

MUSCULOSKELETAL AND NEUROLOGICAL DISORDERS PREAMBLE

There are a wide variety of neurologic and musculoskeletal disorders which can impact driving safety. Impairment may be the result of altered muscular, skeletal, neurologic, and/or cognitive function. Motor, sensory, and/or cognitive deficits may adversely affect strength, coordination, reaction time, range of motion, visual perception, processing speed, judgment, problem solving, attention, memory, and/or awareness, in terms of a driver's ability to perform the actions necessary to safely operate a motor vehicle.

Disorders affecting cognition such as epilepsy, stroke, traumatic brain injury, Parkinson's disease, dementia, as well as disorders affecting neuromuscular function such as multiple sclerosis, Parkinson's disease, muscular dystrophy, cerebral palsy, myasthenia gravis, amyotrophic lateral sclerosis, spinocerebellar ataxia, foot drop, neuropathy, and spinal cord disorders all may present their own unique barriers to safe motor vehicle operation. What's more, there is considerable overlap in the clinical manifestations of these disorders. A driver with these conditions may have chronic functional limitations that have the potential to affect safe operation of a motor vehicle and should be evaluated. **When functional abilities are in question, a road test may be recommended by the clinician or required by BMV. A description of the road test may be found in the Appendix.**

Many of these conditions may result in symptoms or impairments that fall under more than one Functional Ability Profile (FAP) and will need to be evaluated using more than one FAP. For example, following a stroke a driver may experience a motor deficit which requires them to use adaptive equipment for their vehicle and may also have a visual field or acuity disturbance. A person with Parkinson's Disease may have cognitive or psychiatric deficits as well as the neurological and motor deficits. They would need to be evaluated using the Parkinson's, as well as the Dementia or Mental Health Conditions FAP. A person with Tourette's Syndrome may exhibit symptoms that should be reviewed using the Mental Health Conditions FAP. BMV will use the most restrictive FAP to determine the fitness of a person to drive.

Neurological disorders may have an unpredictable, episodic, or progressive course and require periodic evaluation by a qualified medical practitioner. The treating clinician may recommend the timing of evaluation but should have a working knowledge of a driver's current condition when filling out the Driver Medical Evaluation (CR-24) form. **When completing the CR-24 the driver must have been seen within the past 12 months or less.**

Individuals with any number of neurological and musculoskeletal conditions may use adaptive equipment when driving. **Person's that use adaptive driving aids for the vehicle must take a road test.** Although referral to a driving rehabilitation specialist may be indicated in some cases, it is not required by BMV. When BMV requires a road test, it will be administered by a BMV Driver's License Examiner. The road test will determine whether the person is allowed to drive and if there are driving restrictions. **A description of a comprehensive OT driving evaluation and the BMV the road test may be found in the Appendix. Adaptive driving aids for the vehicle may include but are not limited to hand controls, pedal extenders, seat modifications, etc.**

Driver's that are prescribed personal assistive medical devices for a chronic condition will be required to take a road test. **Personal assistive medical devices include** but are not limited to a wheelchair, prosthesis, orthosis, walker, or a cane when required for normal ambulation. If a cane is the only medical device needed, the clinician may recommend that the road test be waived.

Conditions which require review include but are not limited to the following:

Amputation or Limb Deficiency:

Amputation or limb deficiencies may be either congenital or acquired of the upper or lower extremities, with functional implications to safe driving being the decreased ability to operate one or more of the vehicle controls. Adaptive driving aids for the vehicle will require consideration depending on the specific limb deficiency, use of prosthesis and overall functional abilities of the person. Evaluation by a driving rehabilitation specialist may be appropriate depending on the extent of impairment. However, it is not required and does not take the place of the BMV road test. The Miscellaneous Musculoskeletal and Neurological Functional Ability Profile should be used to assess potential for driving impairment.

Arthritis or Joint Disorders:

This category would include related conditions such as rheumatoid arthritis, osteoarthritis, ankylosing spondylitis, and spinal stenosis, among others. Affected structures include joints and/or spinal nerves. These conditions can cause pain, decreased strength and range of motion, and impaired functional mobility, potentially altering the ability to safely operate a motor vehicle. In assessing these persons for potential driving impairment, overall functional performance of the person in terms of ability to perform activities of daily living should be taken into consideration to help determine if adaptive driving aids for the vehicle or other strategies may be needed. The Miscellaneous Musculoskeletal and Neurological Conditions Functional Ability Profile should be used to assess driving impairment.

Brain Injury:

Brain injury causes dysfunction of the central nervous system resulting from trauma or forces to the head significant enough to alter brain function. Cognitive changes after a brain injury can affect mood, memory, executive function, judgment, initiation, attention, and problem-solving. In addition, because self-awareness and judgment may be affected, a person may not be able to recognize their impairments. Depending on the extent of the injury, other deficits may include altered gait, balance and sensation, as well as impaired muscle and joint function due to weakness, spasticity, and contracture. These persons may require ankle-foot orthoses or upper extremity orthotics to improve mobility and use of extremities. Factors that impact the ability to drive safely after a brain injury can be extensive, and a comprehensive driving evaluation by a driving rehabilitation specialist should be considered. Use the Stroke/Brain Injury Functional Ability Profile to assess impairment. Other medical impairments following brain injury may include but are not limited to seizures and visual disturbances. These may need evaluation separately using the additional Functional Ability Profile.

Cerebrovascular Accident (CVA or Stroke):

Stroke may have a complicated and variable presentation. Residual impairments may include altered strength, mobility, coordination, motor planning, sensation, spatial planning, body or environmental awareness, vision, communication, judgment, and cognition. Motor deficits or contractures may require upper or lower extremity personal assistive medical devices or adaptive driving aids for the vehicle.

Due to the possibility of multiple potential deficits, a comprehensive evaluation by a driving rehabilitation specialist may be indicated but is not required. Use the Brain Injury/Stroke Functional Ability Profile to assess impairment. Other medical impairments following a stroke may include but are not limited to seizures, aphasia and/or visual disturbances. These may need to be evaluated separately using the additional Functional Ability Profile. **Please note that a transient ischemic attack (TIA)** by definition has no residual deficit and is therefore not subject to the Stroke FAP.

Miscellaneous Musculoskeletal and Neurological Conditions

Neurologic and musculoskeletal conditions with the potential to impair a person's ability to safely operate a motor vehicle are numerous, and therefore have not all been specifically listed. **Even if these conditions have not been adequately identified in any of the other categories, they still should be evaluated.** Examples of neuromuscular conditions which would be appropriately evaluated using the Miscellaneous

Musculoskeletal and Neurological Conditions FAP include but are not limited to muscular dystrophy, cerebral palsy, amyotrophic lateral sclerosis, peripheral/other neuropathies, syringomyelia, non-stroke related aphasia, Tourette's Syndrome, as well as any **generalized deconditioning syndrome** due to any etiology which reduces functional capacity to drive. These conditions may require personal assistive medical devices or adaptive driving aids for the vehicle, cause deficits in mobility, sensation, strength, coordination, reaction time, range of motion, and/or other abilities needed to safely operate a motor vehicle. Referral to a driving rehabilitation specialist, although not required, may be indicated in some cases. Also, persons who have an implanted spinal cord/dorsal column stimulator are advised to turn off the device prior to driving due to the potential for unexpected changes in stimulation with activity that could possibly be unsafe. **When visual, cognitive, psychiatric or other conditions also exist, they should be evaluated separately using the appropriate profile.**

If a clinician has concerns regarding an individual's ability to operate a vehicle safely that are not captured in this FAP, a road test may be requested. Include documentation of all pertinent medical concerns and the rationale for requesting a road test.

Multiple Sclerosis (MS):

Multiple Sclerosis is a highly variable disorder. Some people may have few if any perceptible symptoms associated with the disorder, while others may be significantly impaired. MS may cause visual impairment, cognitive impairment, alterations in sensation, muscle weakness, incoordination, spasticity, or joint contracture. Upper and/or lower extremity orthotics may be required, or a person may require vehicle adaptations or be operating a vehicle from a mobility device (such as a wheelchair). These deficits may cause difficulties with manipulation of vehicle controls, and driver performance in complex driving environments. Comprehensive evaluation for adaptive driving aids and an evaluation by a driving rehabilitation specialist may be beneficial but is not required. The progressive nature of MS warrants periodic reassessment of driving risk using the MS Functional Ability Profile. Psychiatric, cognitive, or visual deficits should be evaluated separately using the appropriate Functional Ability Profile.

Parkinson's or Parkinsonian Syndromes:

Parkinson's Disease and Parkinsonism physical signs include tremor, bradykinesia, postural instability, and rigidity, along with complex cognitive issues such as dementia and mood disturbance. These deficits may cause slowed reaction times, difficulties with vehicle controls, and impaired performance in complex driving environments further complicated by medication efficacy. Evaluation by a driving rehabilitation specialist may be indicated. The progressive nature of the disorder warrants periodic reassessment using the Parkinson's Functional Ability Profile. Psychiatric or cognitive issues should be evaluated separately using the appropriate Functional Ability Profile.

For the purpose of this FAP, Progressive Supranuclear Palsy, Multisystem Atrophy, Corticobasal Ganglionic Degenerations, Medication Induced Parkinsonism and Lewy Body Dementia are considered Parkinsonian Syndromes. The cognitive implications of Lewy Body Dementia should be reviewed using the Dementia FAP. Other movement disorders should be reviewed using the Miscellaneous Musculoskeletal and Neurological Conditions FAP.

Spinal Cord Injury (SCI):

SCI of the cervical, thoracic, or lumbosacral regions is the result of a medical condition, lesion or trauma to the neural elements within the spinal canal. This causes impairment of motor and sensory function to the upper or lower limbs and trunk which is variable and depends on the level of injury. Although common terms to describe spinal cord injury are paraplegia and tetraplegia (quadriplegia), The American Spinal Injury Association (ASIA) Impairment Scale more precisely grades the degree of impairment according to the spinal level of preserved motor and sensory function. Safe driving after SCI may be impaired due the altered ability to operate vehicle controls; so use of orthotics, adaptive driving aids for the vehicle, and an

adapted motor vehicle for use with mobility device/wheelchair are often required. Comprehensive evaluation by a driving rehabilitation specialist should be considered. The Miscellaneous Musculoskeletal and Neurological Conditions Functional Ability Profile should be used to assess driving impairment.

FUNCTIONAL ABILITY PROFILE
Cerebrovascular Accident (CVA/Stroke) or Brain Injury¹

Profile Levels	Degree of Impairment/ Potential for At Risk Driving	Condition Definition / Example	Interval for Review and Other Actions
1.	No diagnosed condition	No history or stroke or brain injury.	N/A
2.	Condition fully recovered	History of stroke or brain injury without residual physical, cognitive or vision deficits or impairments. Does not require personal assistive medical devices ² or adaptive driving aids for the vehicle as a result of the stroke or brain injury.	N/A
3.	Active impairment (Profile levels are intended to describe potential for at risk driving; they are NOT consistent with clinical definitions for mild, moderate or severe.)	History of stroke or brain injury with residual ³ cognitive, physical or vision deficits. For TIA, see. ⁴	Please document residual deficits on Driver Medical form.
	a. Mild risk	Residual ³ cognitive, physical or vision deficits, but unlikely risk to safely operating a motor vehicle and does not require personal assistive medical or devices ² or adaptive driving aids for the vehicle; or Clinician documents stable 3b condition that is unlikely to deteriorate, and driver has already passed a road test.	N/A Clinician may request ROAD TEST if unsure ^{5, 6}
	b. Moderate risk	Residual ³ cognitive, physical or vision deficits that could potentially impair ability to safely drive, and/or requires personal assistive medical devices ² or adaptive driving aids for the vehicle.	4 years ROAD TEST ^{5, 6}

	c. Severe risk	Residual ³ cognitive, physical or vision deficits that are significant enough to impair ability to safely drive; or Cognitive, physical or vision changes when stroke is suspected, and condition is being investigated.	No driving
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¹ For further discussion regarding CEREBROVASCULAR ACCIDENT OR BRAIN INJURY, please refer to Preamble at the beginning of this section.

² Driver's that are prescribed personal assistive medical devices for a chronic condition, such as but not limited to a wheelchair, prosthesis, orthosis, walker, or a cane when required for normal ambulation will be required to take a road test. If a cane is the only medical device needed, the clinician may recommend that the road test be waived.

³ Stroke and brain injury may lead to other impairments that need to be evaluated using an additional FAP, such as seizures, visual deficits such as hemianopsia or diplopia. The most restrictive Profile will determine the driving privileges.

⁴ Please note that a transient ischemic attack (TIA) by definition has no residual deficit and is therefore not subject to this FAP.

⁵ If a clinician has concerns regarding an individual's ability to operate a vehicle safely that are not captured in this FAP, a road test may be requested. Include documentation of all pertinent medical concerns, and rationale for requesting road test.

⁶ Refer to the appendix for more information about BMV Road Tests and Comprehensive Occupational Therapy Driving Evaluations. On-road tests with a driving rehabilitation instructor, occupational therapist or a driver educator may be appropriate in some situations, but BMV does not normally require these evaluations and they are not a substitute for the BMV road test.

FUNCTIONAL ABILITY PROFILE
Miscellaneous Musculoskeletal and Neurological Disorders¹

Profile Levels	Degree of Impairment/ Potential for At Risk Driving	Condition Definition / Example	Interval for Review and Other Actions
1.	No diagnosed condition	No history of musculoskeletal or neurological condition(s)	N/A
2.	Condition fully recovered	History of injury, deficiency, disorder, or other condition recovered, no longer requires treatment and maintains normal function; and does not require use of personal assistive medical devices ² or adaptive driving aids for the vehicle.	N/A
3.	Active impairment (Profile levels are intended to describe potential for at risk driving; they are NOT consistent with clinical definitions for mild, moderate or severe.)	Chronic condition such as amputation or limitation of limb, arthritis, joint disorders, spinal cord injury, non-Parkinsonian movement disorders, or others which may affect neuromuscular function; and currently requires treatment or cause impairments, restrictions, or deficits.	For spinal cord/dorsal column stimulator see ³ . If clinician has concerns that are not captured in this FAP, see footnote ⁴
	a. Mild risk	Chronic condition that does not pose risk for safe driving and does not require use of personal assistive medical devices ² or adaptive driving aids for the vehicle; or Clinician documents stable Profile Level 3b condition that is unlikely to deteriorate, and driver has already passed road test.	N/A ⁴
	b. Moderate risk	Chronic condition, which may impair ability to drive safely and/or requires use of personal assistive medical devices ² or adaptive driving aids for the vehicle, such as hand/foot controls.	4 years ⁵ ROAD TEST ^{5, 6}

	c. Severe risk	Chronic condition which causes impairments that interfere with the ability to operate safely.	No driving
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¹ For further discussion regarding MISCELLANEOUS MUSCULOSKELETAL AND NEUROLOGICAL DISORDERS, please refer to Preamble at the beginning of this section.

² Driver's that are prescribed personal assistive medical devices for a chronic condition, such as but not limited to a wheelchair, prosthesis, orthosis, walker, or a cane when required for normal ambulation will be required to take a road test. If a cane is the only medical device needed, the clinician may recommend that the road test be waived.

³ Persons who have an implanted spinal cord/dorsal column stimulator are advised to turn off the device prior to driving due to the potential for unexpected changes in stimulation with activity that could possibly be unsafe.

⁴ If a clinician has concerns regarding an individual's ability to operate a vehicle safely that are not captured in this FAP, a road test may be requested. Include documentation of all pertinent medical concerns, and rationale for requesting a road test.

⁵ Interval for review and road test may be more frequent if recommended by clinician.

⁶ Refer to the appendix for more information about BMV Road Tests and Comprehensive Occupational Therapy Driving Evaluations. On-road tests with a driving rehabilitation instructor, occupational therapist or a driver educator may be appropriate in some situations, but BMV does not normally require these evaluations and they are not a substitute for the BMV road test.

FUNCTIONAL ABILITY PROFILE
Multiple Sclerosis¹

Profile Levels	Degree of Impairment/ Potential for At Risk Driving	Condition Definition / Example	Interval for Review and Other Actions
1.	No diagnosed condition	No diagnosed multiple sclerosis	N/A
2.	Condition fully recovered	There is no recovery from multiple sclerosis	N/A
3.	Active impairment (Profile levels are intended to describe potential for at risk driving; they are NOT consistent with clinical definitions for mild, moderate or severe.)	Multiple sclerosis may affect many domains of the nervous system including cognition, vision, motor skills, coordination etc. In addition, it may cause fatigue and/or psychiatric symptoms. ²	
	a. Mild risk	Symptoms ² well controlled, or condition is quiescent. No side effects from medications that could potentially impair driving. No personal assistive medical devices ³ or adaptive driving aids for the vehicle; or Clinician documents stable 3b condition that is unlikely to deteriorate, and driver has already passed a road test.	4 years ⁴
	b. Moderate risk	Symptoms ² or medication side effects that may potentially impair safe driving and/or requires personal assistive medical devices ³ or adaptive driving aids for the vehicle.	2 years ROAD TEST ^{3, 5}
	c. Severe risk	Symptoms ² or side effects of medication severe enough to impair safe driving.	No driving

¹ For further discussion regarding MULTIPLE SCLEROSIS, please refer to Preamble at the beginning of this section.

² Multiple Sclerosis is highly variable. Some people may have few if any perceptible symptoms associated with the disorder, while others may be significantly physically or cognitively impaired. Symptoms may fall under more than one FAP and all appropriate FAP's should be used. For example, a driver may require vehicle modifications or have a significant visual field or acuity disturbance. The most restrictive FAP will determine driving privileges or restrictions.

³ Driver's that are prescribed personal assistive medical devices for a chronic condition, such as but not limited to a wheelchair, prosthesis, orthosis, walker, or a cane when required for normal ambulation, will be required to take a road test. If a cane is the only medical device needed, the clinician may recommend that the road test be waived.

⁴ Clinician may recommend a longer interval for review for those whose condition is quiescent or stable and well controlled, and without concerning side effects from medications.

⁵ Refer to the appendix for more information about BMV Road Tests and Comprehensive Occupational Therapy Driving Evaluations. On-road tests with a driving rehabilitation instructor, occupational therapist or a driver educator may be appropriate in some situations, but BMV does not normally require these evaluations and they are not a substitute for the BMV road test.

FUNCTIONAL ABILITY PROFILE
Parkinson's and Parkinsonian Syndromes¹

Profile Levels	Degree of Impairment/ Potential for At Risk Driving	Condition Definition / Example	Interval for Review and Other Actions
1.	No diagnosed condition	No diagnosed Parkinson's ²	N/A
2.	Condition fully recovered	Parkinson's Disease and/or Parkinsonian Syndromes ² are lifelong conditions and there is no recovery. Drug induced Parkinsonism may be considered recovered when symptoms resolve after the causative medication is stopped.	N/A
3.	Active impairment (Profile levels are intended to describe potential for at risk driving; they are NOT consistent with clinical definitions for mild, moderate or severe.)	Parkinson's Disease and/or Parkinsonian Syndromes ² may cause tremor, autonomic instability, rigidity, bradykinesia and/or dyskinesia, cognitive or psychiatric symptoms. ³	
	a. Mild risk	Mild physical symptoms that do not pose risk for safe operation of a vehicle. No cognitive or psychiatric symptoms. ³ Medications do not cause impairment. Does not require personal assistive medical devices ⁵ or adaptive driving aids for the vehicle.	2 years ^{4, 5}
	b. Moderate risk	Physical symptoms and/or side effects of medication may potentially interfere with the safe operation of a motor vehicle. May have early cognitive or psychiatric symptoms; ³ and/or require personal assistive medical devices ⁵ or adaptive driving aids for the vehicle.	1 year ROAD TEST ^{5, 6}

	c. Severe risk	Physical symptoms or side effects of medications are incompatible with safe operation of a motor vehicle. For cognitive or psychiatric symptoms, see ³ .	No driving
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¹ For further discussion regarding PARKINSON'S OR PARKINSONIAN SYNDROMES, please refer to Preamble at the beginning of this section.

² For the purpose of this FAP, Lewy Body Dementia, Multisystem Atrophy, Corticobasal Ganglionic Degenerations, medication induced Parkinsonism, Vascular Parkinsonism, and Progressive Supranuclear Palsy are considered Parkinsonian Syndromes.

³ Cognitive or Psychiatric symptoms should be evaluated using the Dementia or Mental Health Conditions FAP.

⁴ When Parkinsonian Syndrome is caused by medications and patient is stable, the clinician may recommend extending the review interval up to 4 years.

⁵ Driver's that are prescribed personal assistive medical devices for a chronic condition, such as but not limited to a wheelchair, prosthesis, orthosis, walker, or a cane when required for normal ambulation will be required to take a road test. If a cane is the only medical device needed, the clinician may recommend that the road test be waived.

⁶ Refer to the appendix for more information about BMV Road Tests and Comprehensive Occupational Therapy Driving Evaluations. On-road tests with a driving rehabilitation instructor, occupational therapist or a driver educator may be appropriate in some situations, but BMV does not normally require these evaluations and they are not a substitute for the BMV road test.