

MUSCULOSKELETAL AND NEUROLOGICAL DISORDERS

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, and encephalopathy 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.

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 visual field or acuity disturbance and may also need adaptive equipment. This person would need to be evaluated using both the Stroke and the Visual Disorders FAP's. 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 Disorders 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 shall determine 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 equipment when driving 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.

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 equipment 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 of axial and appendicular skeleton, 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 motor vehicle controls. 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 equipment or strategies may be needed. Miscellaneous Musculoskeletal and Neurological Conditions Functional Ability Profile should be used to assess driving impairment.

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 adaptive equipment for driving. 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 TBI/Stroke Functional Ability Profile to assess impairment. Other medical issues following a stroke may include seizures, cognitive impairment, and/or visual disorders which need to be evaluated separately using the proper Functional Ability Profile for those conditions. 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, as well as any generalized deconditioning syndrome due to any etiology which reduces functional capacity to drive. These conditions may require personal medical equipment or adaptive accessories to operate a motor 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.

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, joint contracture. Upper and/or lower extremity orthotics may be required, and a person may also be operating an adapted 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 equipment 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. 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.

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

Traumatic Brain Injury (TBI)

TBI causes dysfunction of the central nervous system resulting from trauma or forces to the head significant enough to alter brain function. Cognitive changes after TBI 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 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 on ability to drive safely after TBI can be extensive, and a comprehensive driving evaluation by a driving rehabilitation specialist should be considered. Use the Stroke/TBI Functional Ability Profile to assess impairment. Other medical impairments following TBI may include seizures, cognitive, and visual disorders, which need evaluation separately using the proper Functional Ability Profile for those conditions.

FOR REFERENCES, SEE BIBLIOGRAPHY AT END OF DOCUMENT.

FUNCTIONAL ABILITY PROFILE
Cerebrovascular Accident (CVA/Stroke) or Traumatic Brain Injury (TBI)¹

| Profile Levels | Degree of Impairment^{2/} Potential for At Risk Driving | Condition Definition / Example | Interval for Review and Other Actions |
|-----------------------|--|---|---|
| 1. | No diagnosed condition | No known disorder | N/A |
| 2. | Condition fully recovered | History of Stroke or TBI without residual physical or cognitive deficits or impairments. | N/A |
| 3. | Active impairment | History of Stroke or TBI with residual ³ cognitive and/or physical impairments or deficits. For TIA, see. ⁴ | Please document residual deficits on Driver Medical form. |
| | a. Mild | Residual ³ cognitive or physical deficits, but unlikely risk to safely operating a motor vehicle and does not require assistive medical equipment or nonstandard accessory driving devices. ⁵ | N/A Clinician may request ROAD TEST if unsure ⁵ |
| | b. Moderate | Residual ³ cognitive or physical deficits that could potentially impair ability to safely drive, and/or requires assistive medical equipment or nonstandard accessory driving device(s). | 4 years ROAD TEST |
| | c. Severe | Residual ³ cognitive and/or physical deficits that are significant enough to impair ability to safely drive. Or, a person with physical or cognitive changes when stroke is suspected and condition is being investigated. | No driving |

¹ For further discussion regarding CEREBROVASCULAR ACCIDENT OR TRAUMATIC BRAIN INJURY, please refer to NARRATIVE found at beginning of this section.

² For further explanation of degree of impairment, please refer to SECTION 3.

³ Stroke and TBI may lead to other cognitive or physical impairments such as seizures, visual deficits such as hemianopsia or diplopia, or cognitive deficits, such as dementia, impairment to reasoning or judgment, these need to be evaluated using the appropriate FAP. 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 provider has concerns regarding an individual's ability to operate a vehicle safely that are not captured in this FAP then a road test may be requested. Include documentation of all pertinent medical concerns, and rationale for requesting road test.

FUNCTIONAL ABILITY PROFILE
Miscellaneous Musculoskeletal and Neurological Disorders¹

| Profile Levels | Degree of Impairment²/ Potential for At Risk Driving | Condition Definition / Example | Interval for Review and Other Actions |
|-----------------------|--|--|---|
| 1. | No diagnosed condition | No known disorder | N/A |
| 2. | Condition fully recovered | History of injury, deficiency, disorder, or other condition recovered, no longer requires treatment and maintains normal function. | N/A |
| 3. | Active impairment | Chronic condition such as amputation or limitation of limb, arthritis, joint dis-orders, spinal cord injury, or others which may affect neuromuscular function; and currently require treatment or cause impairments, restrictions, or deficits. | For spinal cord/dorsal column stimulator see ³ . |
| | a. Mild | Chronic condition that does not pose risk for safe driving and does not require use of assistive medical equipment or nonstandard accessory driving devices; or Clinician documents stable condition that is unlikely to deteriorate and driver has already passed road test. | N/A |
| | b. Moderate | Chronic condition, which may impair ability to drive safely and/or requires personal assistive medical equipment (such as prosthesis, orthosis, or any type of nonstandard accessory driving device such as hand/foot controls). | 4 years ⁴ ROAD TEST |
| | c. Severe | Chronic condition, which causes impairments that interfere with the ability to drive safely despite use of personal assistive medical equipment, or any nonstandard accessory driving devices. | No driving |

¹ For further discussion regarding MISCELLANEOUS MUSCULOSKELETAL AND NEUROLOGICAL DISORDERS, please refer to NARRATIVE found at beginning of this section.

² For further explanation of degree of impairment, please refer to SECTION 3.

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

⁴ Interval for review may be more frequent if recommended by clinician.

FUNCTIONAL ABILITY PROFILE
Multiple Sclerosis¹

| Profile Levels | Degree of Impairment²/ Potential for At Risk Driving | Condition Definition / Example | Interval for Review and Other Actions |
|-----------------------|--|--|--|
| 1. | No diagnosed condition | No known disorder | N/A |
| 2. | Condition fully recovered | There is no recovery from multiple sclerosis | N/A |
| 3. | Active impairment | 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. ³ | |
| | a. Mild | Symptoms well controlled, or condition is quiescent. No side effects from medications that could potentially impair driving. | 4 years |
| | b. Moderate | Symptoms or medication side effects that may potentially impair safe driving. | 2 years ROAD TEST |
| | c. Severe | Symptoms or side effects of medication severe enough to preclude safe driving. | No driving |

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

² For further explanation of degree of impairment, please refer to SECTION 3.

³ 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 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 adaptive equipment or have a significant visual field or acuity disturbance. The most restrictive FAP will determine driving privileges or restrictions.

FUNCTIONAL ABILITY PROFILE

Parkinson's and Parkinsonian Syndromes¹

| Profile Levels | Degree of Impairment ² / Potential for At Risk Driving | Condition Definition / Example | Interval for Review and Other Actions |
|----------------|---|--|--|
| 1. | No diagnosed condition | No known disorder ³ | N/A |
| 2. | Condition fully recovered | Parkinson's Disease ³ is a lifelong condition 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 | Parkinson's Disease ³ may cause tremor, autonomic instability, rigidity, bradykinesia and/or dyskinesia, cognitive or psychiatric symptoms. ⁴ | |
| | a. Mild | Mild physical symptoms that do not pose risk for safe operation of a vehicle. No cognitive or psychiatric symptoms. Medications do not cause drowsiness. | 2 years ⁵ |
| | b. Moderate | 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 ⁴ . | 1 year ROAD TEST |
| | c. Severe | Physical symptoms or side effects of medications are incompatible with safe operation of a motor vehicle. For cognitive or psychiatric symptoms, see ⁴ . | No driving |

¹ For further discussion regarding PARKINSON'S OR PARKINSONIAN SYNDROMES, please refer to NARRATIVE found at beginning of this section.

² For further explanation of degree of impairment, please refer to SECTION 3.

³ 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.

⁴ Cognitive or Psychiatric symptoms should be evaluated using the Dementia or Mental Disorders FAP.

⁵ When Parkinsonian Syndrome is caused by medications and patient is stable, the clinician may recommend extending the review interval up to 4 years.