The Essential Tremor Rating Assessment Scale (TETRAS)
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Objective

To develop a clinical rating scale for essential tremor (ET) that is rapid, reliable and applicable to clinical and research settings.

Background

Several clinical rating scales have been developed to measure tremor.

The WHIGET scale was developed for action tremor, but it only provides a graded assessment of upper extremity tremor.

The Fahn-Tolosa-Marín scale provides a more comprehensive assessment of rest and action tremors but was not developed specifically for ET.

Design/Methods

The Essential Tremor Rating Assessment Scale (TETRAS) was developed by the members of the Tremor Research Group (TRG) and consists of ten items in which action tremor is rated 0-4 in half-point intervals.

TETRAS test items

1. Head tremor
2. Face (including jaw) tremor during smile, close eyes, open mouth, purse lips.
3. Tremor of protruded tongue
4. Voice tremor
5. Upper limb tremor during three maneuvers: forward horizontal reach posture, lateral "wing beating" posture and finger-nose-finger testing.
6. Lower limb tremor: extended parallel to the ground for 5 seconds and then during heel to shin maneuver.
7. Archimedes spirals
8. Cursive handwriting: "This is a sample of my best handwriting" using the dominant hand only.
9. Dot approximation task: the subject holds the tip of the pen "as close as possible to a dot on a piece of paper without touching it
10. Standing tremor: the knees are 10-20 cm apart and are flexed 10-20°. The arms are down at the subject's side.

Instructions and Scoring

Scoring is 0 – 4.

0.5 increments may be used

All items of the examination, except standing tremor, are performed with the patient seated comfortably.

The highest amplitude seen at any point during the exam is scored.

Patients are instructed to not suppress the tremor, but to let it come out.

Table 1: Range of values for each test item

Test item	Rating			
	1	2	3	4
Head	< 0.5 cm	0.5 to < 2.5 cm	2.5 to 5 cm	> 5 cm
Face	Barely visible	Noticeable	Obvious, present in most facial contractions	Gross, disfiguring tremor
Tongue				
Voice	Slight, during aaah or eee only	During aaah or eee and minimal in speech	Obvious tremor in speech	Some words difficult to understand
Upper limb	Barely visible	1 to < 3 cm	5 to < 10 cm	≥ 20 cm
Lower limb	Barely visible	Obvious but mild	< 5 cm	> 5 cm
Spirals	Barely visible	Obvious tremor	Portions of figure not recognizable	Figure not recognizable
Handwriting	Barely visible	Obvious tremor but legible	Some words illegible	Completely illegible
Dot approximation	Barely visible	1 to < 3 cm	5 to < 10 cm	> 20 cm
Standing	Barely visible	Obvious but mild	Moderate	Severe

For each test item, rating = 0 when there is no visible tremor.

Results

Ten patients were rated simultaneously by 10 experienced examiners who developed the scale. Inter-rater reliability was assessed with a two-way random effects intraclass correlation (ICC), using an absolute agreement definition (Table 2).

Table 1: two-way ICC scores (10 TRG raters, 10 patients)

Task	ICC	Task	ICC
Head	0.90	Leg tremor	0.59
Face	0.70	R. hand spiral	0.88
Tongue	0.15	L. hand spiral	0.92
Voice	0.39	Writing tremor	0.84
R. hand postural	0.88	R. hand dot	0.83
L. hand postural	0.87	L. hand dot	0.73
R. hand wing beating	0.90	R. hand pouring	0.94
L. hand wing beating	0.87	L. hand pouring	0.96
R. finger-nose	0.81	Standing	0.85
L. finger-nose	0.79	Total TRS	0.90

ICCs for tongue, voice, leg and face tremor were 0.15, 0.39, 0.59 and 0.70. ICCs for head and upper limb tremor ranged from 0.73 to 0.92. The ICC for the total tremor score was 0.90.

Conclusions

1. The TETRAS has excellent interrater reliability for head and upper limb tremor, which are of greatest concern in most ET patients and which are rated in terms of estimated tremor amplitude.
2. ICCs for tongue, voice, leg and face tremor were poor to fair, despite a patient population with a fairly wide range of impairment (0 to 3).
3. Based on these data, tongue tremor has been removed from TETRAS
4. Improved assessment of voice and face tremors will require a training video and possibly a refinement of these test items.