- Tremor
- Getting out of bed, a car, or a deep chair
- Walking and balance
- Freezing

At the end of the questionnaire, it notes that the patient may not have many of the problems mentioned in the test and may never experience them.[10]

Part III: Motor Examination

Part III is an assessment of the patient's motor abilities. First, the assessor notes whether the patient is currently using medication for PD, whether the patient is on levodopa and if so the time since the last dose, and finally whether the patient is "on" or "off."[10]

The section has 18 items for the assessor to rate. Most of the items are based on observation of the patient performing specific activities, except for two near the end (global spontaneous movement, and rest tremor) that should be scored based on observation.[10]

Items in part III assess:[10]

- Speech
- Facial expression
- Rigidity
- Finger tapping
- Hand movements
- Pronation-supination movements of hands
- Toe tapping
- Leg agility
- Arising from chair
- Gait
- Freezing of gait
- Postural stability
- Posture
- Global spontaneity of movement (body bradykinesia)
- Postural tremor of the hands
- Kinetic tremor of the hands
- Rest tremor amplitude
- Constancy of rest tremor

Items are structured as follows.[10]

3.4 FINGER TAPPING

Instructions to examiner: each hand is tested separately. Demonstrate the task, but do not continue to perform the task while the patient is being tested. Instruct the patient to tap the index finder on the thumb 10 times as quickly AND as big as possible. Rate each side separately, evaluating speed, amplitude, hesitations, halts, and decrementing amplitude.

0: Normal:	No problems.
1: Slight:	Any of the following: a) the regular rhythm is broken with one or two interruptions or hesitations of the tapping movement; b) slight slowing; c) the amplitude decrements near the end of the 10 taps.
2: Mild:	Any of the following: a) 3 to 5 interruptions during tapping; b) mild slowing; c) the amplitude decrements midway in the 10-tap sequence.
3: Moderate:	Any of the following: a) more than 5 interruptions during tapping or at least one longer arrest (freeze) in ongoing movement; b) moderate slowing; c) the amplitude decrements starting after the first tap.
4: Severe:	Cannot or can only barely perform the task because of slowing, interruptions, or decrements.

Some items in this section ask the assessor to rate different parts of the body during a single exam. For example, for rigidity the assessor gives separate scores for the neck and each limb. Others, such as hand movements and toe tapping, assess right and left sides separately.[10]

At the end of part III, the assessor is asked whether dyskinesias (chorea or dystonia) were present during the exam and if they interfered with the ratings. Finally, the assessor is asked to assign a Hoehn and Yahr stage to the patient.[10]

See below for a discussion of the Hoehn and Yahr Rating Scale.

Part IV: Motor Complications

Part IV uses historical and objective information to assess two motor complications: dyskinesias (two items) and motor fluctuations (four items) that include "off"-state dystonia.[10]

This part has more involved directions because important terms are defined. For example, dystonia is defined as contorted posture, often with a twisting component. Plus, it is noted that words patients recognize for dystonia include "spasms," "cramps," and "posture." Other defined terms include dyskinesia, motor fluctuation, "off", and "on". These definitions help to maintain consistency between different assessors.[10]

Some answers in this section are based on percentages. The assessor is given directions on how to calculate these percentages.[10]

Items in this section include:[10]

- Time spent with dyskinesias
- Functional impact of dyskinesia
- Time spent in the "off" state
- Functional impact of fluctuations
- Complexity of motor fluctuations
- Painful "off"-state dystonia

The following is an example item.[10]

4.1 TIME SPENT WITH DYSKINESIAS

Instructions to examiner: determine the hours in the usual waking day and then the hours of dyskinesias. Calculate the percentage. If the patient has dyskinesias in the office, you can point them out as a reference to ensure that patients and caregivers understand what they are rating. You may also use your own acting skills to enact the dyskinetic movements you have seen in the patient before or show them dyskinetic movements typical of other patients. Exclude from this question early morning and nighttime painful dystonia.

Instructions to patient and [caregiver]: over the past week, how many hours do you usually sleep on a daily basis, including nighttime sleep and daytime napping? Alright, if you sleep ___ hrs, you are awake ___ hrs. Out of those awake hours, how many hours in total do you have wiggling, twitching, or jerking movements? Do not count the times when you have tremor, which is a regular back and forth shaking or times when you have painful foot cramps or spasms in the early morning or at nighttime. I will ask about those later. Concentrate only on these types of wiggling, jerking, and irregular movements. Add up all the time during the waking day when these usually occur. How many hours ___ (use this number for your calculations).

0: Normal: No dyskinesias.

1: Slight: ≤25% of waking day.

2: Mild: 26–50% of waking day.

3: Moderate: 51–75% of waking day.

4: Severe: >75% of waking day.

1. Total hours awake: ___

2. Total hours with dyskinesia: ___

3. % dyskinesia = ((2/1) X 100): ___

Hoehn and Yahr rating scale

The Hoehn and Yahr rating scale was developed in the 1990s to provide a general estimate of clinical function in PD combining functional deficits (disability) and objective signs (impairment). This twofold concept assumes that the severity of overall Parkinson dysfunction relates to bilateral involvement and compromised balance/gait.[11]

The scale was originally developed using a 5-point scale, but two 0.5 increments were introduced later. Each stage in the scale is briefly defined in terms of motor impairment and disability/dependence.[11]

Due to its simplicity, the Hoehn and Yahr scale is used almost universally to classify patients throughout the phases of disease progression.[5] The scale is considered the reference standard for disability and impairment measures.[11]

- It significantly correlates with both quality-of-life measures and studies of objective motor performance.
- Progressively higher Hoehn and Yahr stages correlate with neuroimaging studies of dopaminergic loss.
- A change in a patient's Hoehn and Yahr stage carries prognostic significance and influences clinician-based interventions.

Hoehn and Yahr scale	Modified Hoehn and Yahr scale
1. Unilateral involvement only, usually with minimal or no functional disability	1.0: Unilateral involvement only
	1.5: Unilateral and axial involvement
2. Bilateral or midline involvement without impairment of balance	2.0: Bilateral involvement without impairment of balance
	2.5: Mild bilateral disease with recovery on pull test
3. Bilateral disease: mild to moderate disability with impaired postural reflexes; physically independent	3.0: Mild to moderate bilateral disease; some postural instability; physically independent
4. Severely disabling disease; still able to walk or stand unassisted	4.0: Severe disability; still able to walk or stand unassisted
5. Confinement to bed or wheelchair unless aided	5.0: Wheelchair bound or bedridden unless aided

Some limitations of the Hoehn and Yahr scale have been identified. First, the stages are not linear and may not be rank order. Unilateral vs bilateral features define early stages while severity and impairment define the later stages, instead of each feature progressing through each stage. Some patients in stage 2 may have greater disability than others that are in stage 3.[6] The scale also does not assess nonmotor symptoms.[5]

Note that the scale is heavily weighted towards postural instability, which is considered to be a symptom that is not responsive to L-dopa therapy, and nonmotor symptoms that tend to drive disability after 15 years of disease duration are not included in the scale. Therefore, the Hoehn and Yahr scale may not capture the efficacy of therapy or improvements in other aspects of the disease at later stages.[12]

Hauser Diary

The Hauser Diary is a tool introduced in 2000 in which the patient reports the amount of time they spend each day in five categories.[7]

- Asleep
- "Off"
- "On" with troublesome dyskinesia
- "On" with nontroublesome dyskinesia
- "On" without dyskinesia

The patient marks the diary every 30 minutes reflecting their predominant status over the prior half-hour period.[7]

Previous diaries included the category "'on' with dyskinesia" but this does not differentiate between benign dyskinesia and disabling dyskinesia.[7] The Hauser Diary separates these into two categories (bullets 3 and 4). A preliminary validation study found that patients generally considered "on" time with troublesome dyskinesia to be "bad time" while "on" with nontroublesome dyskinesia was considered "good time."[7]

"On" and "off" time changes captured in patient diaries have become the gold standard in clinical trials studying the effects of drugs for the improvement of motor fluctuations. The Hauser Diary can be used in clinical studies to quantify the effect of an intervention by reporting the change from baseline to endpoint in "off" time and "on" time without troublesome dyskinesia ("good 'on' time;" sum of bullets 4 and 5) during waking hours, or other variables. In general, "off" time reduction or a "good 'on' time" increase of 1 hour may be considered clinically significant in clinical studies.[13]

The diary was shown to be simple and feasible; 83% of a study group of 302 patients with advanced PD completed 3 consecutive days of diaries in each of 2 consecutive weeks (6 days total) with no missing or duplicate entries.[7]

Possible drawbacks of the diary included challenging patient compliance (reporting status every 30 minutes for at least 1–3 days); does not rate the quality or severity of "off" time or dyskinesias, recall bias, the requirement of rigorous training to estimate state, and the assumption that all dyskinesias occur during "on" time.[13]

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