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Letter to the Editor

A formula for the conversion of UPDRS-III scores to Hoehn and Yahr stage

The Unified Parkinson's Disease Rating Scale (UPDRS) [1] is the most widely used rating scale for disability and impairment in Parkinson's disease (PD) [2]. Introduced in 1987, the UPDRS remains the standard. The UPDRS primarily consists of 42 items distributed across four major subscales of disability commonly evaluated in persons with PD: (I) Mentation, Behavior, and Mood, (II) Activities of Daily Living, (III) Motor Examination, and (IV) Complications of Therapy. While the UPDRS is widely used in movement disorders specialty centers, the scale is not always administered in full. Hoehn and Yahr staging [3], first published in 1967, is a more rudimentary descriptor of Parkinsonian disability and impairment. Hoehn and Yahr stage has great utility for providing a gross overall picture of disease severity and is often administered in addition to

the four-part UPDRS. Two versions of the Hoehn and Yahr scale are currently used: original [3] and modified [1]; the modified version includes two additional stages (1.5 and 2.5). The ease of administration and practicality of the Hoehn and Yahr rating has helped to foster its pervasive use, with the majority of surveyed Movement Disorder Society members applying it in clinical trials (89%) and practice (70%) [4].

The UPDRS-III (Motor Examination) entails a systematic evaluation of various distal and axial symptoms, creating an in-depth picture of PD symptomatology. Its less detailed companion measure, Hoehn and Yahr staging, stands as a practical measure of overall PD severity based on a general clinical impression. Despite the widespread use of the Hoehn and Yahr scale to stage disease, a standardized administration protocol has not been developed [4]. This may be of particular concern in large scale, epidemiological investigations where Hoehn and Yahr

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IF ((item18 = 0 AND item19 = 0) AND ((item20_L + item21_L + item_22_L + item23_L +
item24_L + item25_L + item26_L = 0) OR (item20_R + item21_R + item22_R + item23_R +
item24_R + item25_R + item26_R = 0))) Hoehn_and_Yahr_stage= 1 .
EXECUTE .

IF ((item18 > 0 OR item19 > 0) AND ((item20_L + item21_L + item_22_L + item23_L +
item24_L + item25_L + item26_L = 0) OR (item20_R + item21_R + item22_R + item23_R +
item24_R + item25_R + item26_R = 0))) Hoehn_and_Yahr_stage= 1.5 .
EXECUTE .

IF (item30 = 0 AND ((item20_L + item21_L + item_22_L + item23_L + item24_L + item25_L +
item26_L > 0) AND (item20_R + item21_R + item22_R + item23_R + item24_R + item25_R +
item26_R > 0))) Hoehn_and_Yahr_stage= 2 .
EXECUTE .

IF ((item30 = 1) AND ((item20_L + item21_L + item_22_L + item23_L + item24_L + item25_L
+ item26_L > 0) AND (item20_R + item21_R + item22_R + item23_R + item24_R + item25_R +
item26_R > 0))) Hoehn_and_Yahr_stage= 2.5 .
EXECUTE .

IF ((item30 > 1 AND item30 < 4) AND ((item20_L + item21_L + item_22_L + item23_L +
item24_L + item25_L + item26_L > 0) AND (item20_R + item21_R + item22_R + item23_R +
item24_R + item25_R + item26_R > 0))) Hoehn_and_Yahr_stage= 3 .
EXECUTE .

IF (((item29 > 1 AND item29 < 4) AND (item 27 < 4) AND (item31 > 2 AND item31 < 5)))
Hoehn_and_Yahr_stage= 4 .
EXECUTE .

IF (((item29 = 4) OR (item30 = 4))) Hoehn_and_Yahr_stage= 5 .
EXECUTE .

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Fig. 1. Proposed formula to cross-check clinician-generated Hoehn and Yahr ratings.

stage is commonly utilized for inclusion/exclusion criteria and where accurate characterization of disease at study entry is imperative. In these circumstances, if UPDRS-III data are also available, one might employ the proposed formula (Fig. 1) to cross-check clinician-generated Hoehn and Yahr ratings.

In most cases, both instruments are administered in tandem. However, there may also be occasional circumstances when a detailed UPDRS is available without Hoehn and Yahr stage. This is particularly relevant in retrospective clinical research, where information collected from medical charts may not yield all desired data. The proposed formula can also be utilized to generate Hoehn and Yahr ratings from UPDRS-III motor scores in these instances.

Of the 14 UPDRS-III items (#18–31), numbers 18 (speech), 19 (facial expression), 20–26 (resting/action/postural tremor, rigidity, and distal bradykinesia on the right and left side), 27 (arising from chair), 29 (gait), 30 (postural stability), and 31 (bradykinesia/hypokinesia) were used to operationalize Hoehn and Yahr stages 1–5. Absence of axial involvement (items 18–19) and presence of unilateral motor symptoms (items 20–26) equates to stage 1. Presence of symptoms on either item 18 or 19 (indicating axial involvement) and unilateral motor symptoms (items 20–26) equates to stage 1.5. Intact postural stability (item 30) and bilateral presentation (items 20–26) designates stage 2. Retropulsion, but pull test recovery (item 30) and bilateral motor presentation (items 20–26) equates to stage 2.5. Some postural instability (item 30) and bilateral motor symptoms (items 20–26) are indicative of stage 3. Gait disturbance (item 29), ability to arise from the seated position unassisted (item 27), and moderate/severe poverty of movement (item 31) designates stage 4. Inability to self-ambulate (item 29) or stand unassisted (item 30) yields a stage 5 rating. Statistical Package for the Social Sciences (SPSS; version 14.0) [5] was used to create the formula for conversion of UPDRS-III to Hoehn and Yahr stage, but it can be translated to suit nearly any data analysis

tool. This formula can generate both original and modified Hoehn and Yahr stages, enabling its use to be tailored to a particular clinician's or researcher's preference.

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