

Table e-1 Commonly used scales and outcome measures

Objective outcome	Measure	Scale range
EDSS ^{e14}	Disability	<ul style="list-style-type: none"> Divided into 20 half steps ranging from 0 (normal) to 10 (death due to MS)
FSS ¹⁴	Disability	
FSSs ¹⁴	Disability	<ul style="list-style-type: none"> Subscores of the EDSS 0–5/6 (higher scores suggests higher disability)
MSFC ^{e15}	Disability Composite of 3 variables (Timed 25-Foot walk, 9-Hole Peg Test, and Paced Auditory Serial Addition Test)	<ul style="list-style-type: none"> Results from each of the 3 tests are transformed into Z-scores and averaged to yield a composite score for each patient at each time point
9-HPT ^{e15}	Hand function	<ul style="list-style-type: none"> Part of the MSFC
PASAT ^{e15}	Cognition	<ul style="list-style-type: none"> Part of the MSFC
GNDS ^{e16}	Disability	<ul style="list-style-type: none"> Sum score of the 12 subcategories, range 0 (normal) to 60 (maximum possible disability)
BBS ^{e17} (Berg Balance Scale):	Balance	<ul style="list-style-type: none"> Measures postural stability during sitting, standing, walking, changing positions, and reaching 14 items, 4-point (0 - cannot perform to 4 - normal) performance rating scale Score ranges from 0 -56
TUG ^{e17, e18} (Timed Up and Go) Test:	Mobility	Measures the time needed for a patient to get up from an armchair (46 cm high), walk 3 m, turn around, and sit down in the chair again
Ashworth Scale ^{e19}	Spasticity	
Subjective outcomes		
MSIS-29 ^{e20}		<ul style="list-style-type: none"> The summary scores of the 2 MSIS-29 scales, physical and psychological impact, are generated by summing the individual items (scored 1–5) and then transforming

		<p>these to a 0–100 scale</p> <ul style="list-style-type: none"> • Higher scores indicate worse health
FSS ^{e21}	Fatigue	<ul style="list-style-type: none"> • Scores range from 1–7 • Higher scores indicate higher levels of fatigue • Scores of ≥ 4 indicative of significant fatigue
FIS ^{e22}	Fatigue	<ul style="list-style-type: none"> • Consists of 40 items, each of which is scored 0 (no problem) to 4 (extreme problem) • Is continuous scale of 0–160 • Composed of 3 subscales that describe how fatigue impacts cognitive (10 items), physical (10 items), and psychosocial functioning (10 items)
MFIS ^{e23}	Fatigue	<ul style="list-style-type: none"> • Part of MSQLI; is a modified form of the Fatigue Impact Scale • Full-length MFIS consists of 21 items (10 cognitive, 11 physical, and 2 psychosocial) • Abbreviated MFIS has 5 items • Total MFIS score range, from 0–84. It is computed by adding scores on the Physical (0–36) + Cognitive (0–40) + Psychosocial (0–8) subscales • Higher scores indicate a greater impact of fatigue on a patient’s activities
SF-36 ^{e25}	Quality of life	<ul style="list-style-type: none"> • Part of MSQLI (see below) • Higher score indicates better health
HAQUAMS ^{e26}	Quality of life	<ul style="list-style-type: none"> • Assesses subscales: communication, mood, upper-limb mobility, lower-limb mobility, and fatigue • 38 items • Subscale and total scores range from 1 to 5, high scores indicating low quality of life
MSQLI ^{e27}	Quality of life	<ul style="list-style-type: none"> • Does not provide a single number to summarize quality of life • Provides several scores, each of which represents one specific facet of quality of life • 10 scales (a total of 138 items) as follows ➤ Health Status Questionnaire (SF-36) - 36 items

		<ul style="list-style-type: none"> ➤ MFIS - 21 items ➤ PES - 6 items ➤ SSS - 5 items ➤ BLCS - 4 items ➤ BWCS - 5 items ➤ IVIS - 5 items ➤ PDQ - 20 items ➤ MHI - 18 items ➤ MSSS - 18 items
QOL	Quality of life	
CES-D ^{e30}	Depression	<ul style="list-style-type: none"> • 20 questions • Range of scores 0–60 (< 15: no depression; 15-21: Mild to Moderate Depression; > 21: Possibility of Major Depression) • Higher score indicates presence of more symptomatology
BDI ^{e31}	Depression	<ul style="list-style-type: none"> • 21 questions • Score ranges from 0–63 (0–9: indicates minimal depression; 10–18: indicates mild depression; 19–29: indicates moderate depression; 30–63: indicates severe depression) • Higher total scores indicate more severe depressive symptoms
HADS ^{e32}	Anxiety and depression	<ul style="list-style-type: none"> • A 14-item scale • Grading ranges from 0–11+ (grading: 0–7 = Non-case; 8–10 = Borderline case; 11+ = Case)
STAI ^{e33}	Anxiety	<ul style="list-style-type: none"> • Consists of 2 subscales; the first measures state anxiety, the second measures trait anxiety • Scores range from 20–80 • Higher score indicates greater anxiety
PQOLC ^{e29}	Quality of life	<ul style="list-style-type: none"> • 40-item, 5-point (1, “not at all,” to 5, “very much”) scale • Assesses 6 dimensions of quality of life over the previous 7 days: (General functional status; 8 items; ability to enjoy life and to relax; 8 items; positive affect:

		5 items; negative affect: 8 items; ability to maintain and develop social contacts: 6 items; sense of belonging: 5 items)
GHQ-30 ^{e34}	Mental health	<ul style="list-style-type: none"> • 30-item questionnaire • 4-point scoring system • Higher scores indicate a more severe condition
RMI ^{e37, e38}	Mobility/Disability	<ul style="list-style-type: none"> • 15 items • Range of score: 0–15 (0 = inability to perform any activity on the scale) • Higher scores indicate better mobility performance
VAS	Pain	<ul style="list-style-type: none"> • Scoring ranges from 0–100 mm (0 = no pain, 100 = severe pain)
PSS		
NRS		<ul style="list-style-type: none"> • Range of score 0–10 (0 = no pain, 10 = severe pain)
CSS ^{e36}	Constipation	<ul style="list-style-type: none"> • Questionnaire • Scores range from 0–30 (0 = normal and 30 = severe constipation)
FAMS ^{e28} (Functional Assessment of Multiple Sclerosis)	Quality of life	<ul style="list-style-type: none"> • A 44-item self-report questionnaire • 6 subscales (measures mobility, symptoms, emotional well being/depression, general contentment, thinking/fatigue, and family/social well being) • Uses a 5-point Likert-type scale with scores ranging from 0 (not at all) to 4 (very much) for each of the items.
RMDQ ^{e35}	Lower back pain	<ul style="list-style-type: none"> • 24-item questionnaire • Scores range from 0–24 • Higher score indicative of greater lower back pain
SFQ ^{e24}	Fatigue	<ul style="list-style-type: none"> • 4 questions • 7-point scoring system

9-HPT = 9-Hole Peg Test, BBS = Berg Balance Scale, BDI = Beck Depression Inventory, BLCS = Bladder Control Scale, BWCS = Bowel Control Scale, CES-D = Center for Epidemiologic Studies Depression Scale questionnaire, CSS = Constipation Scoring System, EDSS = Kurtzke Expanded Disability Status Scale, FAMS = Functional Assessment of Multiple Sclerosis, FIS = Fatigue Impact Scale, FSs = Functional Systems, FSS = Fatigue Severity Scale, FSSs = Functional System Scores, GHQ-30 = General Health Questionnaire-30, GNDS = UK Guy's Neurological Disability Scale, HADS = Hospital Anxiety and Depression Scale, HAQUAMS = Hamburg Quality of Life Questionnaire for Multiple Sclerosis, IVIS = Impact of Visual Impairment Scale, MFIS = Modified Fatigue Impact Scale, MHI = Mental Health Inventory, MSFC = Multiple Sclerosis Functional Composite, MSIS-29 = Multiple Sclerosis Impact Scale-29, MSQLI = Multiple Sclerosis Quality of Life Inventory, MSSS = MOS Modified Social Support Survey, NRS = Numeric rating scale, PDQ = Perceived Deficits Questionnaire, PES = MOS Pain Effects Scale, PQOLC = Profile of Health-Related Quality of Life for the Chronically Ill, PASAT = Paced Auditory Serial Addition Test, PSS = Primary symptom score, QOL = Quality of Life, RMDQ = Roland Morris Disability Questionnaire, RMI = Rivermead Mobility Index, SF-36 = Short Form-36, SFQ = Shortened Fatigue Questionnaire, SSS = Sexual Satisfaction Scale, STAI = Spielberger State-Trait Anxiety Inventory, TUG = Timed Up and Go test, VAS = Visual analog scale.