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> Functional Systems Scores (FSS) and Expanded Disability Status Scale (EDSS)

## Functional Systems Scores (FSS) and Expanded Disability Status Scale (EDSS)

### Description

The FSS and EDSS constitute one of the oldest and probably the most widely utilized assessment instruments in MS (Kurtzke, 1983). Based on a standard neurological examination, the 7 functional systems (plus "other") are rated. These ratings are then used in conjunction with observations and information concerning gait and use of assistive devices to rate the EDSS. Each of the FSS is an ordinal clinical rating scale ranging from 0 to 5 or 6. The EDSS is an ordinal clinical rating scale ranging from 0 (normal neurologic examination) to 10 (death due to MS) in half-point increments. The FSS and EDSS have been used in virtually every major clinical trial that has been conducted in MS during the last four decades and in numerous other clinical studies.

### Administration Time

Administration time will vary depending upon the condition of the patient and the skill of the examiner. Although the FSS and EDSS themselves can be rated in a few minutes, the neurological examination that is needed to make the ratings can take anywhere from 15 minutes to a half-hour.

### Administration Method

The FSS and EDSS are administered in person by a trained examiner, most often a neurologist. However, nurse practitioners with the proper training can also complete the neurological examination and rate the FSS and EDSS.

### Scoring

The FSS and EDSS are ordinal clinical rating scales that are rated on the basis of the judgment of the examiner. Each of the FSS and the EDSS are single-item scales and there is no composite or summed score. The FSS include pyramidal, cerebellar, brainstem, sensory, bowel and bladder, visual, cerebral (or mental), and other.

Download the [FSS Form](#) (PDF) and the [EDSS Form](#) (PDF).

### General Comments

The FSS and EDSS were developed in the 1950's and refined in the 1980's to provide a standardized measure of global neurological impairment in MS. Although some clinicians use these measures they are utilized primarily in clinical studies, especially clinical trials. The EDSS has frequently been used as a component of the primary or secondary outcomes in clinical trials. However, dissatisfaction with the psychometric characteristics of the FSS and EDSS have led investigators to develop other measures for

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clinical studies in MS, for example, the MSFC. However, since the EDSS represents a familiar and widely used albeit imperfect standard, it will probably remain an important part of clinical assessment in MS for the foreseeable future.

## Psychometric Properties

Both test-retest reliability and inter-rater agreement have varied considerably from study to study with some studies finding high values and other studies unacceptably low figures (Coulthard-Morris, 2000). In most studies, the distribution of scores on the EDSS forms a bimodal distribution with peaks in the lower and upper ranges and a trough in the middle. (Hohol et al, 1995) Scores on the lower end of the EDSS are more dependent upon nuances in the neurological examination; those in the middle range are more dependent upon gait, while those in the upper (more impaired) range are also dependent upon activities of daily living. Since the EDSS is an ordinal rating scale, a 1-point difference in one part of the scale does not represent the same interval as a 1-point difference in another part of the scale, thus making change or group differences difficult to interpret. Most importantly, there is evidence that the EDSS lacks adequate sensitivity to fluctuations in MS-related impairment. (Rudick et al, 1996)

Many investigators have attempted to correct some of the problems mentioned above by making changes in the FSS and EDSS. See for example Goodkin et al (1992). As a result, there have been several different versions of the FSS and EDSS, many of which have been used in clinical trials but not published. The version presented here is the one originally published by Kurtzke (1983) with some explanatory material added when the FSS and EDSS were incorporated in the Minimal Record of Disability by the World Health Organization. (Haber and LaRocca, 1985)

## Kurtzke Expanded Disability Status Scale (EDSS)

- 0.0 - Normal neurological exam (all grade 0 in all Functional System (FS) scores\*).
- 1.0 - No disability, minimal signs in one FS\* (i.e., grade 1).
- 1.5 - No disability, minimal signs in more than one FS\* (more than 1 FS grade 1).
- 2.0 - Minimal disability in one FS (one FS grade 2, others 0 or 1).
- 2.5 - Minimal disability in two FS (two FS grade 2, others 0 or 1).
- 3.0 - Moderate disability in one FS (one FS grade 3, others 0 or 1) or mild disability in three or four FS (three or four FS grade 2, others 0 or 1) though fully ambulatory.
- 3.5 - Fully ambulatory but with moderate disability in one FS (one grade 3) and one or two FS grade 2; or two FS grade 3 (others 0 or 1) or five grade 2 (others 0 or 1).
- 4.0 - Fully ambulatory without aid, self-sufficient, up and about some 12 hours a day despite relatively severe disability consisting of one FS grade 4 (others 0 or 1), or combination of lesser grades exceeding limits of previous steps; able to walk without aid or rest some 500 meters.
- 4.5 - Fully ambulatory without aid, up and about much of the day, able to work a full day, may otherwise have some limitation of full activity or require minimal assistance; characterized by relatively severe disability usually consisting of one FS grade 4 (others or 1) or combinations of lesser grades exceeding limits of previous steps; able to walk without aid or rest some 300 meters.
- 5.0 - Ambulatory without aid or rest for about 200 meters; disability severe enough to impair full daily activities (e.g., to work a full day without special provisions); (Usual FS equivalents are one grade 5 alone, others 0 or 1; or combinations of lesser grades usually exceeding specifications for step 4.0).
- 5.5 - Ambulatory without aid for about 100 meters; disability severe enough to preclude full daily activities; (Usual FS equivalents are one grade 5 alone, others 0 or 1; or combination of lesser grades usually exceeding those for step 4.0).
- 6.0 - Intermittent or unilateral constant assistance (cane, crutch, brace) required to walk about 100 meters with or without resting; (Usual FS equivalents are combinations with more than two FS grade 3+).

- 6.5 - Constant bilateral assistance (canes, crutches, braces) required to walk about 20 meters without resting; (Usual FS equivalents are combinations with more than two FS grade 3+).
  - 7.0 - Unable to walk beyond approximately 5 meters even with aid, essentially restricted to wheelchair; wheels self in standard wheelchair and transfers alone; up and about in wheelchair some 12 hours a day; (Usual FS equivalents are combinations with more than one FS grade 4+; very rarely pyramidal grade 5 alone).
  - 7.5 - Unable to take more than a few steps; restricted to wheelchair; may need aid in transfer; wheels self but cannot carry on in standard wheelchair a full day; May require motorized wheelchair; (Usual FS equivalents are combinations with more than one FS grade 4+).
  - 8.0 - Essentially restricted to bed or chair or perambulated in wheelchair, but may be out of bed itself much of the day; retains many self-care functions; generally has effective use of arms; (Usual FS equivalents are combinations, generally grade 4+ in several systems).
  - 8.5 - Essentially restricted to bed much of day; has some effective use of arm(s); retains some self-care functions; (Usual FS equivalents are combinations, generally 4+ in several systems).
  - 9.0 - Helpless bed patient; can communicate and eat; (Usual FS equivalents are combinations, mostly grade 4+).
  - 9.5 - Totally helpless bed patient; unable to communicate effectively or eat/swallow; (Usual FS equivalents are combinations, almost all grade 4+).
  - 10.0 - Death due to MS.
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\*Excludes cerebral function grade 1.

Note 1: EDSS steps 1.0 to 4.5 refer to patients who are fully ambulatory and the precise step number is defined by the Functional System score(s). EDSS steps 5.0 to 9.5 are defined by the impairment to ambulation and usual equivalents in Functional Systems scores are provided.

Note 2: EDSS should not change by 1.0 step unless there is a change in the same direction of at least one step in at least one FS.

Sources: Kurtzke JF. Rating neurologic impairment in multiple sclerosis: an expanded disability status scale (EDSS). *Neurology*. 1983 Nov;33(11):1444-52.

Haber A, LaRocca NG. eds. *Minimal Record of Disability for multiple sclerosis*. New York: National Multiple Sclerosis Society; 1985.