2. Multi-domain scales

The complex nature of Parkinson's disease (PD) requires the use of multi-purpose and comprehensive assessment tools that cover a wide array of symptoms. The Unified Parkinson's Disease Rating Scale (UPDRS) has been widely used and extensively tested for its clinimetric properties. The recently developed Movement Disorders Society (MDS) sponsored revision of the Unified Parkinson's Disease Rating Scale (MDS-UPDRS) has shown satisfactory quality of its attributes and probably will replace the UPDRS in the coming years.

Unified Parkinson's Disease Rating Scale (UPDRS) (Figure 2.1) [1]	
Description of scale	
Overview	The UPDRS assesses PD-related disability and impairment [2] Composed of 42 items grouped into four subscales: I, Mentation, Behavior and Mood (4 items); II, Activities of Daily Living (ADL) (13 items); III, Motor (14 items, 27 scores); IV, Complications of Therapy (11 items). It also includes the modified Hoehn & Yahr Staging Scale (HY) and the Schwab & England Activities of Daily Living Scale (SE) In subscales I to III, items are scored on a four-point scale. In subscale IV, some items are dichotomous and others are scored on a four-point scale for duration or severity Time for administration: 10 to 20 minutes Time frame: time of assessment or past week (for Section IV) Rated by the health professionals. Sections I and II can be self-administered [3,4] Specific for PD
Copyright?	Public domain
How can the scale be obtained?	The scale can be obtained from the original publication [1]
Clinimetric properties of scale in patients with PD	
Feasibility	Used in all stages of PD, but the scale favors the assessment of moderate and severe impairments. Floor effect limits the scale's utility in early stages of PD
Dimensionality	Multitrait scaling and factor analysis have revealed four factors, each one corresponding to a subscale [5]. Factor structure of the Motor section has been analyzed [5–7]

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Acceptability	Observed scores coincided with the possible score ranges only in Section III [5] Floor effect in Sections I and IV [2,5]
Reliability	Cronbach's alpha ranged from 0.64 (Section I) to 0.92 (Sections II and III) [5,8]. ADL and Motor sections can be reduced to eight items each without losing reliability or validity [9] Inter-rater reliability is adequate for the total UPDRS and for Sections II and III [2] Test-retest reliability is acceptable; higher for early-stage PD [4,5,10]
Validity	Face/content validity has been considered adequate only for Motor Examination [11] Correlations with other PD scales: UPDRS Mentation and Complications with HY, moderate; UPDRS ADL and Motor Exam with SE, high correlation [11] Known-groups validity: significantly different UPDRS subscales scores by HY stages [11]
Responsiveness & Interpretability	Standard error of measurement (SEM) ranged from 1.24 (UPDRS Mentation) to 2.48 (UPDRS Motor) [5] UPDRS is responsive to therapeutic interventions and is the reference scale for regulatory agencies. Minimally detectable change (MDC) ranged from 2 (Mentation) to 11 (Motor Examination). MDC for total score was 13 [8]. Minimal clinically relevant incremental difference (MCRID) was established in a range from 4 to 10 points for UPDRS Motor [2] The effects of sex and age on UPDRS ratings during treatment interventions have not been specifically examined [2]
Cross-cultural Adaptations & Others	Translated and validated into many languages. Alternative ways of administration for self, caregivers and nursing staff assessments have been tested [3,12]
Overall impression	
Advantages	Uniformity of communication; teaching tapes available through the MDS [13]
Disadvantages	Excessive length; redundancies in ADL and Motor sections [14]; insufficient items to assess non-motor symptoms of PD; lack of standardized instructions; different score system in Section IV; inconsistent allocation of items to specific sections; cultural bias

Movement Disorders Society sponsored revision of the Unified Parkinson's Disease Rating Scale (MDS-UPDRS) [15]	
Description of scale	
Overview	Assesses the motor and non-motor impact of PD Part I: Non-Motor Experiences of Daily Living, with six rater-based items and seven for self-assessment; Part II: Motor Experiences of Daily Living, with 13 patient-based items; Part III: Motor Examination (33 scores based on 18 items, due to left, right and other body distributions); and Part IV: Motor Complications, with six items [15] Rating for items: 0 (normal) to 4 (severe). Total score for each Part is obtained from the sum of the corresponding item scores Time estimated: 30 minutes for the full scale, 10 minutes for Part III Time frame: the past week for Parts I, II, and IV. Time of assessment for Part III Specific for PD
Copyright?	Owned by the MDS
How can the scale be obtained?	www.movementdisorders.org/publications/rating_scales
Clinimetric properties of scale in patients with PD	
Feasibility	Specifically designed for patients with PD. Vocabulary avoids medical jargon and is adapted to a seventh-grade level [15] Designed to be applicable to patients with PD across various levels of disabilities [16]. Scores significantly increase with disease duration and HY stages [17]
Dimensionality	Multidimensional scale, with four sections [15,18,19]
Acceptability	Mild/moderate floor effect present in Part IV. No ceiling effect. [15]
Reliability	Cronbach's alpha: from 0.79 (Part I) to 0.93 (Part III) [15,19,20] Inter-rater reliability: not tested Test-retest reliability: satisfactory in the Spanish validation [19]
Validity	Content validity: evaluated during the scale development phase [16]; not formally tested Convergent validity: strongly correlated with UPDRS [15]. HY showed moderate correlations with Parts I and IV, and high correlations with Parts II and III. Clinical Impression of Severity Index for Parkinson's Disease (CISI-PD) showed high correlations with all MDS-UPDRS sections [17-19]. As a whole, Part I items showed moderate-to-high correlations with scales assessing similar constructs [20,21] Known-groups: MDS-UPDRS scores significantly increased with age (Parts I and III), disease duration, years of treatment, and HY stages [17,19] Internal validity: moderate to high correlation between the subscales [16,19]
Responsiveness & Interpretability	Responsive to therapeutic interventions [22–24], although its use in clinical trials is still scarce Scores from UPDRS and other scales can be converted into MDS-UPDRS respective scores (and vice-versa) using equation models [21,25,26]

Cross-cultural Adaptations & Others	Translations into several languages are available in the MDS website (see above). More translations are ongoing through the MDS-UPDRS translation program [27]
Overall impression	
Advantages	Satisfactory clinimetric properties; translation and cross-cultural adaptation program; certificate training program available through the MDS [28]
Disadvantages	Length (50 items; 65 scores). Responsiveness not tested

Figure 2.1 Unified Parkinson's Disease Rating Scale (UPDRS)

I. Mentation, Behavior And Mood

1. *Intellectual Impairment*

0 = None.
1 = Mild. Consistent forgetfulness with partial recollection of events and no other difficulties.
2 = Moderate memory loss, with disorientation and moderate difficulty handling complex problems. Mild but definite impairment of function at home with need of occasional prompting.
3 = Severe memory loss with disorientation for time and often to place. Severe impairment in handling problems.
4 = Severe memory loss with orientation preserved to person only. Unable to make judgements or solve problems. Requires much help with personal care. Cannot be left alone at all.

2. *Thought disorder* (Due to dementia or drug intoxication)

0 = None.
1 = Vivid dreaming.
2 = "Benign" hallucinations with insight retained.
3 = Occasional to frequent hallucinations or delusions; without insight; could interfere with daily activities.
4 = Persistent hallucinations, delusions, or florrid psychosis. Not able to care for self.

3. *Depression*

1 = Periods of sadness or guilt greater than normal, never sustained for days or weeks.
2 = Sustained depression (1 week or more).
3 = Sustained depression with vegetative symptoms (insomnia, anorexia, weight loss, loss of interest).
4 = Sustained depression with vegetative symptoms and suicidal thoughts or intent.

4. *Motivation/Initiative*

0 = Normal.
1 = Less assertive than usual; more passive.
2 = Loss of initiative or disinterest in elective (nonroutine) activities.
3 = Loss of initiative or disinterest in day to day (routine) activities.
4 = Withdrawn, complete loss of motivation.

II. Activities of daily living (for both "on" and "off")

5. *Speech*

0 = Normal.
1 = Mildly affected. No difficulty being understood.
2 = Moderately affected. Sometimes asked to repeat statements.
3 = Severely affected. Frequently asked to repeat statements.
4 = Unintelligible most of the time.

6. Salivation
0 = Normal.
1 = Slight but definite excess of saliva in mouth; may have nighttime drooling.
2 = Moderately excessive saliva; may have minimal drooling.
3 = Marked excess of saliva with some drooling.
4 = Marked drooling, requires constant tissue or handkerchief.

7. Swallowing
0 = Normal.
1 = Rare choking.
2 = Occasional choking.
3 = Requires soft food.
4 = Requires NG tube or gastrotomy feeding.

8. Handwriting
0 = Normal.
1 = Slightly slow or small.
2 = Moderately slow or small; all words are legible.
3 = Severely affected; not all words are legible.
4 = The majority of words are not legible.

9. Cutting food and handling utensils
0 = Normal.
1 = Somewhat slow and clumsy, but no help needed.
2 = Can cut most foods, although clumsy and slow; some help needed.
3 = Food must be cut by someone, but can still feed slowly.
4 = Needs to be fed.

10. Dressing
0 = Normal.
1 = Somewhat slow, but no help needed.
2 = Occasional assistance with buttoning, getting arms in sleeves.
3 = Considerable help required, but can do some things alone.
4 = Helpless.

11. Hygiene
0 = Normal.
1 = Somewhat slow, but no help needed.
2 = Needs help to shower or bathe; or very slow in hygienic care.
3 = Requires assistance for washing, brushing teeth, combing hair, going to bathroom.
4 = Foley catheter or other mechanical aids.

12. Turning in bed and adjusting bed clothes
0 = Normal.
1 = Somewhat slow and clumsy, but no help needed.
2 = Can turn alone or adjust sheets, but with great difficulty.
3 = Can initiate, but not turn or adjust sheets alone.
4 = Helpless.

13. Falling (unrelated to freezing)
0 = None.
1 = Rare falling.
2 = Occasionally falls, less than once per day.
3 = Falls an average of once daily.
4 = Falls more than once daily.

14. Freezing when walking
0 = None.
1 = Rare freezing when walking; may have starthesitation.
2 = Occasional freezing when walking.
3 = Frequent freezing. Occasionally falls from freezing.
4 = Frequent falls from freezing.

15. Walking
0 = Normal.
1 = Mild difficulty. May not swing arms or may tend to drag leg.
2 = Moderate difficulty, but requires little or no assistance.
3 = Severe disturbance of walking, requiring assistance.
4 = Cannot walk at all, even with assistance.

16. Tremor (symptomatic complaint of tremor in any part of body.)
0 = Absent.
1 = Slight and infrequently present.
2 = Moderate; bothersome to patient.
3 = Severe; interferes with many activities.
4 = Marked; interferes with most activities.

17. Sensory complaints related to parkinsonism
0 = None.
1 = Occasionally has numbness, tingling, or mild aching.
2 = Frequently has numbness, tingling, or aching; not distressing.
3 = Frequent painful sensations.
4 = Excruciating pain.

III. Motor Examination
18. Speech
0 = Normal.
1 = Slight loss of expression, diction and/or volume.
2 = Monotone, slurred but understandable; moderately impaired.
3 = Marked impairment, difficult to understand.
4 = Unintelligible.

19. Facial expression
0 = Normal.
1 = Minimal hypomimia, could be normal "Poker Face".
2 = Slight but definitely abnormal diminution of facial expression
3 = Moderate hypomimia; lips parted some of the time.
4 = Masked or fixed facies with severe or complete loss of facial expression; lips parted 1/4 inch or more.
(head, upper and lower extremities)

20. Tremor at rest
0 = Absent.
1 = Slight and infrequently present.
2 = Mild in amplitude and persistent. Or moderate in amplitude, but only intermittently present.
3 = Moderate in amplitude and present most of the time.
4 = Marked in amplitude and present most of the time.

21. Action or Postural Tremor of hands
0 = Absent.
1 = Slight; present with action.
2 = Moderate in amplitude, present with action.
3 = Moderate in amplitude with posture holding as well as action.
4 = Marked in amplitude; interferes with feeding.

22. Rigidity (Judged on passive movement of major joints with patient relaxed in sitting position. Cogwheeling to be ignored.)
0 = Absent.
1 = Slight or detectable only when activated by mirror or other movements.
2 = Mild to moderate.
3 = Marked, but full range of motion easily achieved.
4 = Severe, range of motion achieved with difficulty.

23. Finger taps (Patient taps thumb with index finger in rapid succession.)
0 = Normal.
1 = Mild slowing and/or reduction in amplitude.
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement.
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement.
4 = Can barely perform the task.

24. Hand movements (patient opens and closes hands in rapid succesion.)
0 = Normal.
1 = Mild slowing and/or reduction in amplitude.
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement.
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement.
4 = Can barely perform the task.

25. Rapid alternating movements of hands (pronation-supination movements of hands, vertically and horizontally, with as large an amplitude as possible, both hands simultaneously.)
0 = Normal.
1 = Mild slowing and/or reduction in amplitude.
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement.
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement.
4 = Can barely perform the task.

26. Leg agility (patient taps heel on the ground in rapid succession picking up entire leg. Amplitude should be at least 3 inches.)
0 = Normal.
1 = Mild slowing and/or reduction in amplitude.
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement.
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement.
4 = Can barely perform the task.

27. Arising from chair (patient attempts to rise from a straightbacked chair, with arms folded across chest.)
0 = Normal.
1 = Slow; or may need more than one attempt.
2 = Pushes self up from arms of seat.
3 = Tends to fall back and may have to try more than one time, but can get up without help.
4 = Unable to arise without help.

28. Posture
0 = Normal erect.
1 = Not quite erect, slightly stooped posture; could be normal for older person.
2 = Moderately stooped posture, definitely abnormal; can be slightly leaning to one side.
3 = Severely stooped posture with kyphosis; can be moderately leaning to one side.
4 = Marked flexion with extreme abnormality of posture.

29. Gait
0 = Normal.
1 = Walks slowly, may shuffle with short steps, but no festination (hastening steps) or propulsion.
2 = Walks with difficulty, but requires little or no assistance; may have some festination, short steps, or propulsion.
3 = Severe disturbance of gait, requiring assistance.
4 = Cannot walk at all, even with assistance.

30. Postural stability (response to sudden, strong posterior displacement produced by pull on shoulders while patient erect with eyes open and feet slightly apart. Patient is prepared.)
0 = Normal.
1 = Retropulsion, but recovers unaided.
2 = Absence of postural response; would fall if not caught by examiner.
3 = Very unstable, tends to lose balance spontaneously.
4 = Unable to stand without assistance.

31. Body bradykinesia and hypokinesia (combining slowness, hesitancy, decreased armswing, small amplitude, and poverty of movement in general.)
0 = None.
1 = Minimal slowness, giving movement a deliberate character; could be normal for some persons. Possibly reduced amplitude.
2 = Mild degree of slowness and poverty of movement which is definitely abnormal. Alternatively, some reduced amplitude.
3 = Moderate slowness, poverty or small amplitude of movement.
4 = Marked slowness, poverty or small amplitude of movement.

IV. Complications of Therapy (in the past week)

A. DYSKINESIAS

32. Duration: What proportion of the waking day are dyskinesias present? (Historical information.)
0 = None
1 = 1-25% of day.
2 = 26-50% of day.
3 = 51-75% of day.
4 = 76-100% of day.

33. Disability: How disabling are the dyskinesias? (Historical information; may be modified by office examination.)
0 = Not disabling.
1 = Mildly disabling.
2 = Moderately disabling.
3 = Severely disabling.
4 = Completely disabled.

34. Painful dyskinesias: how painful are the dyskinesias?
0 = No painful dyskinesias.
1 = Slight.
2 = Moderate.
3 = Severe.
4 = Marked.

35. Presence of early morning dystonia (Historical information.)
0 = No
1 = Yes

B. CLINICAL FLUCTUATIONS
36. Are "off" periods predictable?
0 = No
1 = Yes

37. Are "off" periods unpredictable?
0 = No
1 = Yes

38. Do "off" periods come on suddenly, within a few seconds?
0 = No
1 = Yes

39. What proportion of the waking day is the patient "off" on average?
0 = None
1 = 1-25% of day.
2 = 26-50% of day.
3 = 51-75% of day.
4 = 76-100% of day.

C. OTHER COMPLICATIONS
40. Does the patient have anorexia, nausea, or vomiting?
0 = No
1 = Yes

41. Any sleep disturbances, such as insomnia or hypersomnolence?
0 = No
1 = Yes

42. Does the patient have symptomatic orthostasis? (Record the patient's blood pressure, height and weight on the scoring form)
0 = No
1 = Yes

V. Modified Hoehn and Yahr staging

Stage 0 = No signs of disease.
Stage 1 = Unilateral disease.
Stage 1.5 = Unilateral plus axial involvement.
Stage 2 = Bilateral disease, without impairment of balance.
Stage 2.5 = Mild bilateral disease, with recovery on pull test.
Stage 3 = Mild to moderate bilateral disease; some postural instability; physically independent.
Stage 4 = Severe disability; still able to walk or stand unassisted.
Stage 5 = Wheelchair bound or bedridden unless aided.

VI. Schwab And England Activities Of Daily Living Scale

100% = Completely independent. Able to do all chores without slowness, difficulty or impairment. Essentially normal. Unaware of any difficulty.
90% = Completely independent. Able to do all chores with some degree of slowness, difficulty and impairment. Might take twice as long. Beginning to be aware of difficulty.
80% = Completely independent in most chores. Takes twice as long. Conscious of difficulty and slowness.
70% = Not completely independent. More difficulty with some chores. Three to four times as long in some. Must spend a large part of the day with chores.
60% = Some dependency. Can do most chores, but exceedingly slowly and with much effort. Errors; some impossible.
50% = More dependent. Help with half, slower, etc. Difficulty with everything.
40% = Very dependent. Can assist with all chores, but few alone.
30% = With effort, now and then does a few chores alone or begins alone. Much help needed.
20% = Nothing alone. Can be a slight help with some chores. Severe invalid.
10% = Totally dependent, helpless. Complete invalid.
0% = Vegetative functions such as swallowing, bladder and bowel functions are not functioning. Bedridden.

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