Movement Disorders
Vol. 23, No. 4, 2008, pp. 484–500

Task Force Report

Scales to Assess Psychosis in Parkinson's Disease: Critique and Recommendations

Hubert H. Fernandez, MD,[1]* Dag Aarsland, MD,[2] Gilles Fénelon, MD,[3] Joseph H. Friedman, MD,[4] Laura Marsh, MD,[5] Alexander I. Tröster, PhD,[6] Werner Poewe, MD,[7] Olivier Rascol, MD,[8] Cristina Sampaio, MD,[9] Glenn T. Stebbins, PhD,[10] and Christopher G. Goetz, MD[10]

[1]*Department of Neurology, McKnight Brain Institute/University of Florida, Gainesville, Florida, USA*
[2]*Stavanger University Hospital, Centre for Clinical Neuroscience Research, Stavanger, Norway*
[3]*Department of Neurology, Hôpital Henri-Mondor, Crétil, France*
[4]*Department of Clinical Neuroscience, Brown University Medical School, Providence, Rhode Island, USA*
[5]*Department of Psychiatry, Johns Hopkins University, Baltimore, Maryland, USA*
[6]*Department of Neurology, University of North Carolina, Chapel Hill, North Carolina, USA*
[7]*Department of Neurology, Medical University of Innsbruck, Innsbruck, Austria*
[8]*Laboratoire de Pharmacologie Medicale Et Clinique, Faculte de Medicine, Toulouse, France*
[9]*Laboratory of Clinical Pharmacology and Therapeutics, Faculdade de Medicina de Lisboa, Lisboa, Portugal*
[10]*Department of Neurological Sciences, Rush University Medical Center, Chicago, Illinois, USA*

Abstract: Psychotic symptoms are a frequent occurrence in Parkinson's disease (PD), affecting up to 50% of patients. The Movement Disorder Society established a Task Force on Rating Scales in PD, and this critique applies to published, peer-reviewed rating psychosis scales used in PD psychosis studies. Twelve psychosis scales/questionnaires were reviewed. None of the reviewed scales adequately captured the entire phenomenology of PD psychosis. While the Task Force has labeled some scales as "recommended" or "suggested" based on the fulfilling-defined criteria, none of the current scales contained all the basic content, mechanistic and psychometric properties needed to capture PD psychotic phenomena and to measure clinical response over time. Different scales may be better for some settings versus others. Since one scale may not be able to serve all needs, a scale used to measure clinical response and change over time [such as the Clinical Global Impression Scale (CGIS)] may need to be combined with another scale better at cataloging specific features [such as the Neuropsychiatric Inventory (NPI) or Schedule for Assessment of Positive Symptoms (SAPS)]. At the present time, for clinical trials on PD psychosis assessing new treatments, the following are recommended primary outcome scales: NPI (for the cognitively impaired PD population or when a caregiver is required), SAPS, Positive and Negative Syndrome Scale (PANSS), or Brief Psychiatric Rating Scale (BPRS) (for the cognitively intact PD population or when the patient is the sole informant). The CGIS is suggested as a secondary outcome scale to measure change and response to treatment over time. © 2008 Movement Disorder Society

Key words: Parkinson; psychosis; scales; hallucination; delusion.

Psychotic symptoms are a frequent occurrence in Parkinson's disease (PD), affecting up to 50% of patients.[1,2] Studies on psychosis have mostly focused on visual hallucinations, the most common type of psychotic symptom in PD.[3-6] However, hallucinations can occur in all sensory domains and delusions of various types are also relatively common.[4,7-9] Table 1 lists the most relevant terms used in this review with their definitions.

Over the course of PD, psychotic symptoms, once present, tend to be persistent and progressive.[10-12] The impact of psychosis is substantial in that it is associated with dementia, depression, earlier mortality, greater caregiver strain, and nursing home placement.[12-16]

This article contains supplementary material available via the Internet at http://www.interscience.wiley.com/jpages/0885-3185/suppmat.

*Correspondence to: Hubert Fernandez, Department of Neurology, McKnight Brain Institute/University of Florida, 100 S. Newell Drive, PO Box 100236, Gainesville, FL 32611.
E-mail: fernandez@neurology.ufl.edu

Received 3 May 2007; Revised 14 August 2007; Accepted 28 October 2007

Published online 3 January 2008 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/mds.21875

TABLE 1. *Terms and definitions used in this critique*

Term	Definition
Psychosis	A global term to encompass hallucinations, delusions and the "minor" phenomena of illusions, "passage hallucinations" and "sense of presence"
Hallucinations	Abnormal perceptions without a physical stimulus that can involve any sensory modality and may be simple or complex in form.
Illusions	Misperceptions of real stimuli that are often visual in nature
Delusions	False, fixed, idiosyncratic beliefs that are maintained despite evidence to the contrary
Sense of presence	Experience that someone is present when nobody is actually there
Passage hallucinations	Fleeting, vague imaging in the peripheral vision

Until recently, there have been no standardized criteria specifically designed to diagnose PD-related psychosis. The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV-R)[17] and the Structured Clinical Interview for DSM-IV-TR Axis I disorders (SCID)[18] have been used, but they rely on general categories like "psychotic disorder due to a general medical condition" or "substance-induced psychotic disorder."

A NIH-sponsored workshop recently reviewed the PD psychosis literature to provide criteria that distinguish PD psychosis from other causes of psychosis.[19] On the basis of these data, provisional criteria for PD psychosis in the style of the Diagnostic and Statistical Manual of Mental Disorders IV-R were proposed (see Table 2). The criteria are inclusive and contain descriptions of the full range of characteristic symptoms, chronology of onset, duration of symptoms, exclusionary diagnoses, and associated features, such as dementia. They describe a distinctive constellation of clinical features that are not shared by other psychotic syndromes. These criteria require validation and perhaps refinement, but form a useful starting point for studies on PD psychosis.

Although the NIH-sponsored workshop focused on diagnostic issues, this report concerns a critical evaluation of scales that rate the severity of PD-related psychosis. The Movement Disorder Society (MDS) has established a Task Force on Rating Scales in PD, and this critique applies the mission of this Task Force to rating scales that address psychotic phenomena. Specifically, the aims of this report were to (1) conduct a survey of MDS members regarding their use of psychosis rating scales, (2) review and critique available psychotic symptom rating scales used in PD, and (3) make formal recommendations to the society regarding the utility of scales for research and clinical practice. The Task Force charge did not include the design of a new scale, although the recommendations could identify this need as a possible conclusion.

PATIENTS AND METHODS

MDS Members Survey of Psychotic Symptom Scale Use

As a background work to develop the critique and recommendations for rating scales used in PD psychosis,

TABLE 2. *Proposed diagnostic criteria for PD associated psychosis*

A. Characteristic symptoms [Presence of at least one of the following symptoms (specify which of the symptoms fulfill the criteria)]
  Illusions
  False sense of presence
  Hallucinations
  Delusions
B. Primary diagnosis
  UK brain bank criteria for PD
C. Chronology of the onset of symptoms of psychosis
  The symptoms in criterion A occur after the onset of PD
D. Duration
  The symptom(s) in criterion A are recurrent or continuous for 1 mo
E. Exclusion of other causes
  The symptoms in criterion A are not better accounted for by another cause of Parkinsonism such as dementia with Lewy bodies, psychiatric disorders such as schizophrenia, schizoaffective disorder, delusional disorder, or mood disorder with psychotic features, or a general medical condition including delirium
F. Associated features (Specify if associated)
  With/without insight
  With/without dementia
  With/without treatment for PD (specify drug, surgical, other)

the Writing Committee reviewed and adapted the template used by the MDS Rating Scale Task Force to survey MDS members on their use of specific psychosis rating scales in the PD population (see Appendix A, available online at http://www.interscience.wiley.com/jpages/0885-3185/suppmat).

Critique Process

PubMed searches (from 1950 to September 2005) were conducted using Parkinson's disease and psychosis/hallucinations/delusions in combination with each of the following terms: clinical course, functional outcome, clinical features, antipsychotic drugs, neuroleptics, diagnosis, diagnostic criteria, rating scales, and clinical trials. The resulting articles were then screened by the Chair of the Writing Committee (HHF) before distribution to the Task Force members to determine that they dealt specifically with PD and that they were original contributions. While several other psychosis scales exist, this critique was limited to the scales used in published, peer-reviewed PD psychosis studies. Each of the Committee members reviewed the primary reference for the psychosis scale along with all articles in which the scales were used in patients with PD. The review began with a "primer on psychometric issues" given by the committee's psychologist (AIT). Appendix B (supplementary material) briefly defines the clinimetric terms used in evaluating the properties[21-23] of each scale. Each scale's strengths, weaknesses, and psychometric properties were then determined. The features were then summarized, and specific recommendations concerning the recommended use of each scale in PD were made according to the following definitions: (1) "recommended": a scale that has been applied to PD populations; there are data on its use in clinical studies beyond the group that developed the scale; and, it has been studied clinimetrically and considered valid, reliable, and sensitive to the given behavior being assessed. Ideally this latter criterion is met for PD psychosis specifically, but can be met if strong clinimetric results are available for hallucinations and psychosis in other contexts. (2) "suggested": the scale has been applied to PD populations, but only one of the other criteria is fulfilled; (3) "listed": the scale has been applied to PD populations, but neither of the other criteria is fulfilled. These designations are also being used to develop the Appendix of ancillary scales to complement the Movement Disorder Society-sponsored revision of the Unified Parkinson Disease Rating Scale (MDS-UPDRS) still in development.[24] The terms recommended, suggested, and listed are designations based on the evidence criteria listed above, but do not represent an official stand by the MDS.

RESULTS

MDS Members Survey Results

Of over 2000 surveys sent to the entire MDS membership, 58 responses were received and tabulated. The response rate was considered too meager to draw definitive conclusions on membership utilization of PD psychosis scales. Nonetheless, 91% (N = 52) of the respondents felt that there was a need for a psychosis rating scale for PD. Seventy-two percent (N = 41) have used a formal psychosis rating scale in PD, the majority of them in clinical practice and clinical trials. Of the rating scales, the Neuropsychiatric Inventory (NPI) was the most commonly used (N = 23), followed by the Brief Psychiatric Rating Scale (BPRS) (N = 16), Parkinson Psychosis Rating Scales (PPRS) (N = 8), Positive and Negative Symptom Scale (PANSS), and Scale for the Assessment of Positive Symptoms (SAPS) (N = 5 respondents each). The majority of the respondents felt that none of the existing scales were ideal in clinical practice, but that some may be useful in clinical trials or PD psychosis research.

If a new scale for PD were to be created, the majority of respondents felt that it was "important" or "very important" that the scale should take less than 10 minutes to administer (86%), that a reliable caregiver/observer also contributes to the history/information obtained (86%), that the scale also captures illusions (67%) and "sense of presence " hallucinations (64%), that it was able to differentiate drug-induced psychosis from delirium (77%), that a nonphysician was able to administer the scale (80%), and that it reflected the severity of psychosis over the last 7 to 14 days (92%).

Psychosis Scales Used in Parkinson's Disease

Each scale fulfilling the *Recommended* or *Suggested* criteria is discussed in the printed report with expanded materials available as supplementary materials on the journal website. For *Listed* scales that did not meet the higher criteria ratings, only a brief text is provided, and readers are referred to the supplementary materials on the journal website for their full discussion.

Table 3 summarizes characteristics of each scale and Table 4 shows how each scale fulfilled the criteria for use recommendations as a scale to assess PD psychosis.

Psychosis Scales Specific for Parkinson's Disease.

Parkinson Psychosis Rating Scale. This scale is designed to "rate the content, quality, severity, and frequency of six domains (of psychotic phenomenology in PD), and their functional impact based on family report."[25] The six domains are as follows: visual hallucinations, illusions/misidentification, para-

TABLE 3. *Summary of the general properties of psychosis scales/inventories reviewed in this article*

Scale	Time required to administer the scale (in min)	Are the items asked in a structured manner? (Y/N)	No special training required to administer the scale. (Y/N)	Has a validation study been reported in PD? (Y/N)	Does the scale look into the full spectrum of PD psychosis? (Y/N)
Parkinson psychosis rating scale	5–15	N	Y	Y	N
Parkinson psychosis questionnaire	5–15	Y	Y	Y	N
Rush hallucination inventory	>30	Y	Y	N	N
Baylor hallucination questionnaire	5–15	Y	Y	N	N
Neuropsychiatric inventory	15–30	Y	N	N	N
Behavioral pathology in Alzheimer's disease rating scale	15–30	Y	Y	N	N
Brief psychiatric rating scale	15–30	N	N	N	N
Positive and negative syndrome scale	>30	N	N	N	N
Schedule for assessment of positive symptoms	>30	Y	Y	N	N
Nurses' observation scale for inpatient evaluation	5–15	Y	Y	N	N
Clinical global impression scale	<5	N	Y	N	N
Unified Parkinson disease rating scale Part I	<5	N	Y	Y	N

noid ideation, sleep disturbance, confusion, and sexual preoccupation.

The original publication was based on 29 generally elderly and demented PD patients with psychosis. The six items are scored on a four-point scale (1 = absent to 4 = severe symptoms), anchor points are provided, with total scoring guidelines: mild = 8 to 12; moderate = 13 to 18, severe = 19 to 24. An additional item with the same scoring system rates the overall functional impact of psychosis based on family report.

TABLE 4. *Summary of "use recommendations" of psychosis scales used in PD*

Psychosis scale	Applied in PD	Used in studies beyond original article	Satisfactory clinimetric assessment	Scale designation*
Parkinson psychosis rating scale	√		√	Suggested
Parkinson psychosis questionnaire	√		√	Suggested
Rush hallucination inventory	√			Listed
Baylor hallucination questionnaire	√			Listed
Neuropsychiatric inventory	√	√	√	Recommended
Behavioral pathology in Alzheimer's disease rating scale	√	√		Suggested
Brief psychiatric rating scale	√	√	√	Recommended
Positive and negative syndrome scale	√	√	√	Recommended
Schedule for assessment of positive symptoms	√	√	√	Recommended
Nurses' observation scale for inpatient evaluation	√			Listed
Clinical global impression scale	√	√		Suggested
Unified Parkinson disease rating scale Part I	√			Listed

*These designations are based on the Appendix of ancillary scales to complement the Movement Disorder Society-sponsored revision of the Unified Parkinson Disease Rating Scale (MDS-UPDRS) still in development.[26] The definitions of these designations are as follows: "recommended": a scale that has been applied to PD populations; there are data on its use in clinical studies beyond the group that developed the scale; and, it has been studied clinimetrically and considered valid, reliable, and sensitive to the given behavior being assessed; "suggested": the scale has been applied to PD populations, but only one of the other criteria is fulfilled; "listed": the scale has been applied to PD populations, but neither of the other criteria is fulfilled.

In the original report, little information is given regarding administration. It appears to be based on an interview by an experienced clinician. The authors describe the scale as "easily administered," but the time required for administration was not given.

Strengths: The PPRS was specifically designed to assess psychotic symptoms in patients with PD. It is short (six items, plus a global assessment item) and allows measurement of change over time. The visual hallucinations item takes into account the frequency of hallucinatory events and insight, two important characteristics of hallucinations in PD.

Weaknesses: The PPRS fails to capture the heterogeneity of psychosis in PD, and the single items each for hallucinations and delusions provide a narrow range of scores for tracking clinical change. Further, the symptoms that accompany psychosis, include "confusion," "sexual preoccupancy," and "sleep disturbances," which are not specifically felt to be part of the specific syndrome of psychosis. With only three items devoted to psychosis and three other items devoted to the associated features, the final score risks being burdened with nonpsychotic confounds. Finally, the anchors have multiple features collapsed together (i.e., "3 = frequent; absence of full insight; can be convinced" leaving no options for the frequent hallucinations with full insight retained).

Psychometric properties: Validity and reliability evaluation is limited to the original report on the scale.[25] Given the small sample size (n = 29), those data must be viewed as preliminary. Further, responsiveness of the PPRS to active or passive intervention in a longitudinal setting has not been fully tested. Interrater reliability for individual items and total score was good to very good ($\rho = 0.80-0.99$) (though it is not specified why this type of correlation coefficient was employed). Internal consistency of items across three raters ranged from 0.31 to 0.80. Values for hallucination and paranoid ideation items are fair (0.64–0.75); others are quite weak. Test–retest reliability is described by the authors as "high" for 6 weeks, but coefficients ranged from quite poor to fair (0.06–0.70). Concurrent validity examining correlation of scores with BPRS (presumably using total scores) was high (0.92); however, the relationship was weak with Nurses' Observation Scale for Inpatient Evaluation (NOSIE) Psychotic dimension score (0.48). The instrument appears sensitive to treatment (i.e., on ondansetron).

Final Assessment: The PPRS fulfills criteria as a *suggested* scale for rating PD psychosis.

Parkinson Psychosis Questionnaire. The Parkinson Psychosis Questionnaire (PPQ)[26] was developed as a screening instrument for early recognition of psychosis in PD. The scale was reviewed by clinicians regarding its appropriateness and underwent further analysis of its internal validity by studying test results in 50 patients with parkinsonism relative to results on the BPRS and the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV).[17]

The scale includes screening probes followed by detailed questions regarding the presence or absence of sleep disturbance, hallucinations/illusions, delusions, and orientation. Any positive answers within a domain trigger inquiries about frequency and severity. A subscore is the product of the frequency multiplied by the severity score for that symptom category. The total score is the sum of the subscores.

Strengths: The PPQ is one of a few scales developed specifically for PD and provides detailed anchors and guidelines for rating items. It provides a mechanism for cataloging the presence or absence of most discrete psychotic phenomena. Unlike the PPRS, it scores both severity and frequency, and two of the four categories are devoted specifically to hallucinations/illusions and to delusions.

Weaknesses: The PPQ does not include all hallucinatory phenomena (olfactory, tactile, kinesthetic, and sense of presence). Insight into hallucinations is not taken into consideration. Some forms of delusions, including somatic delusions, are not assessed, and there is no mechanism for cataloging psychotic phenomena outside the specific questions. Delusions (five items) are more detailed than hallucinations (four items), although they are less common in PD psychosis. One item, delusional ideas of control or influence on actions and thoughts, is rare in PD. The sleep and orientation items reduce the specificity of the scale.

Psychometric properties: There is limited psychometric evidence based on the original study of 50 PD patients. The scale has not been tested extensively, and has not been subject to evaluation in clinical trials or larger samples, and its sensitivity to change has not been tested.

Internal consistency (of presumably the total scale) was moderate–good (α 0.68). Interrater reliability is unknown. Divergent validity with UPDRS Part III ($\rho = -0.13$) and MMSE ($\rho = -0.27$) is good. The scale has excellent agreement with SCID (100% sensitivity, 92% specificity). There is a significant, but unspecified correlation with the BPRS. The use of additive versus multiplicative scores is not justified adequately.

Final Assessment: The PPQ fulfills criteria as a *suggested* scale for rating PD psychosis.

Rush Hallucination Inventory. This 53-item inventory allows four answers to most questions, but also includes informational questions (how long to fall asleep,

what is bedtime?) and yes/no answers to others.[27] The questions with four answers allow for frequency and duration ratings. These questions are not given weights. Illusions and hallucinations as well as emotional coloration (fear) are considered, and visual, auditory, tactile, and olfactory domains are separately assessed.

The first set of questions addresses sleep disorders. There are 11 in number including informational questions such as quality of sleep, frequency questions on vivid dreams, nightmares, excessive daytime sedation, and use of sedative medications.

The second section is devoted to visual illusions and consists of seven questions, the first being a screening question, asking if illusions occur. If not, one skips to the next section. The third section pertains to auditory illusions and has a maximum frequency of three times per week. The six further questions are the same as for the visual illusions. The fourth section is on hallucinations, with an initial focus on visual hallucinations. The initial screening question defines maximal frequency as three times per week. This section asks how long the hallucination persists, what time of day and environmental circumstances, and whether they are frightening. Similar questions are then asked about auditory hallucinations. Then, a section on presence hallucinations, phrased somewhat ambiguously, asks, "During the past month, have you had the experience of feeling something or someone out of nowhere. . . that is, have you had a sensation when nothing was there?" The last section asks about olfactory hallucinations.

Strengths: This scale specifically outlines that it covers the past 1 month. It comprehensively probes into the major and minor forms of hallucinations and includes detailed questioning of associated sleep disturbances. The questions take into account the frequency and duration of each type of hallucination.

Weaknesses: This inventory assumes that severity is based on frequency and negative emotional association. There is no overall rating for any section. Further, although written as a questionnaire, there are no specific instructions. Delusions are not included in the inventory. None of the information is solicited from an observer. Contentwise, there is no mechanism for applying the scale to patients with dementia.

In the visual illusions section, there is no question on how clearly the vision is seen, how persistent or anything about the content other than whether it is frightening. The most severe rating for visual illusion frequency is three times per week (which may not be unlikely for a normal person with impaired vision). There are questions of interest, such as, on what situations (day, night, dark, light) are most likely to stimulate visual illusions, but not useful for either treatment studies or diagnosis. There is no question on visual acuity. Similarly, in the auditory illusions section, no questions on hearing impairment are asked. Duration of the illusion is not ascertained nor are any questions on content asked (e.g., are the sounds isolated such as a bark or a name being called, or is it sustained music, conversations, clearly heard, heard at a distance, etc). For olfactory hallucinations, there is no question on smell or taste impairment and no question on taste. The lack of description of the hallucinated content or whether there is an emotional reaction (other than fear) is another drawback.

Psychometric properties: The inventory has unknown psychometric properties. The correlation between the scale and MMSE (measuring cognitive state) and the UPDRS motor score at baseline is difficult to interpret. That is, is the Rush Hallucinations Inventory Score simply a proxy for disease severity? Or, does it indicate, as one might expect, that persons with more marked motor problems and cognitive compromise are also more likely to have hallucinations?

Final Assessment: The Rush Hallucination Inventory fulfills criteria as a *listed* scale for rating PD psychosis.

Baylor Hallucinations Questionnaire. This six-item, four-point scale questionnaire assesses only hallucinations[28]: (1) visual hallucinations, (2) auditory hallucinations, (3) presence hallucinations, (4) insight: "can you tell that the hallucinations are not real?," (5) "do you attempt to communicate with the hallucinations?," and (6) "how upset is your family by the hallucinations?." The answers to the questions 1 to 3 are: 0 = I do not have this problem; 1 = rare; 2 = occasionally (about once/week); 3 = frequently (more than three times per week); 4 = all the time (more than once each day).

Strengths: The strengths of this scale are its ease and rapidity of administration, characterization of the distress caused to the family, and delineation of symptom frequency. It focuses specifically on hallucinations in PD, and is anchored in frequency and insight, two clinically important dimensions of PD hallucinations.

Weaknesses: The frequency anchors are not clear and the equivalence of daily and "all the time" is likely to be a problem for many patients and caregivers. The spectrum used to rate symptom frequency seems disproportionate. For example, patients or raters may not view hallucinations experienced more than once a day as occurring all the time if they are very fleeting. A person with frequent presence hallucinations may have them three or four times daily without being terribly bothered. Despite focusing on hallucinations only, not all hallucinations are included. It does not assess tactile hallucinations or other rare modalities such as olfactory halluci-

nations. Delusions are not taken into account. The last item concerning the reactions of "the family" is interesting but debatable as reactions of the family may not reflect the severity of the patient's hallucinations.

Psychometric properties: The psychometric properties are unknown. The score reportedly correlates with global impression but the correlation coefficient was not reported.[28] The scale has been used in one small study only.[28]

Final Assessment: The Baylor Hallucinations Questionnaire fulfills criteria as a *listed* scale for rating PD psychosis.

Scales Developed to Assess Psychosis in Patients with Dementia.

Neuropsychiatric Inventory. The NPI is a 12-item scale developed primarily for the assessment of psychopathology in patients with dementia.[29] While the NPI has also been used in studies of neuropsychiatric disturbances with nondemented patients, its standard administration assumes that the subject has dementia and that the interview is conducted by trained rater with a knowledgeable caregiver. There are now other validated and widely used versions: the nursing home NPI and the questionnaire version (NPIQ), but informant report remains the source of information about the patient.

The twelve items covered by the NPI are delusions, hallucinations, agitation/aggression, depression/dysphoria, anxiety/elation/euphoria, apathy/indifference, disinhibition, irritability, aberrant motor behavior, nighttime behaviors, and appetite/eating behaviors. To facilitate detection of behavioral changes in these domains and minimize administration time, the NPI uses screening questions about symptoms and behaviors for each of the 12 items. More specific questions are asked only if the screening probe is positively endorsed. For each positive screening probe, the severity and frequency of the related symptoms are rated and a product of these two ratings is multiplied to obtain the score for each domain. A separate rating is attached to the "distress caused to the caregiver," or the "occupational disruption" at the nursing home. The NPI is copyrighted.

Strengths: The NPI has a number of strengths. Administration of this scale is relatively efficient with screening probes that capture delusions and hallucinations as well as the range of most psychiatric symptoms in patients with PD. The structured interview questions potentially enable administration of the NPI by less clinically experienced professionals without reducing scale validity or reliability. Open-ended questions for each item also allow recording of behaviors not listed for a particular domain. Separating symptom frequency from symptom severity provides a means to track the frequency, incidence, prevalence, and the dynamics of various psychiatric phenomena over time. As such, the NPI allows the rater to capture mild but very frequent phenomena or moderate but less frequent phenomena. The scale also provides some questions to characterize specific psychotic phenomena. Ratings of other symptoms, e.g., agitation and anxiety allow characterization of additional psychiatric phenomena that may occur with psychosis and improve when the psychotic symptoms improve.

Weaknesses: While the NPI is applicable to a range of neuropsychiatric conditions, its development as an instrument to evaluate patients with dementia potentially limits its application in PD patients who are not demented. Accordingly, if the NPI is to be used in clinical studies of PD patients, the scale needs to be modified so that informant- and patient-derived information is obtained in a standardized fashion. The instrument inquires about most psychotic phenomena, but it does not provide a systematic way of capturing the presence or character of the "minor " forms of psychosis (i.e., illusions and passage and sense of presence hallucinations). The total score does not provide a specific index of psychosis, because other behaviors are included in the final outcome

Psychometric properties: In Alzheimer's disease, the NPI showed good internal consistency (Cronbach's α 0.87–0.88). The test–retest reliability over 2 to 3 weeks for the 10 constituent scales and the total score of the NPI ranged from 0.51 to 0.97 for frequency of occurrence of symptoms and from 0.51 to 1.00 for ratings of the severity of symptoms. The interrater agreement was "90 to 100%." Concurrent validity was established with Behave-AD: the Behave-AD score and NPI frequency score correlation was 0.66, while the correlation with the NPI severity rating of symptoms was 0.71. Correlations among corresponding (similar) subscales of the Behave-AD and NPI tended to be weaker: 0.54 to 0.78 for frequency of symptoms and 0.47 to 0.80 for severity of symptoms.[29] The NPI has been used in several studies related to PD psychosis. Although the NPI may be useful for tracking the incidence and presence of psychosis, some antipsychotic treatment studies suggest that the NPI may not be as sensitive to change in the PD population[30-32] relative to the Brief Psychiatric Rating Scale (BPRS). This may be related to the multiplicative scoring metric, which results in noncontinuous scores as symptom frequency and severity increase. In addition, there probably is a nonlinear relationship between symptom severity (intensity) and frequency and these constructs may have differential sensitivity to treatment. Clinimetric testing has been performed on the total score and not

the specific subscores related to hallucinations and psychotic behaviors.

Final Assessment: The NPI fulfills criteria as a *recommended* scale for rating PD psychosis, especially in the cognitively impaired population.

Behavioral Pathology in Alzheimer's Disease Rating Scale. The Behave-AD[33] was designed to measure behavioral disturbances in dementia, especially those occurring in AD, by excluding symptoms that primarily result from cognitive and functional impairments. Hallucinations (five items) and delusions (seven items) are assessed, and therefore the scale has been applied to PD psychosis. The Behave-AD is a two-part scale. Part 1 (symptomatology) includes 25 items that measure behavioral disturbances classified in seven categories: paranoid and delusional ideation (7 items), hallucinations (5 items), activity disturbances (3 items), aggressiveness (3 items), diurnal rhythm disturbances (1 item), affective disturbance (2 items), and anxieties and phobias (4 items). Each symptom is scored on four-point scale of severity, where 0 means "not present" and 3 means "present, generally with an emotional and physical component." Part 2 (global rating) is a four-point global assessment of the overall magnitude of the behavioral symptoms in terms of disturbance to the caregiver and/or dangerousness to the patient. Ratings are based on caregiver reports of symptoms occurring in the preceding 2 weeks. The scale takes ~20 min or less to administer. A shorter, 12-item observer-rated derived scale has been developed.[34]

Strengths: In the setting of AD, this relatively brief scale is sensitive to therapeutic interventions, such as the use of antipsychotic drugs.[35] Its administration is operationalized to provide low variability. The emphasis of the scale is on delusions (seven items) and hallucinations (five items). In particular, the detailed rating of delusions is well fitted to the PD population. It is a caregiver-based scale, which is an advantage in demented populations.

Weaknesses: The scale was specifically constructed for the assessment of behavioral disorders of AD not in patients with PD, in which the profile of behavioral disorders is different. In particular, hallucinations are more frequent than delusions in PD and should receive heavier representation. Of the five items on hallucinations, only one item is on visual hallucinations. Equal weight is then placed on auditory, olfactory, haptic, and "other" hallucinations that are less prevalent in PD. "Minor" forms, such as illusions, passage hallucinations, and sense of presence are not taken into account. Retained or lost insight and frequency, both clinically considered as key features of PD hallucinations and delusions are not considered. The frequency of hallucinations and delusions is also not considered. On the other hand, the scale includes "diurnal rhythm disturbances" that are common in PD, such as in response to anti-PD medications. They should, therefore, not be considered a priori as a psychiatric symptom. Basing symptom severity on the caregiver's response carries the risk of indirectly measuring other features such as "agitation impression" rather than the actual delusion or psychosis. Some items are confounded by motor, cognitive, and behavioral features of PD, such as the items on depression and anxiety. Since the scale is caregiver-based, nonobservable intrapsychic symptoms may not be directly measured.

Psychometric properties: In AD, interrater agreement for total scores and for Paranoia and Delusions subscales was very high (greater than 0.90). Strong internal consistency and validity evaluations have been established for AD. Its internal consistency appears to be excellent for the scale overall (0.96 total).[36] Regarding validity, the items are grouped to "measure" seven areas; recent factor analysis with 151 AD patients supports five factors,[37] only one measuring psychosis. A study on its concurrent validity shows a 0.92 correlation between Behave-AD Paranoid and Delusional Ideation category and Dementia Signs and Symptoms Scale (DSS); 0.93 between Behave-AD Hallucinations and DSS. Paranoid and Delusional Ideation scores are sensitive to serotonergic and antipsychotic treatment.[36] In spite of these positive evaluations in AD, however, the scale has only rarely been used in PD psychosis.[38]

Final Assessment: The Behave-AD fulfills criteria as a *suggested* scale for rating PD psychosis.

Scales Developed to Assess Psychosis in Schizophrenia.

Brief Psychiatric Rating Scale. The BPRS was designed to measure clinical change in patients with schizophrenia.[39] Developers of the BPRS intended for it to be administered by experienced psychiatrists and psychologists and that the 20 to 30 minute scale required staff training and monitoring to ensure adherence to item definitions. The BPRS includes 18 items with one item devoted to hallucinatory behavior, one to suspiciousness, and one to unusual thought content. Ratings are to be based solely on clinician-observed symptom severity.

Each item is scored on a seven-point scale ranging from "not present" to "extremely severe." The total BPRS score is the sum of the scores for each of the 18 items and can be used as a global measure of psychopathology.

Strengths: The BPRS has been used more often than any other symptom rating scale in clinical trials of antipsychotic agents in patients with PD.[10,30-32,40-53] It is

relatively brief to administer. It is a good measure of overall psychopathology in a wide range of patient groups. This is relevant in studies of PD psychosis because patients frequently experience other psychiatric symptoms (e.g., depression and anxiety) or behaviors (e.g., uncooperativeness) that cut across diagnostic categories and may be affected by antipsychotic treatment. In addition, empirically derived subscores, based on patients with schizophrenia, provide an index of the severity of related psychotic phenomena as well as independent symptom areas (e.g., mood phenomena). The BPRS contains items that enable characterization of different delusional phenomena that can occur in PD, such as bizarre delusions, somatic delusions (or concerns), and grandiosity. The seven-point scoring system allows a large gradation of measures including minor (i.e., "very mild") hallucinations when scoring.

Weaknesses: The scale does not provide adequate detailed characterization of the various psychotic phenomena that occur in PD. The scale does not permit differential scoring of the intensity and frequency of different types of hallucinatory phenomena (e.g., frequent formed visual hallucinations and rare auditory hallucinations). Anchors for the item on hallucinations exclude "vivid mental imagery," which could represent illusions in PD patients.

Raters for the BPRS need training. Some items, e.g., "physical tension," "mannerisms," "blunted affect," and "motor retardation" may be confounded by the motor aspects of PD, dementia, or apathy. It may also be unclear how to evaluate the items on "conceptual disorganization," "guilt feelings," "grandiosity," and "excitement" in patients with PD and psychosis. In cognitively impaired patients, the restricted use of patient's report during the interview and direct observation of the patient may limit the validity of the BPRS.

Psychometric properties: In general, the BPRS total score and the BPRS "psychosis subscore" appear to be sensitive to change in overall psychopathology in placebo-controlled and open-label clinical studies on the treatment of psychosis in PD. Despite its extensive use in PD psychosis studies, however, the scale has yet to undergo formal psychometric evaluation in this population. It might be difficult to replicate the tight psychometric properties originally reported in schizophrenia Hedlund and Vieweg[54] reported item interrater reliabilities (Pearson coefficients of 0.63–0.83) unless significant effort is spent in training observers, especially on observational versus patient-report items. One study reported needing more than 30 training sessions to achieve intraclass correlation coefficients >0.80 using seven psychiatrists.[55] Modified descriptive anchors may help improve reliability. Positive and negative symptom items have good internal consistency, with $\alpha > 0.81$.[56].

Regarding internal consistency, a recent meta-analysis of 26-factor analytic studies[57] showed good support for the core four-factor model (meaning that the instrument measures four domains relevant to psychosis); however, a five-factor solution is also supported by meta-analysis: affect, positive symptoms, negative symptoms, resistance, and activation (the fifth best emerges in studies of schizophrenia). Most validity studies examined convergent validity: BPRS positive and negative symptom scores correlate well with same scales from PANSS (0.92 and 0.82). Construct validity in terms of sensitivity to change with treatment is supported in many studies. The BPRS may be less useful in patients with mild symptoms.[58]

Final Assessment: The BPRS fulfills criteria as a *recommended* scale for rating PD psychosis, especially in the cognitively intact population and as a means to tracking response to treatment or other interventions.

Positive and Negative Syndrome Scale. The Positive and Negative Syndrome Scale (PANSS) is a 30-item scale with 7 positive symptom items, 7 negative symptom items, and 16 general psychopathology symptom items. The scale is completed by the physician, on the basis of "verbal report and manifestations during the course of the interview as well as reports of behavior by primary care workers or family."[59] Each item is scored on a seven-point severity scale from 1 (symptom absent, definition does not apply) to 7 (extreme). The positive and negative symptom scales are often reported separately. The PANSS was based originally on the BPRS and on the Psychopathology Rating Schedule. It was designed to measure symptoms in schizophrenia and is commonly used in that setting in trials of antipsychotic agents. The PANSS or its positive symptom subscore has been used in several studies of the treatment of drug-induced psychosis in PD.[11,60-63]

Strengths: Detailed definitions and specific criteria for all rating points are provided in the scale. The positive scale also includes behavioral phenomena (hostility, suspiciousness, excitement) that can accompany hallucinations or delusions. It provides a "minimal" rating and therefore permits rating the presence of minor forms of hallucinations in a standardized fashion.

The general psychopathology subscale includes other psychiatric phenomena that are frequently, though not invariably present in PD patients with psychosis. And, the scale has a sufficient number of items to permit conduction of factor analyses for psychosis in PD and to determine whether the syndrome of PD psychosis is associated with specific patterns of psychotic symptoms.

Weaknesses: The scale was specifically constructed for the assessment of psychopathology of schizophrenia, not PD. The duration of administration is relatively long (recommended interview time is 30–40 minutes) and includes assessment of complex phenomena. The examiner should have experience in psychiatry, but applicability in PD samples may be limited. The positive scale of the PANSS includes a single item devoted to "hallucinatory behavior," and the operational criteria for severity scoring are based on the hallucinatory syndrome of schizophrenia (which are mostly verbal and distressing). Among the other positive symptoms subscale of the PANSS, delusions may apply to patients with PD but the other items (conceptual disorganization, excitement, grandiosity, suspiciousness/persecution, and hostility) are not well adapted to PD psychopathology. The negative symptoms subscale has many items that can overlap with presence of dementia or apathy.

Psychometric properties: The positive symptom scale and the individual items for "hallucinations" and "delusions" have been sensitive to changes in therapeutic trials in PD.[11] In studies among persons with schizophrenia, interrater reliability is good with intraclass correlation coefficients of 0.80 or above.[58]. For individual items, interrater correlations (with patients with schizophrenia) have ranged from 0.54 to 0.93[64] or 0.23 to 0.88.[65] Adequate interrater reliability can be achieved in three training sessions.[66] For the positive and negative scales, interrater reliability has been reported at 0.82 and 0.86.[65] Internal consistency is good with Cronbach's α from 0.73 to 0.87 for the three subscales.[67]

The fact that PANSS shows correlation with BPRS (convergent validity) is not surprising, since the items were derived in part from the BPRS. Correlations between positive scale with SAPS and between negative scale with SANS are 0.77.[67] Although it has three original scales (positive symptoms, negative symptoms, general psychopathology), almost all-factor analytic studies with schizophrenic and mood disordered patients have shown this to be not supported. Instead, most studies support a five- to six-factor model.[68]

Final Assessment: The PANSS fulfills criteria as a *recommended* scale for rating PD psychosis especially for tracking treatment response. The scale can be used in cognitively intact or impaired populations as it relies not only on patient report and clinician observation during the interview but also from the reports of primary caregivers and family.

Schedule for Assessment of Positive Symptoms (SAPS). The SAPS was developed to assess and provide qualitative information about specific features of hallucinations delusions, behavioral changes associated with psychosis, and thought disorder.[69] The instructions state that the interview should be administered as part of a standardized interview with additional information obtained from nursing staff or others who have observed the patient. The scale is designed to include single items as well as global ratings for each symptom cluster. The rater is instructed to take detailed notes when the patient describes the symptoms. The scale was not developed as a tool for measuring change, although it has been used this way in treatment trials for PD psychosis. The hallucinations section includes seven items: one each on visual hallucinations, olfactory hallucinations, and somatic or tactile hallucinations; three items on auditory hallucinations, of which two rate certain "first rank " symptoms (such as voices conversing and voices commenting, which should be rated independent of the more typical auditory hallucinations); and a global rating. The rater is instructed not to rate illusions or hallucinations that occur when the person is falling off or waking up from sleep or in the context of an illness or medication exposure that might be associated with occurrence of hallucinations. The individual hallucinations items are rated on a continuum based on their frequency (occasional to daily, with the latter being most severe). However, the global hallucinations item scoring is based on both the frequency and the extent to which the hallucinations are disruptive. The delusions section has 13 items, including 12 individual items reflecting various types of delusions and 1 global delusions score. The types of delusions rated include persecutory, grandiose, jealousy, guilt, religious, somatic, and referential, as well as first rank symptoms of being controlled, mind reading, thought broadcasting, thought insertion, and thought withdrawal. These items are rated according to degree of conviction about the idea, the frequency to which the idea is considered, and whether it affects behavior. The global rating also takes into account bizarre delusions, but is otherwise rated in a similar fashion to the individual items. The next section rates "bizarre behavior" and includes four items plus a global score that reflect a range of phenomena, including abnormal dress, manneristic behavior that is socially inappropriate behavior, aggressive behavior, and repetitive stereotyped behaviors. The final section rates formal "thought disorder," which is characterized by a disruption in how ideas are linked to one another in the context of communication. This section includes eight items. There are no specific instructions for scoring the SAPS. Some studies in PD patients use the sum of all the items as well as the global scores. Others look only at global scores or just the hallucinations and delusions scores.

Strengths: The SAPS is easy to administer with a structured interview and clear anchors provided as part of the scale. It assesses the range of various subtypes of hallucinations and delusions, and this may provide a tool for cataloging the range of hallucinatory and delusional phenomena in PD.

The global severity rating for each subsection provides a useful measure of overall symptom severity. In particular, the global rating of hallucinations is a good question, as it rates severity by its impact, with "mild" (patient unsure if they are real), "moderate" (vivid and mildly bothersome), "marked" (vivid, frequent, and "pervade his life") and "severe" (very vivid and extremely troubling). The global rating for delusions is similarly useful.

Weaknesses: Like other scales, the SAPS was developed for use in patients with schizophrenia, not PD, so items do not rate the more common types of hallucinations or delusions in PD or capture the range of severity of those symptoms and vice versa (covering many symptoms that are uncommon in PD). The scale specifically excludes illusions. It does not provide a systematic way of capturing the presence or character of all psychotic phenomena, including other minor forms. The hallucinations items are weighted toward auditory hallucinations. The presence of insight is not taken into account with scoring.

The scale was not intended for use in patients with dementia or cognitive impairment that limits awareness that symptoms are present. Furthermore, the anchors for scoring hallucinations are confusing to apply in PD and may not reflect the overall severity of the phenomena because frequency and severity are dissociated in the scoring metric. For example, vivid visual hallucinations with insight that occur daily and do not disrupt behavior would score a "5" (severe) in this item, but it is unclear where they would be rated for the global item.

The behavioral section includes disparate items that are poorly defined and cover too varied dimensions in a single rating. Phenomena in the thought disorder section overlap with features of aphasia and it would be impossible to distinguish the etiology of the language disturbance in a patient with psychosis. An inclusive rating approach, however, would inflate the overall SAPS score of a patient with dementia and aphasia who has minimal hallucinations.

Raters without experience interviewing patients with schizophrenia may have less familiarity with many of the constructs within each subsection, especially in eliciting the various types of delusions. This could have a significant effect on validity and reliability of the instrument. The SAPS provides a set of structured interview questions, but experienced raters are aware of the need to probe in greater depth to clarify the presence or absence of a given phenomena based on information provided by the patient or others as well as observations of the patient. To that end, the structured interview could yield a scale that is administered reliably but lacks validity.

Psychometric properties: Studies using the SAPS in clinical trials of PD psychosis (especially the subsection on delusions and hallucinations) show that it is sensitive to change in response to effective treatment.[34,50] However, SAPS has not been subject to careful psychometric analysis in PD.

Nonetheless, interrater reliability for SAPS summary score in psychotic patients is good (0.84).[65] The intraclass coefficient (ICC) is 0.94.[70] For the global domain, intraclass correlations ranged from 0.50 to 0.91[65] Test–retest reliability is weak–moderate (0.54).[70,71] Internal consistency is weaker for the overall instrument (Cronbach α 0.48) than for the four global domain scores (α ranging from 0.66 to 0.79).[72] Correlations with PANSS and BPRS are consistently high. For example, Norman et al.[65] found correlation 0.91 between PANSS positive and SAPS summary score. Nicholson et al. 1995 found BPRS positive symptoms (various definitions) correlated well with SAPS composite (0.89+). Single factor structure generally not supported.[73]

Final Assessment: The SAPS fulfills criteria as a *recommended* scale for rating PD psychosis. While not intended to be used to track changes in treatment, it has been used for this purpose in PD psychosis. It is best used in nondemented populations.

Nurses' Observation Scale for Inpatient Evaluation. The Nurses' Observation Scale for Inpatient Evaluation (NOSIE-30) is an inpatient ward behavior rating scale. A first version consisted of 80 items of ward behavior completed by a pair of nursing service members. A revised form, the NOSIE-30, is a selection of 30 items.[74] Each item is rated on a five-point scale of frequency (0 = never; 1 = sometimes; 2 = often; 3 = usually; 4 = always). The behavior is rated as observed in the last 3 days. Factor analysis has identified six factors, three "positive" (social competence, social interest, and personal neatness) and three "negative" (irritability, manifest psychosis, and retardation).

This scale has been designed to evaluate the behavior of hospitalized schizophrenic patients. The original report on the NOSIE-30 was based upon a sample of 630 schizophrenic men.

Strengths: The scale is brief (takes under 10 minutes to complete) with simple scoring, focusing on frequency. Raters require little training and simply fill in the responses at the end of the 3-day period without having to

ask the patient questions. No interpretation of behavior is required (e.g., whether a patient is uncommunicative because of depression, delusional thinking, confusion, etc) making this a reliable and simple tool for nurses.

It has been used for over 40 years in a large number of published studies on inpatient schizophrenics and shown to be sensitive to changes in therapeutic trials with a high interrater reliability.

Weaknesses: The items in the NOSIE-30 were chosen to describe behavior of severe (men) schizophrenic inpatients (and therefore not applicable to the outpatient setting). A number of items do not fit well with PD patients (e.g., "tries to be friendly with others"). It scores frequency, but not severity. Some of the items can be confounded by the motor state or apathy (e.g., "is slow moving or sluggish," "sits, unless directed into activity," etc).

The NOSIE-30 has been used in only a few studies of PD patients with psychosis[75,76] and often together with other psychosis rating scales.

It contains several items focused on social integration and maintaining social norms, assuming normal physical function. It has no items related to delusions, apathy or anxiety.

Pyschometric properties: Original reports by Honigfeld et al.[74] do not provide adequate psychometric data. There is a weak correlation between the NOSIE psychosis score with Friedberg et al.'s PPRS (0.48). Internal consistency of positive symptom items is fair (KR 0.68), but weak for negative symptoms (KR 0.10).[77] Interrater reliability is adequate for global score but not for subscores.[78]

Final Assessment: The NOSIE-30 fulfills criteria as a *listed* scale for rating PD psychosis.

Other Scales Used in Parkinson's Psychosis Studies.

Clinical Global Impression Scale. The CGIS is comprised of three subscales: CGI-severity; CGI-improvement; and CGI-therapeutic effect.[79] Each subscale is a single item rating that is the closest thing to a clinical "gestalt." In CGI-severity, the clinician simply categorizes the severity of the patient's problem using a nominal scoring system with: 0 = not assessed; 1 = normal; 2 = borderline ill; 3 = mildly ill; 4 = moderately ill; 5 = markedly ill; 6 = severely ill; 7 = among the most extremely ill patients. Similarly, in CGI-improvement, the clinician categorizes the improvement using a similar nominal scoring system from very much improved to very much worse. The only instruction is to rate this patient within the spectrum of "similar patients." This guideline would be interpreted in the context of PD psychosis as meaning other PD patients with psychosis, excluding, for example Alzheimer's disease or schizophrenia. The scale does not include a battery of questions and interpretation of severity encompasses whatever the rater considers important. It may be applied to any illness.

Strengths: This scale takes only a few seconds to complete once the history and examination are concluded. The formulation of the score involves no extra effort on the clinician's behalf, as there are no particular questions to ask and the clinician should have obtained sufficient information in any encounter to be able to complete this question. The scale provides a measure of clinical relevance, which may be a useful addition to the more sophisticated scales with high reliability and sensitivity, but where the clinical relevance of a change may be limited. The scale is in the public domain, making it cost-free to use.

Weaknesses: Whereas the CGIS is a "flexible " and open scale that permits the rater to consider the "whole picture," assessment of single items can be easily confusing. For example, hallucinations of similar degree in different patients may cause markedly different responses in the patient, making it a major problem in one case and a minor problem in the other. Raters for the CGI may also confound more than one problem, such that depression, anxiety, or motor dysfunction itself may alter the rater's interpretation of the severity of the illness (i.e., a patient with mild psychosis may have severe anxiety, causing the global impression to have an uncertain interpretation). Importantly, item 3 (minimally improved) and 5 (minimally worse) do not indicate whether these refer to minimal in the sense of the minimal change that is still clinically significant or to "minimal" in the sense of "inconsequential."

Psychometric properties: While there is limited psychometric information available, the scale has been used in several large randomized PD psychosis clinical trial and appears to be sensitive to change.[50,61,80] Guy[81] notes that the limited studies available on psychometrics are quite critical of the scale but that some studies may not have adequately evaluated psychometric properties of the scale by virtue of having included heterogeneous samples, e.g., patients with schizophrenia, depression and anxiety. Interrater reliability for the severity scale is low (0.41–0.66). Nonetheless, it has been used in a several PD psychosis studies, either as the primary or secondary outcome measure and has been found to always correlate with the other more in depth psychosis scale.[50,61,80] Some guidelines for the use and training are probably needed to establish adequate interrater reliability, at least in multicenter studies in PD samples.

Final Assessment: The CGIS fulfills criteria as a *suggested* scale for rating PD psychosis. It is best used as an additional outcome measure to complement a more detailed psychosis scale.

Unified Parkinson Disease Rating Scale, Part I. Part 1 of the UPDRS has four items ("mentation"; "thought disorders," "depression" and "motivation/initiative), scored from 0 (normal) to 4 (most severe), based on the week prior to assessment.[82] It was developed as a subscale of the larger UPDRS with the goal of tapping nonmotor phenomena. The ratings for Part I are based on a clinical interview of the patient, although probably best performed with a caregiver present. Some scoring strategies are unclear. Under the item "2 " (thought disorders), the following are the anchor points: 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 florid psychosis; not able to care for self. Thus, item 2 is the most relevant item for psychosis, although cognitive impairment, depression and reduced motivation frequently co-occur with psychosis. The item combines dreaming phenomena, hallucinations, and delusions in one item. The UPDRS is currently under revision and this subscale is subject to major changes.

Strengths: The thought disorder item can be administered and scored very rapidly. Its inclusion in the most widely used PD scale has made it widely used instrument for assessment of psychiatric symptoms in epidemiological studies, although psychometric studies are wanting. It is brief and easily administered. The anchor points are clear and clinically relevant.

Weaknesses: A single item is obviously not sufficient to explore the variety of psychotic phenomena in PD. The item implicitly assumes that there is a continuum from vivid dreams to formed hallucinations, a point that is controversial based on current literature. The lumping of dream phenomena, hallucinations and delusions into one item does not always fit with the clinical presentation. Although less common, it is possible for some patients to experience delusions but not hallucinations. Many symptoms that are not uncommon in PD patients with psychosis, such as auditory or other hallucinations, are not included. Finally, as a screening instrument it may not be particularly sensitive to change, and to our knowledge, studies addressing this issue do not exist.

Psychometric properties: A major problem is that a "floor effect " may be present in many patients (23%).[83] Interrater reliability is questionable. Internal consistency is good (Cronbach α 0.79). Item-to-scale mentation total correlations were moderate (0.57–0.66). Factor structure confirmed; the four items loaded on their own factor (loadings 0.54–0.72). A self-rating version exists, which has demonstrated good reliability with a clinical interview.[84]

Final Assessment: The UPDRS Part I and item 2 within Part I fulfill criteria as a *listed* scale for rating PD psychosis.

Challenges Posed by Psychosis Rating Scales.

Several factors are implicit concerns in the assessment of psychosis scales. Validity of any scale is necessarily affected by the rater who conducts the interview. Patients or informants may be more likely to endorse symptoms when asked, for example, by a physician versus a research assistant. Further, knowledge of a patient's history and familiarity with previously reported hallucinations or delusions provides a basis for the physician's inquiry about present symptoms and their impact. Clinical judgment and experience of the interviewer will influence the consistency of the informant/patient answers and the extent to which the rater probes or notices subtle features of psychosis. As an example, an untrained rater with limited clinical experience may base ratings on the patient's initial answer to a direct question and miss hallucinatory or delusional phenomena that only become apparent during an open-ended interview or through disclosure that is based on trust in the physician. Some scales attempt to limit this source of variation in symptom ratings by providing scripted screening probes or detailed anchors for scoring the ratings, but these restrictions may in fact underrate behaviors like psychosis that are culturally sensitive.

The source of information also influence ratings, and the various scales use a number of approaches, e.g., self-report, informant-derived information, medical records. Some patients may not reveal their psychotic or affective phenomena to others, diminishing the validity of the instrument when it is administered to an informant only. Conversely, cognitive impairment may limit the information a patient can provide.

Some scales focus only on psychosis, whereas others include a range of psychiatric symptoms in addition to psychosis. Psychosis scales usually provide more detailed description of psychosis, whereas the latter group provide a broader psychopathological description.

A final concern is that most psychosis scales were developed in non-PD samples and have not been psychometrically tested in PD.

Task Force Recommendations

Similar to the Quality Standards Subcommittee of the American Academy of Neurology that concluded in their

review that there currently are "no validated tools for psychosis screening in PD,"[85] it is evident from this review that none of the current scales used in PD adequately captures the entire phenomenology of PD psychosis. It is important that the current scales do not have the ability to assesses the incidence, prevalence and severity (or impact) of all forms of discrete psychotic phenomena. For treatment studies, it is essential that the scale be useful for assessing individual responses as well as group scores and responses. The BPRS and the SAPS are scales that appear to be sensitive to change. The SAPS is relatively complete but like most psychosis scales derived from psychiatric research (BPRS, SAPS, PANSS, etc), several items relevant to schizophrenia are less useful to PD psychosis. The NPI is a good scale in cataloging the presence or absence of psychotic phenomena. It is a scale with a scripted interview that relies less on the clinician's judgment. Scales with open-ended interviews rely more on the judgment of the rater. As opposed to tremor, which is observable and fairly objective, clinical experience and judgment are needed to classify in a reliable and valid way whether a perception is indeed hallucinatory. Yet, despite the script in the NPI, there are still concerns about how the constructs are interpreted when the scale is used by clinicians who are not psychiatrically trained. Trained raters are better at picking up on cues that the patient does have paranoid ideas or is hallucinating, and notice inconsistencies in responses. The PPRS, PPQ and the UPDRS Part I were designed specifically for PD but are still inadequate scales in exploring and tracking the entire PD psychosis phenomenology. The Rush Hallucination Inventory and the Baylor Hallucination Questionnaire do not explore delusions. The NOSIE-30 cannot be applied to the majority of PD patients who are community dwelling. See Tables 3 and 4 for the summary of the general properties of each scale reviewed. While the Task Force has labeled some scales as "recommended " or "suggested " based on the fulfilling defined criteria, it does not mean that these scales are "ideal."

What Then Are the Properties of the "Ideal" Scale for PD Psychosis?

Contentwise, the Task Force recommends that the ideal scale have two parts. The first should be a diagnostic guide to determine whether the patient is, in fact, psychotic. The scale should then be applied only to those who meet this first criterion, or at least, it should be validated only for this objective. While the DSM criteria are regarded as the "gold standard " for establishing psychiatric diagnoses, it does not include a specific diagnosis for PD-related psychosis. The Diagnostic Criteria for Psychosis in Parkinson's disease: Report of an NINDS/NIMH Work Group[19] is therefore a good model with which to start.

The second part should be the scale itself and should rate the various psychotic symptoms by their presence and by impact on the patient and the family. To do this, frequency is involved, but should not be used as a multiplicative score, as in the NPI. Products of scores are conceptually difficult to interpret (e.g., what construct does the product of symptom severity and distress represent?), yield noncontinuous scores at the extremes, and the nature of the relationship between the constituent scores (and of the scores with external constructs) may be heterogeneous and difficult to establish. There needs to be a scoring system that allows the patient to rate the presence of a (mild) "concern" versus a convincing belief that a delusion is true. Determining the impact of a symptom is critical, since delusions, for example, usually have greater impact, even when minor, compared to frequent hallucinations of a nonemotional nature. The entire range of PD psychosis phenomenology needs to be probed, including less common hallucinations (olfactory, tactile, etc) "minor hallucinations " (passage hallucinations, sense of presence hallucinations), illusions, and delusions. The delusion section should include delusions sensu stricto, such as theft or jealousy delusions, and items pertaining to misidentification (such as Capgras syndrome, "mirror sign," reduplication, etc). It should be equally applicable to cognitively intact and cognitively impaired patients and should identify whether the patient is demented and whether insight is preserved. The scale should have the ability to distinguish hallucinations from delirium; psychosis from RBD and vivid dreams. Associated features such as mood disorders and anxiety should be considered for inclusion, as they affect and are affected by the hallucinations and delusions. Finally, a global psychiatric measure should be embedded in the scale, as in the CGIS, but should be restricted to the psychiatric aspects alone and completely independent of motor function.

Mechanistically, the patient and at least one observer need to be interviewed for the scale, if possible. When there is only the patient available, then a notation should be made that the scoring is based on the subject alone. The test must be easy to administer and should take up to 15 to 20 minutes to administer, but not longer. A screening version that takes 5 to 10 minutes, allowing administration of whole instrument only if patient scores in a certain range on the screen should be considered. The scale should have a simple scoring metric. It should contain clear instructions on how the scale is administered and it should be capable of being accurately ad-

ministered by technicians. Detailed definitions or criteria should be provided for all rating points, preferably with a set of training tapes that can be used to evaluate reliability.

Psychometrically, the ideal scale should, in a PD cohort, at least demonstrate concurrent validity with another "gold" standard, and discriminant validity (e.g., from dementia severity, motor symptom severity). Items from subscales (e.g., pertaining to visual hallucinations) should have stronger relationship among themselves than with other dimensions of psychosis or total score). Interrater reliability is more important than test–retest reliability. The scale should demonstrate sensitivity to change and predict functional change with treatment. It should be evaluated cross-culturally, and should thus consider content that is relevant to different cultures.

On the basis of these considerations, the Task Force therefore recommends the development of a new scale of PD psychosis as none of the current scales contain all the basic content, mechanistic and psychometric properties outlined above. In the meantime, selection of the current scales should be based on the goals of the assessment. Different scales may be better for some settings versus others. Any chosen scale should be adapted to use both informant and patient information, and the rater will need to make a judgment as to which information to use when making a final rating. Since one scale may not be able to serve all needs, a scale used to measure clinical response and change over time (such as the CGIS) may need to be combined with another scale better at cataloging specific features (such as the NPI or SAPS). At the present time, for clinical trials on PD psychosis assessing new treatments, the following are recommended primary outcome scales: NPI (for the cognitively impaired PD population or when a caregiver is required), SAPS, PANSS, or BPRS (for the cognitively intact PD population or when the patient is the sole informant). The CGIS is suggested as a secondary outcome scale to measure change and response to treatment over time.

Acknowledgments: The Writing and Steering Committee thanks the MDS secretariat staff (Caley Kleczka, Director) for their valuable assistance in this project.

REFERENCES

1. Fenelon G, Mahieux F, Huon R, Ziegler M. Hallucinations in Parkinson's disease: prevalence, phenomenology and risk factors. Brain 2000;123:733–745.
2. Hely MA, Morris JG, Reid WG, Trafficante R. Sydney multicenter study of Parkinson's disease: non-L-dopa-responsive problems dominate at 15 years. Mov Disord 2005;20:190–199.
3. Sanchez-Ramos JR, Ortoll R, Paulson GW. Visual hallucinations associated with Parkinson disease. Arch Neurol 1996;53:1265–1268.
4. Inzelberg R, Kipervasser S, Korczyn AD. Auditory hallucinations in Parkinson's disease J Neurol Neurosurg Psychiatry 1998;64:533–535.
5. Fenelon G, Mahieux F, Huon R, Ziegler M. Hallucinations in Parkinson's disease: prevalence, phenomenology and risk factors. Brain 2000;123:733–745.
6. Papapetropoulos S, Mash DC. Psychotic symptoms in Parkinson's disease. From description to etiology. J Neurol 2005;252:753–764.
7. Graham JM, Grunewald RA, Sagar HJ. Hallucinosis in idiopathic Parkinson's disease. J Neurol Neurosurg Psychiatry 1997;63:434–440.
8. Inzelberg R, Kipervasser S, Korczyn AD. Auditory hallucinations in Parkinson's disease. J Neurol Neurosurg Psychiatry 1998;64:533–535.
9. de Maindreville AD, Fenelon G, Mahieux F. Hallucinations in Parkinson's disease: a follow-up study. Mov Disord 2005;20:212–217.
10. Marsh L. Psychosis in Parkinson's disease. Curr Treat Options Neurol 2004;6:181–189.
11. Fernandez HH, Trieschmann ME, Okun MS. Rebound psychosis: effect of discontinuation of antipsychotics in Parkinson's disease. Mov Disord 2005;20:104–105.
12. Pollak P, Tison F, Rascol O, et al. Clozapine in drug induced psychosis in Parkinson's disease: a randomised, placebo controlled study with open follow up. J Neurol Neurosurg Psychiatry 2004;75:689–695.
13. Factor SA, Feustel PJ, Friedman JH, et al. Longitudinal outcome of Parkinson's disease patients with psychosis. Neurology 2003;60:1756–1761.
14. Aarsland D, Larsen JP, Karlsen K, Lim NG, Tandberg E. Mental symptoms in Parkinson's disease are important contributors to caregiver distress. Int J Geriatr Psychiatry 1999;14:866–874.
15. Aarsland D, Larsen JP, Tandberg E, Laake K. Predictors of nursing home placement in Parkinson's disease: a population-based, prospective study. J Am Geriatr Soc 2000;48:938–942.
16. Goetz CG, Stebbins GT. Mortality and hallucinations in nursing home patients with advanced Parkinson's disease. Neurology 1995;45:669–671.
17. Fernandez HH, Donnelly EM, Friedman JH. Long-term outcome of clozapine use for psychosis in parkinsonian patients. Mov Disord 2004;19:831–833.
18. American Psychiatric Association. Diagnostic and statistical manual of mental disorders, 4th ed. Washington, DC: American Psychiatric Association; 1994.
19. First MB, Spitzer RL, Gibbon M, Williams JBW. Structured clinical interview for DSM-IV axis I disorders-patient edition. Washington, DC: American Psychiatric Press; 1996.
20. Ravina B, Marder K, Fernandez HH, et al. Diagnostic criteria for psychosis in Parkinson's disease: report of an NINDS/NIMH work group. Mov Disord 2007;22:1061–1068.
21. Nunnally JC, Psychometric theory, 2nd ed. New York: McGraw-Hill; 1978.
22. Sattler JM, Assessment of children: cognitive applications, 4th ed. San Diego: Jerome M. Sattler; 2001.
23. Streiner DL, Norman GR. Health measurement scales: a practical guide to their development and use, 2nd ed. Oxford: Oxford University Press; 1995.
24. Goetz CG, Fahn S, Martinez-Martin P, et al. Movement Disorder Society-sponsored revision of the Unified Parkinson's Disease Rating Scale (MDS-UPDRS). Mov Disord 2007;22:41–47.
25. Friedberg G, Zoldan J, Melamed E. Parkinson psychosis rating scale: a practical instrument for grading psychosis in Parkinson's disease. Clin Neuropharmacol 1998;21:280–284.
26. Brandstaedter D, Spiker S, Ulm G, et al. Development and evaluation of the Parkinson psychosis questionnaire: a screening instrument for the early diagnosis of drug-induced psychosis in Parkinson's disease. J Neurol 2005;252:1060–1066.

27. Goetz CG, Leurgans S, Pappert EJ, Raman R, Stemer AB. Prospective longitudinal assessment of hallucinations in Parkinson's disease. Neurology 2001;57:2078–2082.
28. Ondo WG, Tinter R, Voung MA, Lai D, Ringholz G. Double-blind, placebo-controlled, unforced titration, parallel trial of quetiapine for dopaminergic-induced hallucinations in Parkinson's disease. Mov Disord 2005;20:958–963.
29. Cummings JL, Mega M, Gray K, Rosenberg-Thompson S, Carusi DA, Gornbein J. The neuropsychiatric inventory: comprehensive assessment of psychopathology in dementia. Neurology 1994;44: 2308–2314.
30. Juncos JL, Roberts VJ, Evatt ML, et al. Quetiapine improves psychotic symptoms and cognition in Parkinson's disease. Mov Disord 2004;19:29–35.
31. Breier A, Sutton VK, Feldman PD, et al. Olanzapine in the treatment of dopamimetic-induced psychosis in patients with Parkinson's disease. Biol Psychiatry 2002;52:438–444.
32. Marsh L, Lyketsos C, Reich S. Olanzapine for the treatment of psychosis in patients with Parkinson's disease and dementia. Psychosomatics 2001;42:477–481.
33. Reisberg B, Borenstein J, Salob SP, et al. Behavioral symptoms in Alzheimer's disease: phenomenology and treatment. J Clin Psychiatry 1987;48 (Suppl 5):9–15.
34. Auer SR, Monteiro IM, Reisberg B. The empirical behavioral pathology in Alzheimer's disease (E-BEHAVE-AD) rating scale. Int Psychogeriatr 1996;8:247–266.
35. De Deyn PP, Rabheru K, Rasmussen A, et al. A randomized trial of risperidone, placebo, and haloperidol for behavioral symptoms of dementia. Neurology 1999;53:946–955.
36. Reisberg et al. Behavior Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD). In: Task Force for the Handbook of Psychiatric Measures, editor. Handbook of psychiatric measures. Washington, DC: American Psychiatric Association; 2000. p 401–404.
37. Harwood DG, Ownby RL, Barker WW, Duara R. The behavioral pathology in Alzheimer's Disease Scale (BEHAVE-AD): factor structure among community-dwelling Alzheimer's disease patients. Int J Geriatr Psychiatry 1998;13:793–800.
38. Chacko RC, Hurley RA, Harper RG, Jankovic J, Cardoso F. Clozapine for acute and maintenance treatment of psychosis in Parkinson's disease. J Neuropsychiatry Clin Neurosci 1995;7:471–475.
39. Overall JE, Gorham DR, The brief psychiatric rating scale. Psychol Rep 1962;10:799–812.
40. Scholtz E, Dichgans J. Treatment of drug-induced exogenous psychosis in parkinsonism with clozapine and fluperlapine. Eur Arch Psychiatry Clin Neurosci 1985;235:60–64.
41. Ostergaard K, Dupont E. Clozapine treatment of drug-induced psychotic symptoms in late stages of Parkinson's disease. Acta Neurol Scand 1988;78:349–350.
42. Friedman J. Lannon M. Clozapine in the treatment of psychosis in Parkinson's disease. Neurology 1990;39:1219–1221.
43. Kahn N, Freeman A, Juncos J, et al. Clozapine is beneficial for psychosis in Parkinson's disease. Neurology 1991;41:1699–1700.
44. Wolk S, Douglas C. Clozapine treatment of psychosis in Parkinson's disease: a report of five consecutive cases. J Clin Psychiatry 1992;53:373–376.
45. Factor S, Brown D. Clozapine prevents recurrence of psychosis in Parkinson's disease. Mov Disord 1992;7:125–131.
46. Lew M, Waters C. Clozapine treatment of Parkinsonism with psychosis. J Am Geriatr Soc 1993;41:669–671.
47. Factor S, Brown D, Molho ES, Podskalny GD. Clozapine: a 2-year trial open trial in Parkinson's disease patients with psychosis. Neurology 1994;44:544–546.
48. Ford B, Cote L, Fahn S. Risperidone in Parkinson's disease (letter). Lancet 1994;344:681.
49. Wagner M, Defilippi J, Menza M, et al. Clozapine for the treatment of psychosis in Parkinson's disease: chart review of 49 patients. J Neuropsychiatr 1996;3:276–280.
50. The Parkinson Study Group. Low-dose clozapine for the treatment of drug-induced psychosis in Parkinson's disease. N Engl J Med 1999;340:757–763.
51. Fernandez HH, Friedman JH, Jacques C, Rosenfeld M. Quetiapine for the treatment of drug-induced psychosis in Parkinson's disease. Mov Disord 1999;14:484–487.
52. Ellis T, Cudkowicz ME, Sexton PM, Growdon JH. Clozapine and risperidone treatment of psychosis in Parkinson's disease. J Neuropsychiatry Clin Neurosci 2000;12:364–369.
53. Fernandez HH, Trieschmann ME, Okun MS. Rebound psychosis: effect of discontinuation of antipsychotics in Parkinson's disease. Mov Disord 2005;20:104–105.
54. Hedlund JL, Vieweg BW. The Brief Psychiatric Rating Scale (BPRS): a comprehensive review. J Oper Psychiatr 1980;11:48–65.
55. Overall JE, Gorham DR. Brief psychiatric rating scale in task force for the handbook of psychiatric measures, handbook of psychiatric measures. Washington, DC: American Psychiatric Association; 1962. p 490–494.
56. Nicholson IR, Chapman JE, Neufeld RW. Variability in BPRS definitions of positive and negative symptoms. Schizophr Res 1995;17:177–185.
57. Shafer A. Meta-analysis of the brief psychiatric rating scale factor structure. Psychol Assess 2005;17:324–335.
58. Overall JE, Gorham DR. The Brief Psychiatric Rating Scale (BPRS): recent developments in ascertainment and scaling. Psychopharmacol Bull 1988;24:97–99.
59. Kay SR, Opler LA, Lindermayer JP. The Positive and Negative Syndrome Scale (PANSS): rationale and standardisation. Br J Psychiatry 1989;155 (Suppl 7):59–65.
60. Chacon JR, Duran E, Duran JA, Alvarez M. Usefulness of olanzapine in the levodopa-induced psychosis in patients with Parkinson's disease. Neurologia 2002;17:7–11.
61. French Clozapine Study Group. Clozapine in drug-induced psychosis in Parkinson's disease. Lancet 1999;353:2041–2042.
62. Kohmoto J, Kihira T, Miwa H, Kondo T. Effect of quetiapine fumarate on drug-induced psychosis in patients with Parkinson's disease. No To Shinkei 2002;54:489–492.
63. Mohr E, Mendis T, Hildebrand K, De Deyn PP. Risperidone in the treatment of dopamine-induced psychosis in Parkinson's disease: an open pilot trial. Mov Disord 2000;15:1230–1237.
64. Bell et al., 1992.
65. Norman RM, Malla AK, Cortese L, Diaz F. A study of the interrelationship between and comparative interrater reliability of the SAPS, SANS and PANSS. Schizophr Res 1996;19:73–85.
66. Muller MJ, Rossbach W, Davids E, Wetzel H, Benkert O. [Evaluation of standardized training for the "Positive and Negative Syndrome Scale" (PANSS)]. Nervenarzt 2000;71:195–204.
67. Kay SR, Fiszbein A, Opler LA. The positive and negative syndrome scale (PANSS) for schizophrenia. Schizophr Bull 1987;13: 261–276.
68. Van den Oord EJ, Rujescu D, Robles JR, et al. Factor structure and external validity of the PANSS revisited. Schizophr Res 2006;82: 213–223.
69. Andreasen NC. Scale for the assessment of positive symptoms (SAPS). Iowa City, Iowa: University of Iowa; 1984.
70. Malla AK, Norman RM, Williamson P. Stability of positive and negative symptoms in schizophrenia. Can J Psychiatry 1993;38: 617–621.
71. Malla AK, Norman RM, Williamson P, Cortese L, Diaz F. Three syndrome concept of schizophrenia. A factor analytic study. Schizophr Res 1993;10:143–150.
72. Andreasen NC, Grove WM. Evaluation of positive and negative symptoms in schizophrenia. Psychiatr Psychobiol 1986;1:108–121.
73. Peralta V, Cuesta MJ. Dimensional structure of psychotic symptoms: an item-level analysis of SAPS and SANS symptoms in psychotic disorders. Schizophr Res 1999;38:13–26.

74. Honigfeld G, Klett CJGillis RD. NOSIE-30: a treatment sensitive ward behaviour scale. Psychol Rep 1966;19:180–182.
75. Wolters EC, Hurwitz TA, Mak E, et al. Clozapine in the treatment of parkinsonian patients with dopaminomimetic psychosis. Neurology 1990;40:832–834.
76. Zoldan J, Friedberg G, Livneh M, Melamed E. Psychosis in advanced Parkinson's disease: treatment with ondansetron, a 5-HT3 receptor antagonist. Neurology 1995;45:1305–1308.
77. Dingemans PM. The Brief Psychiatric Rating Scale (BPRS) and the Nurses' Observation Scale for Inpatient Evaluation (NOSIE) in the evaluation of positive and negative symptoms. J Clin Psychol 1990;46:168–174.
78. Hafkenscheid A. Psychometric evaluation of the Nurses Observation Scale for Inpatient Evaluation in The Netherlands. Acta Psychiatr Scand 1991;83:46–52.
79. Guy W, ed. ECDEU assessment manual for psychopharmacology. Rockville, MD: Alcohol, Drug Abuse, and Mental Health Administration, 1976 (DHEW publication no. ADM 76-338). p 217–222.
80. Morgante L, Epifanion A, Spina E, et al. Quetiapine and clozapine in parkinsonian patients with dopaminergic psicosis. Clin Neuropharmacol 2004;27:153–156.
81. Guy W. Clinical Global Impressions (CGI) scale. In: Task Force for the Handbook of Psychiatric Measures, editor. Handbook of Psychiatric Measures. Washington, DC: American Psychiatric Association; 2000. p 100–102.
82. Fahn S, Elton RL. UPDRS program members. Unified Parkinson's disease rating scale. In Fahn S, Marsden CD, Goldstein M, Calne D, editors. Recent developments in Parkinson's disease, Vol. 2. Florham Park, NJ: Macmillan Healthcare Information; 1987. p 153–163.
83. Martinez-Martin P, Forjaz MJ. Metric attributes of the unified Parkinson disease rating scale 3.0 battery: part I, feasibility, scaling assumptions, reliability and precision. Mov Disord 2006;29:1182–1188.
84. Louis ED, Lynch T, Marder K, Fahn S. Reliability of patient completion of the historical portion of the unified Parkinson disease rating scale. Mov Disord 1996;11:185–192.
85. Miyasaki JM, Shannon K, Voon V, et al. Practice parameter: evaluation and treatment of depression, psychosis and dementia in Parkinson disease (an evidence based review). Report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 2006;66:996–1002.