CLINICAL APPROPRIATENESS GUIDELINES

ADVANCED IMAGING

Appropriate Use Criteria: Imaging of the Brain

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Approval and implementation dates for specific health plans may vary. Please consult the applicable health plan for more details.

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Description and Application of the Guidelines

The AIM Clinical Appropriateness Guidelines (hereinafter "the AIM Clinical Appropriateness Guidelines" or the "Guidelines") are designed to assist providers in making the most appropriate treatment decision for a specific clinical condition for an individual. As used by AIM, the Guidelines establish objective and evidence-based criteria for medical necessity determinations where possible. In the process, multiple functions are accomplished:

- To establish criteria for when services are medically necessary
- To assist the practitioner as an educational tool
- To encourage standardization of medical practice patterns
- To curtail the performance of inappropriate and/or duplicate services
- To advocate for patient safety concerns
- To enhance the quality of health care
- To promote the most efficient and cost-effective use of services

The AIM guideline development process complies with applicable accreditation standards, including the requirement that the Guidelines be developed with involvement from appropriate providers with current clinical expertise relevant to the Guidelines under review and be based on the most up-to-date clinical principles and best practices. Relevant citations are included in the References section attached to each Guideline. AIM reviews all of its Guidelines at least annually.

AIM makes its Guidelines publicly available on its website twenty-four hours a day, seven days a week. Copies of the AIM Clinical Appropriateness Guidelines are also available upon oral or written request. Although the Guidelines are publicly-available, AIM considers the Guidelines to be important, proprietary information of AIM, which cannot be sold, assigned, leased, licensed, reproduced or distributed without the written consent of AIM.

AIM applies objective and evidence-based criteria, and takes individual circumstances and the local delivery system into account when determining the medical appropriateness of health care services. The AIM Guidelines are just guidelines for the provision of specialty health services. These criteria are designed to guide both providers and reviewers to the most appropriate services based on a patient's unique circumstances. In all cases, clinical judgment consistent with the standards of good medical practice should be used when applying the Guidelines. Guideline determinations are made based on the information provided at the time of the request. It is expected that medical necessity decisions may change as new information is provided or based on unique aspects of the patient's condition. The treating clinician has final authority and responsibility for treatment decisions regarding the care of the patient and for justifying and demonstrating the existence of medical necessity for the requested service. The Guidelines are not a substitute for the experience and judgment of a physician or other health care professionals. Any clinician seeking to apply or consult the Guidelines is expected to use independent medical judgment in the context of individual clinical circumstances to determine any patient's care or treatment.

The Guidelines do not address coverage, benefit or other plan specific issues. Applicable federal and state coverage mandates take precedence over these clinical guidelines. If requested by a health plan, AIM will review requests based on health plan medical policy/guidelines in lieu of the AIM Guidelines.

The Guidelines may also be used by the health plan or by AIM for purposes of provider education, or to review the medical necessity of services by any provider who has been notified of the need for medical necessity review, due to billing practices or claims that are not consistent with other providers in terms of frequency or some other manner.

General Clinical Guideline

Clinical Appropriateness Framework

Critical to any finding of clinical appropriateness under the guidelines for a specific diagnostic or therapeutic intervention are the following elements:

- Prior to any intervention, it is essential that the clinician confirm the diagnosis or establish its pretest likelihood based on a complete evaluation of the patient. This includes a history and physical examination and, where applicable, a review of relevant laboratory studies, diagnostic testing, and response to prior therapeutic intervention.
- The anticipated benefit of the recommended intervention should outweigh any potential harms that may result (net benefit).
- Current literature and/or standards of medical practice should support that the recommended intervention offers the greatest net benefit among competing alternatives.
- Based on the clinical evaluation, current literature, and standards of medical practice, there exists a reasonable likelihood that the intervention will change management and/or lead to an improved outcome for the patient.

If these elements are not established with respect to a given request, the determination of appropriateness will most likely require a peer-to-peer conversation to understand the individual and unique facts that would supersede the requirements set forth above. During the peer-to-peer conversation, factors such as patient acuity and setting of service may also be taken into account.

Simultaneous Ordering of Multiple Diagnostic or Therapeutic Interventions

Requests for multiple diagnostic or therapeutic interventions at the same time will often require a peer-to-peer conversation to understand the individual circumstances that support the medical necessity of performing all interventions simultaneously. This is based on the fact that appropriateness of additional intervention is often dependent on the outcome of the initial intervention.

Additionally, either of the following may apply:

- Current literature and/or standards of medical practice support that one of the requested diagnostic or therapeutic interventions is more appropriate in the clinical situation presented; or
- One of the diagnostic or therapeutic interventions requested is more likely to improve patient outcomes based on current literature and/or standards of medical practice.

Repeat Diagnostic Intervention

In general, repeated testing of the same anatomic location for the same indication should be limited to evaluation following an intervention, or when there is a change in clinical status such that additional testing is required to determine next steps in management. At times, it may be necessary to repeat a test using different techniques or protocols to clarify a finding or result of the original study.

Repeated testing for the same indication using the same or similar technology may be subject to additional review or require peer-to-peer conversation in the following scenarios:

- Repeated diagnostic testing at the same facility due to technical issues
- Repeated diagnostic testing requested at a different facility due to provider preference or quality concerns
- Repeated diagnostic testing of the same anatomic area based on persistent symptoms with no clinical change, treatment, or intervention since the previous study
- Repeated diagnostic testing of the same anatomic area by different providers for the same member over a short period of time

Repeat Therapeutic Intervention

In general, repeated therapeutic intervention in the same anatomic area is considered appropriate when the prior intervention proved effective or beneficial and the expected duration of relief has lapsed. A repeat intervention requested prior to the expected duration of relief is not appropriate unless it can be confirmed that the prior intervention was never administered.

Imaging of the Brain

General Information/Overview

Scope

These guidelines address advanced imaging of the brain in both adult and pediatric populations. For interpretation of the Guidelines, and where not otherwise noted, “adult” refers to persons age 19 and older, and “pediatric” refers to persons age 18 and younger. Where separate indications exist, they are specified as **Adult** or **Pediatric**. Where not specified, indications and prerequisite information apply to persons of all ages.

See the Coding section for a list of modalities included in these guidelines.

Technology Considerations

Advanced imaging is an umbrella term that refers to anatomy-based (structural), physiology-based (functional), and hybrid imaging methods that offer greater spatial and/or contrast resolution relative to conventional imaging methods in radiology such as radiography or ultrasound. Examples of advanced structural imaging include computed tomography (CT) and magnetic resonance imaging (MRI) and some technique variants. Advanced functional imaging includes positron emission tomography (PET) as well as those MRI/CT technique variants that create image contrast based on a physiological parameter (for example, functional magnetic resonance imaging (fMRI). Hybrid advanced imaging techniques optimize diagnostic accuracy by coupling structural and functional approaches (such as PET-CT or PET-MRI).

Computed tomography (CT) is preferred in the following situations: initial evaluation of craniocerebral trauma; evaluation of acute intracranial hemorrhage (parenchymal, subarachnoid, subdural, epidural); evaluation of calcified intracranial lesions; osseous assessment of the calvarium, skull base, and maxillofacial bones, including detection of calvarial and facial bone structures; and imaging of midline structures and ventricular system. CT is utilized less frequently in neuroimaging due to inferior resolution when compared to MRI. CT also has a tendency to result in beam-hardening artifact adjacent to the petrous bone, which may limit visualization in portions of the posterior fossa and brainstem. Standard anatomic coverage of head CT is from the base of the skull to its vertex, covering the entire calvarium and intracranial contents. Coverage may vary depending on the specific clinical indication. Disadvantages of CT include exposure to ionizing radiation and risks associated with infusion of iodinated contrast media, including allergic reactions or renal compromise.

Magnetic resonance imaging (MRI) is preferable to CT in most clinical scenarios. It is the study of choice for visualization of brain parenchyma and white matter tracts. It is also preferred for imaging of the posterior fossa and brainstem structures. Standard anatomic coverage of head MRI is from the base of the skull to the vertex, covering the entire calvarium and intracranial contents, including the internal auditory canals. Coverage may vary depending on the specific clinical indication. The presence of implantable devices such as pacemakers or defibrillators, a potential need for sedation in pediatric patients, and claustrophobia are the main limitations of MRI. Infusion of gadolinium may also confer an unacceptable risk in persons with advanced renal disease.

Diffusion-weighted imaging (DWI) is a specific MRI sequence that gathers information on the movements of water molecules in the brain. DWI is most commonly used to diagnose pathologies in which water molecules demonstrate less ability to move through the histologic structure of the brain. Common examples include acute ischemic stroke, abscess, and certain tumors. DWI can also be used to image structure of white matter tracts by a process called **diffusion tensor imaging (DTI)**, which uses the data from the scan to make calculations. DTI may also be useful in neurosurgical planning.

Functional MRI (fMRI) is primarily utilized for mapping primary brain activities related to motor, sensory, and language functions. Studies have demonstrated that fMRI is comparable to the intracarotid sodium amobarbital procedure (Wada test) and direct electrical stimulation for language localization. fMRI is

noninvasive, does not require ionizing radiation, and has a shorter time requirement for imaging and post-procedural recovery.

Positron emission tomography (PET or PET-CT) provides functional information about brain activity by mapping the relative concentrations of certain radiotracers within the parenchyma. PET brain imaging is primarily used to evaluate blood flow, metabolic changes, and neurotransmitter dynamics, and is frequently performed in conjunction with CT for anatomic localization. PET-CT can be used to evaluate many types of dementia and memory disorders, and it can also be used to localize epileptic seizures or stage brain tumors.

Magnetic resonance spectroscopy (MRS), usually performed with standard MRI, provides a biochemical profile of metabolic constituents in tissues. Alterations in specific metabolites such as choline and creatine are associated with certain disease states; this information can be used as an adjunct in cases where standard MRI fails to distinguish between diseased and healthy tissue. In neuroimaging, MRS is useful for differentiating between tumor, necrotic tissue, and certain types of infectious lesions.

Definitions

Phases of the care continuum are broadly defined as follows:

- **Screening** – testing in the absence of signs or symptoms of disease
- **Diagnosis** – testing based on a reasonable suspicion of a particular condition or disorder, usually due to the presence of signs or symptoms
- **Management** – testing to direct therapy of an established condition, which may include preoperative or postoperative imaging, or imaging performed to evaluate the response to nonsurgical intervention
- **Surveillance –** periodic assessment following completion of therapy, or for monitoring known disease that is stable or asymptomatic

Statistical terminology[1]

- **Confidence interval (CI) –** range of values which is likely to contain the cited statistic. For example, 92% sensitivity (95% CI, 89%-95%) means that, while the sensitivity was calculated at 92% on the current study, there is a 95% chance that, if a study were to be repeated, the sensitivity on the repeat study would be in the range of 89%-95%.
- **Diagnostic accuracy –** ability of a test to discriminate between the target condition and health. Diagnostic accuracy is quantified using sensitivity and specificity, predictive values, and likelihood ratios.
- **Hazard ratio –** odds that an individual in the group with the higher hazard reaches the outcome first. Hazard ratio is analogous to odds ratio and is reported most commonly in time-to-event analysis or survival analysis. A hazard ratio of 1 means that the hazard rates of the 2 groups are equivalent. A hazard ratio of greater than 1 or less than 1 means that there are differences in the hazard rates between the 2 groups.
- **Likelihood ratio –** ratio of an expected test result (positive or negative) in patients *with* the disease to an expected test result (positive or negative) in patients *without* the disease. Positive likelihood ratios, especially those greater than 10, help rule in a disease (i.e., they substantially raise the post-test probability of the disease, and hence make it very likely and the test very useful in identifying the disease). Negative likelihood ratios, especially those less than 0.1, help rule out a disease (i.e., they substantially decrease the post-test probability of disease, and hence make it very unlikely and the test very useful in excluding the disease).
- **Odds ratio –** odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure. An odds ratio of 1 means that the

exposure does not affect the odds of the outcome. An odds ratio greater than 1 means that the exposure is associated with higher odds of the outcome. An odds ratio less than 1 means that the exposure is associated with lower odds of the outcome.

- **Predictive value –** likelihood that a given test result correlates with the presence or absence of disease. Positive predictive value is defined as the number of true positives divided by the number of test positives. Negative predictive value is defined as the number of true negatives divided by the number of test negative patients. Predictive value is dependent on the prevalence of the condition.
- **Pretest probability –** probability that a given patient has a disease prior to testing. May be divided into very low (less than 5%), low (less than 20%), moderate (20%-75%), and high (greater than 75%) although these numbers may vary by condition.
- **Relative risk –** probability of an outcome when an exposure is present relative to the probability of the outcome occurring when the exposure is absent. Relative risk is analogous to odds ratio; however, relative risk is calculated by using percentages instead of odds. A relative risk of 1 means that there is no difference in risk between the 2 groups. A relative risk of greater than 1 means that the outcome is more likely to happen in the exposed group compared to the control group. A relative risk less than 1 means that the outcome is less likely to happen in the exposed group compared to the control group.
- **Sensitivity –** conditional probability that the test is positive, given that the patient has the disease. Defined as the true positive rate (number of true positives divided by the number of patients with disease). Excellent or high sensitivity is usually greater than 90%.
- **Specificity –** conditional probability that the test is negative, given that the patient does not have the disease. Defined as the true negative rate (number of true negatives divided by the number of patients without the disease). Excellent or high specificity is usually greater than 90%.

Clinical Indications

The following section includes indications for which advanced imaging of the brain is considered medically necessary, along with prerequisite information and supporting evidence where available. Indications, diagnoses, or imaging modalities not specifically addressed are considered not medically necessary.

It is recognized that imaging often detects abnormalities unrelated to the condition being evaluated. Such findings must be considered within the context of the clinical situation when determining whether additional imaging is required.

Congenital and Developmental Conditions

Ataxia, congenital or hereditary

Includes ataxia-telangiectasia, fragile X syndrome, and congenital anomalies of the posterior fossa

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT brain
- MRI brain

Developmental delay (Pediatric only)

Advanced imaging is considered medically necessary for evaluation of **EITHER** of the following conditions:

- Cerebral palsy
- Significant delay or loss of milestones in **ANY TWO (2)** of the following domains:
  - Activities of daily living
  - Cognition
  - Motor skills (gross/fine)
  - Social/personal
  - Speech/language

IMAGING STUDY

- CT brain
- MRI brain

Congenital cerebral anomalies

Includes Chiari malformation, craniosynostosis, macrocephaly, and microcephaly

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- Ultrasound required as the initial study to evaluate macrocephaly in patients under 5 months of age
- CT brain
- MRI brain

Rationale

Congenital anomalies of the central nervous system can be classified[2] into disorders of dorsal/ventral induction such as myelomeningocele, holoprosencephaly, Dandy-Walker variant, or craniosynostosis, disorders of neural proliferation such as microcephaly and megalencephaly, disorders of neuronal migration such as schizencephaly and cortical heterotopias, and disorders of myelination such as adrenoleukodystrophy and Canavan disease. There are characteristic imaging patterns for each of these congenital abnormalities, making imaging an important diagnostic test. Repeat imaging and surveillance imaging are indicated only if neurological complications of these conditions are suspected such as hydrocephalus.

The American Academy of Neurology recommends neuroimaging in the diagnostic evaluation of a child with global developmental delay,[3] which is defined as a delay in 2 or more developmental domains—gross/fine motor control, speech/language, cognition, social/personal, and activities of daily living—that affect children under the age of 5 years.[4] While history and physical exam are sufficient to establish the diagnosis in up to a third of cases,[4] structural abnormalities on neuroimaging are seen in 14% of unselected patients and in 41% of patients with suggestive physical exam findings such as macrocephaly or focal neurological deficits.[3]

Cerebral palsy is the most common physical disability in childhood and refers to a syndrome of voluntary movement or posture that manifests before age 2.[5] MRI has a high sensitivity (86%-89%) for the condition[6] with 70%-90% of patients having identifiable structural abnormalities. Neuroimaging in general and MRI in particular are recommended by the American Academy of Neurology to help establish the diagnosis.[7]

MRI is the preferred imaging modality for evaluation of congenital and developmental abnormalities of the brain because it is more sensitive than CT for the detection of morphological abnormalities of the brain parenchyma and because it does not require ionizing radiation. Abnormalities on MRS have been associated with developmental delay, but have not consistently been show to improve diagnostic yield of change management as either an add-on or a replacement test to MRI.[4]

CT may be preferred to better characterize congenital abnormalities that primary involve the calvarium, such as craniosynostosis.[8] Ultrasound is also sensitive and should be considered in clinical practices with expertise in the technique.[9]

Ultrasound is an accurate and reliable initial modality for evaluating macrocephaly in neonates, and it can identify a small percentage (2%) of patients who require neurosurgical intervention.[10] Macrocephaly without focal neurological deficits has a very low (3.5%) incidence of congenital abnormalities, and add-on MRI or CT detection has a very low (0%) impact on management.[11]

Infectious Conditions

Infectious conditions – not otherwise specified

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT brain
- MRI brain (preferred)

Inflammatory Conditions

Multiple sclerosis (MS) and other white matter diseases

Also see Head and Neck Imaging, Spine Imaging

Advanced imaging is considered medically necessary in **ANY** of the following scenarios:

- Diagnosis
    - Neurological signs or symptoms of demyelinating disease
- Management
    - Evaluation of new or recurrent neurological signs or symptoms
    - Recent or current use of natalizumab
    - New baseline prior to starting or changing therapy
    - Following a change in disease-modifying therapy: Initial imaging at 3-6 months and follow up at 6-12 months
    - Periodic evaluation of white matter diseases other than multiple sclerosis
- Surveillance
    - Clinically isolated syndrome (CIS) or radiologically isolated syndrome (RIS): Imaging 3-6 months after presentation, 6-12 months after presentation, and annually thereafter
    - Annual evaluation in stable patients with multiple sclerosis who have had no change in therapy within the past one year

IMAGING STUDY

- MRI brain

Rationale

Multiple sclerosis (MS) is a chronic, disabling autoimmune disease of the central nervous system[12] and among the most common causes of neurological disability in young people, with an annual incidence ranging from 2 to 10 cases per 100,000 persons per year.[13] Its clinical manifestations typically occur between 20 and 40 years of age, with symptoms and signs involving different regions of the central nervous system: optic nerve, brainstem, cerebellum, cerebral hemispheres, and spinal cord. MS has a chronic course - relapses and disability progression evolving over 30 to 40 years are typical.[13]

The revised 2017 McDonald criteria are commonly accepted criteria establishing the diagnosis of MS and are used in both clinical and research contexts. The McDonald criteria incorporate clinical presentation as well as laboratory and imaging biomarkers and brain MRI plays a central role in the diagnosis of MS by establishing evidence for dissemination

in space and in time in patients with both typical (optic neuritis, brainstem syndrome) and atypical clinical presentations.[14] MRI may also inform the management of MS by confirming a disease flare when clinically suspected or by excluding other causes for the new neurological signs or symptoms.

Patients with clinically isolated syndrome present with a clinical attack typical for demyelinating disease (for example, optic neuritis) but do not meet the McDonald criteria. They are at increased risk for MS and MRI is indicated to determine whether these patients develop the disease.

While MS should not be diagnosed on the basis of MRI findings alone,[14,15] patients rarely present with white matter disease typical of multiple sclerosis (not nonspecific) without clinical symptoms. These patients are classified as having a radiologically isolated syndrome (RIS). Follow up imaging in RIS is controversial, but RIS patients appear to be at increased risk for conversion to MS.[16] Future research is likely to change recommendations for the diagnosis and management of RIS and additional studies have been identified as a high priority.[14]

There are over a dozen FDA-approved disease-modifying therapies (DMTs) for multiple sclerosis including interferon beta-1a, glatiramer acetate, fingolimod, and natalizumab and these therapies are recommended in patients with relapsing forms of MS with recent clinical relapses or MRI activity (strong recommendation based on moderate quality evidence).[17] For patients without new clinical findings, MRI may therefore be used in the management (immediately prior to or after changing DMTs) or in surveillance for subclinical disease in patients without clinical or recent therapy changes). More frequent MRI evaluation is recommended in patients with a recent therapy change as recurrences are more likely within the first year. Patients on natalizumab (Tysabri) have a higher relative risk for progressive multifocal leukoencephalopathy (PML) and may require more frequent imaging.

Management and surveillance intervals for MS, CIS and RIS are primarily consensus based but addressed in several evidence and practice based guidelines.[18 19 20 21]

CT is not recommended in the evaluation of demyelinating disease due to low sensitivity relative to MRI and other clinical and laboratory tests.[22] Likewise, several nonconventional technique variants of MRI (magnetization transfer, diffusion tensor, functional MRI) have been proposed as add-on diagnostic tests for MS but they have not been validated at the individual level[21] or incorporated into the McDonald criteria or other standardized MS imaging protocols and require further research before incorporation into routine clinical practice.[23]

Other demyelinating diseases of the central nervous system are rare and include autoimmune disseminated encephalomyelitis (ADEM) and neuromyelitis optica (NMO). Their clinical presentation can overlap with MS but clinical, laboratory, and MRI findings help to distinguish the etiologies. For instance, ADEM usually has an viral or vaccine prodrome and is more common in pediatric patients[24]; NMO typically presents with longitudinally extensive transverse myelitis and a positive serum NMO-IgG/Aquaporin 4 (AQP4) antibody test.[16, 25]

The McDonald criteria apply in pediatrics, although MS is rare in this population and hence data is limited.[20]

Inflammatory conditions – not otherwise specified

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT brain
- MRI brain

Neurodegenerative Conditions

Movement disorders (Adult only)

Advanced imaging is considered medically necessary in **EITHER** of the following scenarios:

- For perioperative evaluation related to placement of a deep brain stimulator
- For initial evaluation of the following movement disorders, to exclude an underlying structural lesion:
    - Hemifacial spasm
    - Huntington’s disease
    - Multiple system atrophy
    - Parkinson’s disease with atypical features

- Progressive supranuclear palsy
- Secondary dystonia
- Other focal or lateralizing movement disorder, such as hemiballismus, athetosis, or chorea

Note: Imaging is generally not indicated for evaluation of typical Parkinson's disease, essential tremor, or primary dystonia.

IMAGING STUDY

- CT brain
- MRI brain

Rationale

Structural imaging has a limited role in most movement disorder conditions. The most common of these are essential tremor, with a prevalence of 5% of individuals over the age of 65, and Parkinson's disease, with a prevalence of 1% in this population.

Structural MRI, as used in current clinical practice, does not reveal significant abnormalities in essential tremor. Diagnosis of essential tremor is based on clinical assessment of the phenomenological characteristics and its course.[26]

Parkinson's disease is a clinical and pathological diagnosis, with MRI limited to atypical presentations of the disorder. Patients should initially be referred to a specialist for diagnosis. Rates of incorrect diagnosis for specialists average ~7%, while those for non-specialists run between 25%-47%.

Typical presentation: resting tremor, cogwheel rigidity, bradykinesia, with delayed onset of postural instability. When clinical signs and symptoms and response to medication are typical of Parkinson's disease, neuroimaging is not required.[27]

Atypical features of Parkinson's disease[28] include the following: falls at presentation and early in the disease course; poor response to levodopa; symmetry at onset; rapid progression; lack of tremor; dysautonomia (urinary urgency/incontinence and fecal incontinence, urinary retention requiring catheterization, persistent erectile failure, or symptomatic orthostatic hypotension). Imaging may be indicated in cases of atypical Parkinson's disease to exclude treatable causes. Other movement disorders such as multiple system atrophy have characteristic imaging features that may be used to corroborate the diagnosis when clinically uncertain.[27,28,29]

Dystonia is characterized by sustained muscle contractions, frequently causing repetitive twisting movements or abnormal postures. The diagnosis is clinical and specialist referral is recommended.

Features of primary dystonia include the following: absence of associated neurological signs or symptoms other than tremor; absence of additional motor abnormalities (weakness, spasticity, etc.); early onset (< 21 years) starts in the limbs and may generalize; late onset (≥ 21 years) begins in the neck/arm/face and does not generalize.

Structural brain imaging is not routinely required when there is a confident diagnosis of primary dystonia in adults, but may be indicated to evaluate secondary forms of dystonia.[30]

Neurocognitive disorders (Adult only)

Includes mild cognitive impairment, dementia, and variants (e.g., vascular, Alzheimer's disease, frontotemporal degeneration spectrum, diffuse Lewy body).

Imaging is considered medically necessary to direct management in **ANY** of the following scenarios:

Imaging Study	Diagnosis	Management
MRI brain (preferred) or CT brain	One-time evaluation of documented cognitive abnormality to exclude a secondary cause when unexplained by clinical evaluation	Evaluation of rapidly progressive symptoms
FDG-PET/CT brain	One-time evaluation to differentiate between frontotemporal dementia and Alzheimer's disease when substantial diagnostic uncertainty remains after **ALL** of the following: • Neuropsychological testing • Evaluation by a physician experienced in neurodegenerative disease	Not indicated