Cigna Medical Coverage Policy

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Coverage Policy

Under many benefit plans, coverage for cognitive rehabilitation is subject to the terms, conditions and limitations of the applicable benefit plan's Short Term Rehabilitative Therapy benefit and schedule of copayments. Some benefit plans include a maximum allowable benefit for duration of treatment or number of visits. When the maximum allowable benefit is exhausted, coverage will no longer be provided, even if the medical necessity criteria described below are met. Please refer to the applicable benefit plan document to determine benefit availability and terms, conditions and limitations of coverage.

Outpatient cognitive rehabilitation is the most medically appropriate setting for these services unless the individual independently meets coverage criteria for a different level of care.

Many benefit plans specifically exclude vocational rehabilitation services that are for training or are educational in nature, or for development of skills needed to cope with an injury or illness. Coverage would therefore not be provided if these components are the primary focus of a cognitive rehabilitation program.

If coverage for cognitive rehabilitation is available, the following conditions of coverage apply.

Cigna covers an individualized program of cognitive rehabilitation as medically necessary for EITHER of the following:

- **stroke/cerebral infarction**
- **moderate to severe traumatic brain injury**

when ALL of the following requirements are met:

- A documented cognitive impairment with related compromised functional status exists.
- The individual is willing and able to actively participate in the treatment plan.
- Significant cognitive improvement with improved related functional status is expected and can be demonstrated by documentation submitted on a weekly basis

Cigna does not cover cognitive rehabilitation to improve academic or work performance because it is primarily educational and training in nature and not medically necessary.

Cigna does not cover cognitive rehabilitation for ANY other indications, including but not limited to the following, because it is considered experimental, investigational or unproven:

- dementia (e.g., human immunodeficiency virus [HIV] dementia, Alzheimer's disease, Wernicke encephalopathy)
- cerebral palsy
- attention deficit disorder, attention deficit hyperactivity disorder
- schizophrenia
- pervasive developmental disorders/autism spectrum disorders
- learning disabilities
- developmental delay
- mild traumatic brain injury, including concussion and post-concussion syndrome

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General Background

Cognitive rehabilitation is a systematic, goal-oriented treatment program designed to improve cognitive functions and functional abilities, and increase levels of self-management and independence following neurological damage to the central nervous system. Although the specific tasks may be individualized to patients' needs, treatment generally emphasizes restoring lost functions; teaching compensatory strategies to circumvent impaired cognitive functions; and improving competence in performing instrumental activities of daily living (IADL) such as managing medications, using the telephone and handling finances. The term cognitive rehabilitation may be used to describe a variety of intervention strategies or techniques that are intended to help patients reduce, manage or cope with cognitive deficits. Cognitive rehabilitation may be provided as an integrated holistic program, or as a separate component used to treat a specific cognitive defect.

Restorative and compensatory approaches are utilized in cognitive rehabilitation. The restorative approach, also referred to as direct intervention or process-specific, is based on the theory that repetitive exercise promotes recovery of damaged neural circuits and restores lost function. Restorative cognitive rehabilitation targets specific internal cognitive processes in an effort to generalize improvements to real-world settings. Interventions typically involve exercises designed to isolate specific components of impaired cognition (e.g., selective attention, visual perception, prospective memory) and to rebuild cognition skills in a hierarchical manner. Restorative techniques include auditory, visual and verbal stimulation and practice, number manipulation, computer-assisted stimulation and practice, performance feedback, reinforcement, video feedback and meta-cognitive procedures such as behavior modification.

The compensatory approach, also referred to as the functional approach, focuses on teaching patients to employ various strategies to cope with underlying cognitive impairments and accompanying social deficits. The compensatory approach is based on the assumption that lost neurological functioning cannot be restored. The goal, therefore, is to teach strategies to circumvent impaired functioning, and encourage and reinforce intact abilities and strengths. Compensatory techniques generally focus on activities of daily living and social interactions. Group therapies may be important to strengthen the patient's ability to interact effectively with others. Memory impairment may be addressed by external and internal methods of rehabilitation. External aids include memory notebook systems, electronic memory devices, alarms, calendars, posted reminders, and

standardized locations for necessary items. Internal aids include learning of mnemonic strategies (e.g., acronyms, peg word systems, and associated imagery). Compensatory cognitive rehabilitation may involve modifying the physical or social environment in a way that cues a specific behavior and eliminates distraction or unwanted behavior. Although the compensatory approach to cognitive rehabilitation has been more widely accepted than the restorative approach, these techniques are not mutually exclusive. Many therapeutic programs employ both techniques.

Cognitive rehabilitation may be provided by various professionals, including speech/language pathologists, occupational therapists, psychiatrists, psychologists, neuropsychologists, psychiatric nurses, cognitive remediation therapists, physical therapists, and occupational therapists. None of these disciplines provide specific training guidelines for cognitive rehabilitation, however. Cognitive rehabilitation is usually provided on an outpatient basis, although other settings may be indicated depending on the patient's stage of recovery and acuity level. Prior to initiation of a cognitive rehabilitation program, patients generally undergo comprehensive neuropsychological testing to evaluate and identify specific baseline deficits and impairments as well as to direct a treatment plan and develop measurable goals.

There is substantial variation in the delivery of cognitive rehabilitation with respect to essential components, program design and emphasis. Cognitive rehabilitation interventions should be structured, systematic, goal-directed (long- and short-term goals), individualized and restorative. There is no evidence in the medical literature to support a specific treatment intensity or duration for cognitive rehabilitation. Cognitive rehabilitation should be evaluated on the basis of goal achievement, including quantifiable rates of improvement in functional abilities and documented treatment outcomes. Contraindications to cognitive rehabilitation include the inability of the patient to participate in a treatment plan (i.e., orthopedic, medical, psychosocial or behavioral issues). Cognitive rehabilitation often involves the services of a multidisciplinary team (Agency for Healthcare Research and Quality [AHRQ]; 1999, ECRI, 2010).

Most published evidence evaluates cognitive rehabilitation for treatment of cognitive deficits resulting from moderate or severe traumatic brain injury (TBI) and stroke/cerebral infarction. The available evidence, although not robust, indicates that cognitive rehabilitation may improve functional outcomes for some patients with moderate or severe TBI. Evidence is limited due to the heterogeneity of subjects, interventions and outcomes studied, small sample size, failure to control for spontaneous recovery, and the unspecified confounding effects of social contact. Evidence from available studies indicates, however, that cognitive rehabilitation may reduce anxiety, improve self-concept and relationships for people with TBI, and may improve memory, attention and executive skills. There is insufficient evidence in the published medical literature, however, to support the use of cognitive rehabilitation for patients with mild TBI, including concussion and post-concussion syndrome.

Patients who sustain a stroke may exhibit symptoms similar to those experienced by TBI patients, with cognitive deficits in the areas of memory, reasoning and perception. Both TBI and stroke may result in impairment of localized, higher-order, sensory and motor function corresponding to affected anatomic structures, but may also result in loss of a variety of functions that are not clearly localized, such as the ability to abstract and to reason. Although the evidence supporting the use of cognitive rehabilitation to treat cognitive deficits following stroke is limited, there is some evidence that it contributes to visuospatial rehabilitation and improvement in aphasia and apraxia. In addition, the medical community has recognized cognitive rehabilitation as a standard treatment modality for stroke as well as for TBI.

Although cognitive rehabilitation has been proposed for numerous other conditions that may cause impaired cognitive function, there is insufficient evidence to support its use for conditions other than moderate to severe TBI or stroke

Traumatic Brain Injury (TBI) and Stroke
A number of classification systems have been developed for assessment of neurological damage following head injury. The Glasgow Coma Scale (GCS) is generally used in the initial evaluation of the head injury. The initial GCS score helps determine prognosis and the extent of injury. GCS classifications are as follows: GCS 3–8, severe; GCS 9–13 (alternately, 9–12), moderate, and GCS 14–15 (alternately, 13–15), mild or minor. A GCS of 13-15 has traditionally been defined as a minor TBI, but many patients with a GCS of 13 have outcomes more consistent with moderate TBI, so some authorities now consider minor TBI as that producing a GCS of 14-15.

Mild or minor TBI is a temporary and brief interruption of neurologic function after head trauma, and may involve a loss of consciousness. A concussion is a type of minor TBI usually caused by acceleration-deceleration or rotational injury to a freely mobile head, and is commonly associated with collision sports. Almost all-patients with minor TBI will have rapid and complete symptom resolution; with no long-term sequelae. A small percentage of patients may report persistent symptoms (e.g., headache, sensory sensitivity, memory or concentration difficulties, irritability, sleep disturbance, depression) for extended periods after trauma. These symptoms are referred to as postconcussive syndrome (Biros and Heegaard, 2009)

Other conditions contribute to the degree of severity, including posttraumatic amnesia (PTA). PTA is defined as the interval between injury and return to day-to-day memory, and can be assessed during the subacute stage of recovery by testing orientation and memory. Scores include mild (< 24 hours), moderate (24 hours to 7 days), and severe (7 days or more). The Rancho Los Amigos Cognitive Functioning Scale (RLAS) is a commonly used method to characterize and stage TBI recovery in rehabilitation settings. RLAS cognitive levels range from I, no response, to VIII, purposeful and appropriate (Evans, 2007; Arciniegas, 2008, Koehler et al., 2011).

Patients with moderate or severe traumatic brain injury (TBI) may experience both cognitive and non-cognitive problems, including behavioral and emotional issues. Cognitive rehabilitation therefore is often provided as part of a comprehensive, holistic program that is focused on treatment of the cognitive, psychosocial, and behavioral issues associated with TBI. Most holistic programs include group and individual therapy in which patients are encouraged to be more aware of and accept their strengths and weaknesses, improve their social relatedness, and are provided with strategies to compensate for cognitive difficulties.

An Agency for Healthcare Research and Quality (AHRQ) comparative effectiveness review was conducted to determine the effectiveness and comparative effectiveness of multidisciplinary postacute rehabilitation for moderate to severe traumatic brain injury TBI in adults (Brasure et al., 2012). Of sixteen randomized controlled trials and prospective cohort studies that met the inclusion criteria, twelve assessed a primary outcome and eight assessed secondary outcomes. Of the twelve studies that assessed primary outcomes four were considered to have a high risk of bias and were excluded from analysis. Studies of multidisciplinary postacute rehabilitation programs often do not define interventions sufficiently. Although newer studies provide more useful definitions, it remains difficult to decipher what the individual components of the program entailed and how, when and why individuals received specific therapies. The review found that currently available evidence is insufficient to draw conclusions about the effectiveness of multidisciplinary postacute rehabilitation for moderate to severe TBI. Although the authors found stronger evidence on the comparative effectiveness of different approaches to multidisciplinary postacute rehabilitation for participation outcomes, there were a limited number of eligible studies and no clear demonstration that one approach was superior to another. The authors stated that future research to identify and test hypothesized combinations between patient types and intervention approaches would have important clinical implications.

The Institute of Medicine conducted a systematic review of 90 studies to evaluate the efficacy and effectiveness of cognitive rehabilitation therapy for TBI (Koehler et al., 2011). More weight was given to randomized controlled trials, but uncontrolled trials were not excluded. The authors found limited, and in some cases, modest evidence that cognitive rehabilitation is effective for treating some deficits related to TBI, including attention, executive function, social communication, and memory. The evidence for the therapeutic value was found to be variable across domains and is insufficient overall to provide definitive guidance for development of clinical best practices, especially regarding selection of the most effective treatment(s) for an individual patient.

A systematic review of 112 studies published between 2003 and 2008 was conducted by Cicerone et al. (2011) to update clinical recommendations for cognitive rehabilitation following TBI and stroke. The authors found substantial evidence to support interventions for attention, memory, social communication skills, executive function, and for comprehensive-holistic neuropsychologic rehabilitation after TBI. Regarding stroke, the authors concluded that the evidence supports visuospatial rehabilitation after right hemisphere stroke and interventions for aphasia and apraxia after left hemisphere stroke. The authors stated that based on the current meta-analysis, together with prior reviews, there is sufficient information to support evidence-based protocols and implement empirically-supported treatments for cognitive disability after TBI and stroke.

Hoffman et al. (2010) conducted a systematic review to determine whether interventions for cognitive impairment following stroke may improve functional performance of basic and/or instrumental activities of daily living (ADL). The review was restricted to randomized controlled trials and trials in which participants were

quasi-randomly assigned to one of two or more treatment groups. Each study evaluated an intervention that focused on providing cognitive retraining to adults with clinically defined stroke and confirmed cognitive impairment, and measured functional ability as a primary or secondary outcome measure. Four studies with 376 participants were included in the review. There was no statistically significant difference between groups in basic ADL performance in any of the four studies, or in instrumental ADL in the study that measured this. The authors stated that the small number of high quality trials did not allow recommendations that support or refute the use of specific cognitive retraining interventions to improve functional outcomes following stroke.

An ECRI Institute evidence report evaluated the efficacy of cognitive rehabilitation therapy for the treatment of mild, moderate, or severe TBI. The analysis included 20 published articles from 18 randomized controlled trials (n=1088). The authors stated that the evidence base permitted the following conclusions: 1.) Adults with moderate to severe TBI who received social skills training perform significantly better on measures of social communication than patients who receive no treatment, and 2.) Adults with TBI who receive comprehensive, holistic cognitive rehabilitation report significant improvement on measures of quality of life, compared to patients who received a less intensive form of therapy. The authors noted, however, that both conclusions were based on the results of two small studies of moderate quality. The strength of evidence supporting the above conclusions is therefore low. The authors were unable to draw conclusions regarding the effectiveness of cognitive rehabilitation to treat deficits associated with attention, memory, visuospatial, and executive function, or to treat multiple areas of cognitive functioning (ECRI, 2010).

Rohling et al. (2009) conducted a meta-analysis of the cognitive rehabilitation literature that had been reviewed by Cicerone et al. in 2000 and 2005. The authors reduced the number of studies included in the Cicerone reviews by excluding studies that measured the following outcomes: motor deficits, emotionality, social interactions, and outcomes of real-world function that are hard to define (e.g., employment status or measures of self-sufficiency). The authors also excluded case reports, very small studies, and studies that did not report data in a manner that allowed an effect estimate to be calculated. The remaining evidence consisted of 97 articles reporting on 115 studies. The analysis of treatment effects on global cognitive function yielded cognitive rehabilitation effects that were modest but statistically significant. The authors concluded that there is a limited scientific base to support the premise that cognitive rehabilitation is effective for persons with acquired brain injury.

Cicerone et al. (2008) conducted a randomized controlled trial to evaluate the effectiveness of standard, multidisciplinary rehabilitation (n=34) compared to comprehensive, holistic neuropsychologic rehabilitation (n=34) for TBI. Most patients had sustained moderate or severe TBI, and more than half were more than one year post-injury. Both programs consisted of clinically established treatment programs based on principles of neuropsychological (NP) rehabilitation, but differed in terms of treatment orientation and program structure. The standard rehabilitation program (SRP) consisted primarily of individual, discipline-specific therapies, including physical, occupational, and speech therapy. The intensive cognitive rehabilitation program (ICRP) emphasized the integration of interventions for cognitive deficits, emotional difficulties, interpersonal behaviors, and functional skills, with an emphasis on performance feedback and active self-evaluation throughout the group process. The core structure of the ICRP consisted of 15 hours of individual and group therapies conducted three days per week for 16 weeks. Patients in both groups were followed by a neuropsychologist, with one hour per week of individual NP treatment. NP treatment was equivalent in both groups, addressing awareness of deficits and strategies to improve cognitive functioning. Patients in the SRP were limited to a maximum of three group sessions per week. The amount and combination of treatments in the SRP was based on individual needs and routine clinical decision making. Primary outcome measures were the Community Integration Questionnaire (CIQ) and Perceived Quality of Life Scale (PQOL). Secondary outcomes included NP functioning, perceived self-efficacy, and community based employment. NP functioning improved in both groups. ICRP participants showed greater improvement in CIQ and PQOL, and improved efficacy for the management of symptoms compared to SRP, and these gains were maintained at six months. Patients in the SRP showed continued gains in productivity at six months, suggesting a more prolonged course of improvement, but were also more likely to require continued comprehensive rehabilitation during the six month follow-up, and did not reach the gains in psychological well-being achieved in the comprehensive holistic program.

In a Cochrane review to evaluate the effectiveness of cognitive rehabilitation for memory problems following stroke, Nair and Lincoln (2007, updated 2008) found only two trials involving 18 patients and determined there was no evidence to support or refute the effectiveness of memory rehabilitation on functional outcomes, and

objective, subjective, and observer-rated memory measures. The authors stated that there is a need for more robust, well-designed trials of memory rehabilitation using common standardized outcome measures.

Cappa et al. (2005), as members of the Task Force on Cognitive Rehabilitation under the auspices of the European Federation of Neurological Societies (EFNS), reported on the effectiveness of cognitive rehabilitation in stroke and traumatic brain injury (TBI). A grade A, B, or C recommendation was given to areas of cognitive rehabilitation based on the evidence available. The areas addressed were: aphasia, unilateral spatial neglect, attention disorders following TBI, memory and apraxia. The Task Force recommendations were as follows: aphasia therapy received a B recommendation; unilateral spatial neglect received an A recommendation for visual scanning and visio-spatio-motor training and B/C recommendations for other areas of unilateral spatial neglect therapy; attention disorders were given an A in the post-acute phase; the use of memory strategies without electronic aid received a C; errorless learning a B; nonelectronic external memory aids (diaries, notebooks) received a C; electronic external memory devices (computers, pagers) received a B; virtual memory training was given a C; apraxia treatment with compensatory strategies received an A recommendation. The task force determined that there is clearly a need for large–scale, randomized clinical trials to evaluate methodologies of intervention in common clinical conditions. The task force suggested that the quality of rehabilitation studies regarding stroke and TBI would improve once better clinical and pathological distinctions between the diagnoses were made.

Cicerone et al. (2005) conducted a systematic review to update the Brain Injury Interdisciplinary Special Interest Group of the American Congress of Rehabilitation Medicine's recommendations for cognitive rehabilitation for TBI and stroke. The review consisted of 17 Class I studies, including a total of 291 patients with TBI and 247 patients with stroke. Sixteen of these studies provided evidence supporting the effectiveness of cognitive rehabilitation. According to the authors, the 10 studies that addressed stroke supported remediation for visual inattention and apraxia and interventions for communication deficits in patients with stroke, and the seven studies that addressed TBI supported effective rehabilitation of attention, memory and executive functioning deficits in patients with TBI utilizing strategy training (training patients to compensate for deficits rather than trying to eliminate the underlying impairment).

Cicerone (2004) conducted a nonrandomized, controlled intervention trial (n=56) to evaluate the effectiveness of an intensive cognitive rehabilitation program (ICRP) (n=27) compared to a standard neurorehabilitation program (SRP) (n=29) for patients with TBI. The ICRP was provided to small groups of 5 to 8 participants. The therapy consisted of individual and group cognitive remediation with an emphasis on increasing awareness and developing compensation for cognitive deficits, small-group treatment for interpersonal and pragmatic communication skills, and individual and/or group psychotherapy. Cognitive group treatment was provided for 2 hours a day, 3 days a week. After group treatment, participants received 1 hour of individual cognitive remediation based on their specific areas of cognitive impairment. Patients in the SRP received comprehensive neurorehabilitation consisting primarily of physical therapy, occupational therapy, speech therapy, and neuropshychologic treatment. The outcome measure was the Community Integration Questionnaire (CIQ) and Quality of Community Integration Questionnaire assessing satisfaction with community functioning and cognitive functioning. Both groups showed significant improvement on the CIQ. The ICRP group exhibited a significant treatment effect compared to the SRP group. The ICRP patients were more than twice as likely to show clinically significant improvement in community integration.

A Cochrane review on cognitive rehabilitation for spatial neglect following stroke concluded that the effectiveness of cognitive rehabilitation strategies for reducing the disabling effects of neglect and increasing independence remains unproven. The authors further noted that no rehabilitation approach can at present be supported or challenged by information from randomized trials (Bowen et al., 2002, updated 2008).

Salazar et al. (2000) randomly assigned 120 active-duty military personnel who had sustained a moderate-to-severe closed head injury to an intensive eight-week inpatient cognitive rehabilitation program or a limited home rehabilitation program that included weekly telephone support from a psychiatric nurse. The standardized, protocol-defined structured daily routine included physical fitness training and group and individual cognitive, speech, occupational and coping skills therapies. Specific group therapies included planning and organization, cognitive skills, pragmatic speech, milieu, psychotherapy, and community reentry. Patients assigned to the home group received TBI education and individual counseling from a psychiatric nurse, and received educational materials and recommended strategies for enhancing cognitive and organizational skills. Outcome measures used included return to gainful employment and fitness for military duty at a one-year follow-up. The authors

concluded that the overall benefit of in-hospital cognitive rehabilitation for patients with moderate-to-severe TBI was similar to that of home rehabilitation. Ninety percent of the hospital group was able to return to work compared to 94% of the home group. Fitness for active military duty was 73% for the hospital group and 66% for the home group. Patient-selection criteria (relatively young, previously healthy, well-oriented military personnel) make it difficult to generalize these findings to a broader population.

Dementia: Dementia is the development of cognitive impairments that diminish social, occupational, and intellectual abilities. It can be grouped into four major categories: degenerative (Alzheimer's disease, Parkinson's disease, Huntington's disease), vascular (following stroke), infectious (HIV Type-1 associated dementia), and metabolic diseases (Wilson's disease) (Small and Mayeux, 2005). In a Cochrane review (2007), Clare and Woods reported on the effectiveness of cognitive training (guided practice on a set of tasks that reflect particular cognitive functions) and cognitive rehabilitation (developing strategies and methods of compensating based on individual needs and goals) interventions on patients with Alzheimer's disease and vascular dementia. Nine randomized controlled trials (RCTs) were identified for cognitive training, and no RCTs were identified for cognitive rehabilitation. The authors reported no significant differences between cognitive training and control were found. In conclusion, the authors stated that, based on the evidence reviewed, there was no evidence supporting the efficacy of cognitive training and insufficient evidence to evaluate the effectiveness of cognitive rehabilitation in Alzheimer's disease and vascular dementia.

Clare et al. (2010) conducted a single-blind randomized controlled trial to compare cognitive rehabilitation (n=23) to relaxation therapy (n=24) and no treatment (n=22) in participants with a diagnosis of Alzheimer Disease (AD) or mixed AD and vascular dementia. Cognitive rehabilitation consisted of eight weekly individual sessions consisting of personalized interventions to address relevant goals, supported by components addressing practical aids and strategies, techniques for learning new information, practice in maintaining attention and concentration, and stress management techniques. Relaxation therapy included the same amount of therapist time and equivalent level of between-session practice. Participants were taught progressive muscle relaxation and breathing exercises and encouraged to practice these strategies when experiencing anxiety. Six-month follow-up was completed in 16 participants in the cognitive rehabilitation group, and 20 in both the relaxation and no-treatment groups. The primary outcomes were goal performance and satisfaction as assessed by the Canadian Occupational Performance Measure (COPM). At six months, ratings on the COPM scale indicated improvement in perceived performance ($p<0.001$) and satisfaction ($p<0.001$), and improvements were corroborated by therapist observation-based ratings of performance. It is difficult to draw conclusions from this study due to the small number of participants and significant numbers lost to follow-up.

In a meta-analysis of the literature regarding cognitive training (CT) and Alzheimer's disease, Sitzer et al. (2006) reviewed 19 controlled trials, 14 of which were RCTs. The authors used Cohen's description of effect size magnitude (0.2=small, 0.5=medium, 0.8=large) to measure outcomes. A small effect size for CT in general was reported but, more specifically, there were negative or minimal effects on visuospatial functioning and language, small effects on motor speed and visual learning, medium effects on executive functioning, and large effects on verbal and visual learning. The authors did note that the large effect size for verbal and visual learning was the result of one study and not aggregate scores. Only a few studies reported follow-up data suggesting that gains may be maintained an average of 4.5 months after discontinuing treatment. Many limitations in the studies were identified such as: the limited number of well-controlled studies, small sample sizes, and the variable outcome measures and techniques used. The authors concluded that CT may improve the cognitive and functional abilities of patients with Alzheimer's disease, but further research is needed, including effectiveness studies in various settings and the use of performance-based measures to evaluate the effects of treatment on daily functioning.

Schizophrenia: Schizophrenia is a severe and persistent debilitating psychiatric disorder that affects approximately 1% of the world's population. It is characterized by disturbances in perception, cognition, mood, thought process, expression of language, and relationships with others. Symptoms can include delusions, hallucinations, and thought disorder. Neuropsychiatric changes often include impairments in information processing (Frankenburg, 2007).

A number of cognitive rehabilitation approaches have been proposed to address the issue of cognitive impairment such as: attention process training, integrated psychological therapy, cognitive enhancement therapy, neurocognitive enhancement therapy, and cognitive remediation therapy, the neuropsychological educational approach to remediation, errorless learning approaches, and attention shaping. Each approach

shares the goal of enhancing cognitive processes or circumventing cognitive impairments in an effort to improve functional outcomes (Velligan et al., 2006).

Eack et al. evaluated the one-year durability of the effects of cognitive enhancement therapy on functional outcomes in patients with early schizophrenia (n=28) or schizoaffective disorder (n=20). Functional outcome was measured using the Social Adjustment Scale-II (SAS-II) and the Major Role Adjustment Inventory (MRA). Patients were randomized to receive cognitive enhancement therapy (CET) or an Enriched Supportive Therapy (EST) control. CET consisted of 60 hours of computer-based training in attention, memory, and problem-solving, integrated with 45 1.5 hour social-cognitive group therapy sessions. EST is a personalized, individual approach including illness management and psychoeducation. Participants met individually with a clinician to learn about schizophrenia, effects of stress and how to develop and apply healthy coping strategies. Significant differences in effects favoring CET on overall social adjusted persisted at one-year follow-up and no significant decreases in adjustment were observed in CET patients during the follow-up period. Patients treated with EST showed a slight but significant level of continued improvement in overall adjustment at one year post-treatment. Maintenance of CET effects was found on social functioning in relationships outside the household and participation in social leisure activities, as well as on major role adjustment and overall ratings of global functioning. The authors concluded that the beneficial effects of CET on functional outcome in early schizophrenia can be maintained a year after completion of treatment, and that CET has the potential of a lasting impact on the early trajectory of the disease. The authors acknowledged limitations of the study, including the lack of durability data on cognition, as well as the use of non-blinded raters.

McGurk et al. (2007) conducted a meta-analysis of 26 randomized controlled trials that evaluated the effects of cognitive remediation on cognitive performance, symptoms and psychosocial functioning in 1,151 patients with schizophrenia. The authors reported a medium effect size for cognitive performance (0.41), a slightly smaller effect size for psychosocial functioning (0.36), and a small effect size for symptoms (0.28). According to the authors, the impact of cognitive remediation on function was moderated by several factors including the addition of adjunctive psychiatric rehabilitation, cognitive training method, and patient age. They also noted there was a lack of data regarding long term effects as only six studies examined if results were maintained at a post treatment follow-up (average of eight months). The authors concluded that cognitive remediation may have a moderate effect on cognitive performance and when combined with psychiatric rehabilitation, may improve functional outcomes. Retention of benefit beyond eight months was not explored.

Wykes et al. (2007b) conducted a single-blind randomized controlled trial of 40 young early onset patients with schizophrenia to evaluate the efficacy of cognitive remediation therapy (CRT) in alleviating cognitive deficits compared to treatment as usual. Twenty-one patients received CRT and 19 received standard care. Primary outcome measures included: cognitive flexibility (measured on the Wisconsin Cars Sort Test [WCST]), memory (measured on Digit Span), planning (measured on the Modified Six Elements Test). Secondary outcomes included: symptoms, social contacts and self-esteem. Assessments took place at baseline, post-treatment (week 14) and follow-up (week 28). The only measure that reached statistical significance when compare to the standard care group was the WCST scores ($p = 0.04$). The authors stated that larger trials that evaluate the long-term maintenance of the effects of CRT are warranted.

Wykes et al. (2007a) conducted a randomized controlled trial to evaluate if cognitive remediation improved cognition in people with schizophrenia. Eighty-five participants with schizophrenia and cognitive difficulties were randomized to 40 sessions of cognitive remediation (n=43) or treatment as usual (n=42). Outcome measures included working memory, cognitive flexibility, and planning. Evaluations took place at 1, 14, and 40 weeks. For working memory, 21 in the therapy group and 18 in the control group had abnormal working memory scores at baseline. After the intervention, the authors reported a significant advantage to the therapy group at the 14-week post-therapy assessment ($p=0.037$), but at the time of the 40-week follow-up, there was no longer any statistical significance ($p=0.10$). There was no difference between the two groups for cognitive flexibility, and there was no statistically significant difference at any point in time for planning. The authors noted that there was a significant group by medication interaction, suggesting that medications may hinder or enhance the effects of cognitive remediation. Methodological considerations, according to the authors, included: some improvement may have been due to increased social interaction, medications may have affected the outcomes, blinding was not maintained, and the sample size was small. Although most of the improvements did not obtain statistical significance, the authors stated that cognitive improvement was noted in many areas.

Velligan et al. (2006) conducted a literature review to examine research findings on the eight evidence-based approaches to cognitive rehabilitation, as listed in the 2005 Training Grid Outlining Best Practices for Recovery and Improved Outcomes for People with Serious Mental Illness, developed by the American Psychological Association Committee for the Advancement of Professional Practice, for patients with schizophrenia. The eight approaches included: attention process training, integrated psychological therapy, cognitive enhancement therapy, neurocognitive enhancement therapy, cognitive remediation therapy, the neuropsychological educational approach to remediation, errorless learning approaches, and attention shaping. According to the authors, the studies that were included varied considerably in areas such as criteria for study inclusion, the conceptual organization of studies, and interpretation of findings. The authors stated that few approaches had more than three data-based studies supporting their efficacy in schizophrenia and that there are no agreed upon guidelines for levels of intensity or duration of training. The authors concluded that the findings of this review were not uniformly positive but encouraging, which is what they would expect at this stage of cognitive rehabilitation development.

A Cochrane review concluded that data are inconclusive and provide no evidence for or against cognitive rehabilitation as a treatment for schizophrenia (Hayes and McGrath, 2000, updated 2009).

Additional Conditions: Cognitive rehabilitation has been proposed for numerous other conditions that cause, or may cause, impaired cognitive function, including:

- dementia (including HIV dementia)
- cerebral palsy
- attention deficit disorder, attention deficit hyperactivity disorder
- pervasive developmental disorders, including autism
- learning disabilities
- developmental delay

There is insufficient evidence in the published medical literature to support the use of cognitive rehabilitation for these conditions. The role of cognitive rehabilitation for the treatment of conditions other than moderate to severe traumatic brain injury or stroke/cerebral infarction has not been established.

Professional Societies/Organizations
The National Institute of Neurological Disorders and Stroke (NINDS) (2005) reported that to improve the quality of life of neurologically-impaired patients, a systematic linkage between diagnosis and intervention must be established. The NINDS sponsored a workshop made up of three interdisciplinary teams to establish a guideline for accelerated progress in cognitive rehabilitation interventions for stroke, traumatic brain injury and brain tumor patients. The following are a few of the recommendations suggested by the research teams: develop tools that are standardized, sensitive and reliable to assess deficits and predict outcomes; develop a step-wise implementation plan for interventions once they are established; and develop a more appropriate clinical trials model specifically for brain tumor, stroke and TBI populations.

The Stroke Council of the American Heart Association endorsed the Veterans Administration/Department of Defense guidelines for stroke rehabilitation published in 2005. The panel was made up of experts from the Department of Veterans Affairs and the United States Department of Defense. The panel evaluated published literature through 2002. Recommendations were based on randomized clinical trials, uncontrolled studies, or consensus expert opinion if definitive data were lacking. The guidelines were developed as a means of direction for clinicians and also to assist researchers in identifying areas in need of further investigation. In the area of cognitive rehabilitation, the recommendation was that all patients be assessed for cognitive deficits and be given retraining if any of the following conditions were present: attention deficit, visual neglect, memory deficits, and executive function and problem-solving difficulties.

The National Academy of Neuropsychology (NAN) (2002) official statement on cognitive rehabilitation supports empirically and rationally based cognitive rehabilitation techniques that have been designed to improve the quality of life and functional outcomes for individuals with acquired brain injuries.

The American Academy of Neurology published an evidence-based guideline update on the evaluation and management of concussion in sports in 2013. Regarding the question of what interventions enhance recovery,

reduce the risk of recurrent concussion, or diminish long term sequelae, the authors stated that on the basis of the available evidence, no conclusions can be drawn regarding the effect of postconcussive activity level on the recovery from sport related concussion or the likelihood of developing chronic post concussion complications (AAN website, 2014).

Summary
Structured cognitive rehabilitation programs may facilitate recovery in selected patients following stroke/cerebral infarction or moderate to severe traumatic brain injury (TBI). There is insufficient evidence, however, to support the use of cognitive rehabilitation for the treatment of mild traumatic brain injury, including concussion or post-concussion syndrome. Cognitive rehabilitation has also been proposed for numerous other conditions that cause impaired cognitive function, including dementia, cerebral palsy, attention deficit disorder, schizophrenia, pervasive developmental disorders, learning disabilities and developmental delay. There is insufficient evidence in the published medical literature to support the use of cognitive rehabilitation for any condition other than moderate to severe traumatic brain injury or stroke

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Coding/Billing Information

Note: 1) This list of codes may not be all-inclusive.
2) Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement
3) ICD-10-CM Diagnosis Codes are for informational purposes only and are not effective until 10/01/2015

Covered when medically necessary:

CPT®* Codes	**Description**
97532	Development of cognitive skills to improve attention, memory, problem solving (includes compensatory training), direct (one-on-one) patient contact by the provider, each 15 minutes

ICD-9-CM Diagnosis Codes	**Description**
431	Intracerebral hemorrhage
434.01	Cerebral thrombosis with cerebral infarction
434.11	Cerebral embolism with cerebral infarction
434.91	Unspecified cerebral artery occlusion with cerebral infarction
438.0	Late effects of cerebrovascular disease; cognitive deficits
800.10-800.19†	Fracture of vault of skull, closed with cerebral laceration and contusion
800.20-800.29†	Fracture of vault of skull, closed with subarachnoid, subdural, and extradural hemorrhage
800.30-800.39†	Fracture of vault of skull, closed with other and unspecified intracranial hemorrhage
800.40-800.49†	Fracture of vault of skull, closed with intracranial injury of other and unspecified nature
800.60-800.69†	Fracture of vault of skull, open with cerebral laceration and contusion
800.70-800.79†	Fracture of vault of skull, open with subarachnoid, subdural and extradural hemorrhage
800.80-800.89†	Fracture of vault of skull, open with other and unspecified intracranial hemorrhage
800.90-800.99†	Fracture of vault of skull, open with intracranial injury of other and unspecified nature
801.10-	Fracture of base of skull, closed with cerebral laceration and contusion

801.19†	
801.20-801.29†	Fracture of base of skull, closed with subarachnoid, subdural and extradural hemorrhage
801.30-801.39†	Fracture of base of skull, closed with other and unspecified intracranial hemorrhage
801.40-801.49†	Fracture of base of skull, closed with intracranial injury of other and unspecified nature
801.60-801.69†	Fracture of base of skull, open with cerebral laceration and contusion
801.70-801.79†	Fracture of base of skull, open with subarachnoid, subdural and extradural hemorrhage
801.80-801.89†	Fracture of base of skull, open with other and unspecified intracranial hemorrhage
801.90-801.99†	Fracture of base of skull, ppen with intracranial injury of other and unspecified nature
803.10-803.19†	Other and unqualified skull fracture, closed with cerebral laceration and contusion
803.20-803.29†	Other and unqualified skull fracture, closed with subarachnoid, subdural and extradural hemorrhage
803.30-803.39†	Other and unqualified skull fracture, closed with other and unspecified intracranial hemorrhage
803.40-803.49†	Other and unqualified skull fracture, closed with intracranial injury of other and unspecified nature
803.60-803.69†	Other and unqualified skull fracture, open, with cerebral laceration and contusion
803.70-803.79†	Other and unqualified skull fracture, open with subarachnoid, subdural and extradural hemorrhage
803.80-803.89†	Other and unqualified skull fracture, open with other and unspecified intracranial injury
803.90-803.99†	Other and unqualified skull fracture, open with intracranial injury of other and unspecified nature
804.10-804.19†	Multiple fractures involving skull or face with other bones, closed with cerebral laceration and contusion
804.20-804.29†	Multiple fractures involving skull or face with other bones, closed with subarachnoid, subdural and extradural hemorrhage
804.30-804.39†	Multiple fractures involving skull or face with other bones, closed with other and unspecified intracranial hemorrhage
804.40-804.49†	Multiple fractures involving skull or face with other bones, closed with intracranial injury of other and unspecified nature
804.60-804.69†	Multiple fractures involving skull or face with other bones, open with cerebral laceration and contusion
804.70-804.79†	Multiple fractures involving skull or face with other bones, open with subarachnoid, subdural, and extradural hemorrhage
804.80-804.89†	Multiple fractures involving skull or face with other bones, open with other and unspecified intracranial hemorrhage
804.90-804.99†	Multiple fractures involving skull or face with other bones, open with intracranial injury of other and unspecified nature
851.00-851.99†	Cerebral laceration and contusion
852.00-852.59†	Subarachnoid, subdural, and extradural hemorrhage, following injury
853.00-853.19	Other and unspecified intracranial hemorrhage following injury
854.00-854.19†	Intracranial injury of other and unspecified nature
905.0	Late effects of fracture of skull and face bones

907.0	Late effects of intracranial injury without mention of skull fracture
997.02	Iatrogenic cerebrovascular infarction or hemorrhage
V15.52	Personal history of traumatic brain injury

†**Note: Coverage will not be provided for any diagnosis in this range that is reported with a fifth digit of "5" (with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level).**

ICD-10-CM Diagnosis Codes (Effective 10/01/2015)	Description
G97.31-G97.32	Intraoperative hemorrhage and hematoma of a nervous system organ or structure complicating a procedure
I61.0-I61.9	Nontraumatic intracerebral hemorrhage
I63.119	Cerebral infarction due to embolism of unspecified vertebral artery
I63.30-I63.39	Cerebral infarction due to thrombosis of cerebral artery
I63.40-I63.49	Cerebral infarction due to embolism of cerebral artery
I63.50-I63.59	Cerebral infarction due to unspecified occlusion or stenosis of cerebral artery
I63.6	Cerebral infarction due to cerebral venous thrombosis, nonpyogenic
I63.8	Other cerebral infarction
I63.9	Cerebral infarction, unspecified
I69.01	Cognitive deficits following nontraumatic subarachnoid hemorrhage
I69.11	Cognitive deficits following nontraumatic intracerebral hemorrhage
I69.21	Cognitive deficits following other nontraumatic intracranial hemorrhage
I69.31	Cognitive deficits following cerebral infarction
I69.81	Cognitive deficits following other cerebrovascular disease
I69.91	Cognitive deficits following unspecified cerebrovascular disease
I97.810-I97.811	Intraoperative cerebrovascular infarction during surgery
I97.820-I97.821	Postprocedural cerebrovascular infarction during surgery
S06.1X0S	Traumatic cerebral edema without loss of consciousness, sequela
S06.1X1S	Traumatic cerebral edema with loss of consciousness of 30 minutes or less, sequela
S06.1X2S	Traumatic cerebral edema with loss of consciousness of 31 minutes to 50 minutes, sequela
S06.1X3S	Traumatic cerebral edema with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.1X4S	Traumatic cerebral edema with loss of consciousness of 6 hours to 24 hours, sequela
S06.1X5S	Traumatic cerebral edema with loss of consciousness greater than 24 hours with return to pre-existing conscious level
S06.1X6S	Traumatic cerebral edema with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.1X9S	Traumatic cerebral edema with loss of consciousness of unspecified duration, sequela
S06.2X0S	Diffuse traumatic brain injury without loss of consciousness, sequela
S06.2X1S	Diffuse traumatic brain injury, with loss of consciousness of 30 minutes or less, sequela
S06.2X2S	Diffuse traumatic brain injury, with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.2X3S	Diffuse traumatic brain injury, with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.2X4S	Diffuse traumatic brain injury, with loss of consciousness of 6 hours to 24 hours, sequela
S06.2X5S	Diffuse traumatic brain injury, with loss of consciousness greater than 24 hours with return to pre-existing conscious levels, sequela
S06.2X6S	Diffuse traumatic brain injury with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela

S06.2X9S	Diffuse traumatic brain injury with loss of consciousness of unspecified duration, sequela
S06.300S	Unspecified focal traumatic brain injury, without loss of consciousness, sequela
S06.301S	Unspecified focal traumatic brain injury, with loss of consciousness of 30 minutes of less, sequela
S06.302S	Unspecified focal traumatic brain injury, with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.303S	Unspecified focal traumatic brain injury, with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.304S	Unspecified focal traumatic brain injury, with loss of consciousness of 6 hours to 24 hours, sequela
S06.305S	Unspecified focal traumatic brain injury with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.306S	Unspecified focal traumatic brain injury with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.309S	Unspecified focal traumatic brain injury with loss of consciousness of unspecified duration, sequela
S06.310S	Contusion and laceration of right cerebrum without loss of consciousness, sequela
306.311S	Contusion and laceration of right cerebrum with loss of consciousness of 30 minutes or less, sequela
306.312S	Contusion and laceration of right cerebrum with loss of consciousness of 31 minutes to 59 minutes, sequela
306.313S	Contusion and laceration of right cerebrum with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
306.314S	Contusion and laceration of right cerebrum with loss of consciousness of 6 hours to 24 hours, sequela
306.315S	Contusion and laceration of right cerebrum with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.316S	Contusion and laceration of right cerebrum with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.319S	Contusion and laceration of right cerebrum with loss of consciousness of unspecified duration , sequela
S06.320S	Contusion and laceration of left cerebrum without loss of consciousness, sequela
S06.321S	Contusion and laceration of left cerebrum with loss of consciousness of 30 minutes or less, sequela
S06.322S	Contusion and laceration of left cerebrum with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.323S	Contusion and laceration of left cerebrum with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.324S	Contusion and laceration of left cerebrum with loss of consciousness of 6 hours to 24 hours, sequela
S06.325S	Contusion and laceration of left cerebrum with loss of consciousness greater than 24 hours with return to pre-existing consciousness level, sequela
S06.326S	Contusion and laceration of left cerebrum with loss of consciousness greater than 24 hours without return to pre-existing consciousness level with patient surviving, sequela
S06.329S	Contusion and laceration of left cerebrum with loss of consciousness of unspecified duration, sequela
S06.330S	Contusion and laceration of cerebrum, unspecified, without loss of consciousness, sequela
S06.331S	Contusion and laceration of cerebrum, unspecified, with loss of consciousness of 30 minutes or less, sequela
S06.332S	Contusion and laceration of cerebrum, unspecified, with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.333S	Contusion and laceration of cerebrum, unspecified, with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.334S	Contusion and laceration of cerebrum, unspecified, with loss of consciousness of 6 hours to 24 hours, sequela

S06.335S	Contusion and laceration or cerebrum, unspecified, with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.336S	Contusion and laceration of cerebrum, unspecified, with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.339S	Contusion and laceration of cerebrum, unspecified, with loss of consciousness of unspecified duration, sequela
S06.340S	Traumatic hemorrhage of right cerebrum without loss of consciousness, sequela
S06.341S	Traumatic hemorrhage of right cerebrum with loss of consciousness of 30 minutes or less, sequela
S06.342S	Traumatic hemorrhage of right cerebrum with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.343S	Traumatic hemorrhage of right cerebrum with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.344S	Traumatic hemorrhage of right cerebrum with loss of consciousness of 6 hours to 24 hours, sequela
S06.345S	Traumatic hemorrhage of right cerebrum with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.346S	Traumatic hemorrhage of right cerebrum with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.349S	Traumatic hemorrhage of right cerebrum with loss of consciousness of unspecified duration , sequela
S06.350S	Traumatic hemorrhage of left cerebrum without loss of consciousness, sequela
S06.351S	Traumatic hemorrhage of left cerebrum with loss of consciousness of 30 minutes or less, sequela
S06.352S	Traumatic hemorrhage of left cerebrum with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.353S	Traumatic hemorrhage of left cerebrum with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.354S	Traumatic hemorrhage of left cerebrum with loss of consciousness of 6 hours to 24 hours, sequela
S06.355S	Traumatic hemorrhage of left cerebrum with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.356S	Traumatic hemorrhage of left cerebrum with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.359S	Traumatic hemorrhage of left cerebrum with loss of consciousness of unspecified duration, sequela
S06.360S	Traumatic hemorrhage of cerebrum, unspecified, without loss of consciousness, sequela
S06.361S	Traumatic hemorrhage of cerebrum, unspecified, with loss of consciousness of 30 minutes or less, sequela
S06.362S	Traumatic hemorrhage of cerebrum, unspecified, with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.363S	Traumatic hemorrhage of cerebrum, unspecified, with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.364S	Traumatic hemorrhage of cerebrum, unspecified, with loss of consciousness of 6 hours to 24 hours, sequela
S06.365S	Traumatic hemorrhage of cerebrum, unspecified, with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.366S	Traumatic hemorrhage of cerebrum, unspecified, with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.369S	Traumatic hemorrhage of cerebrum, unspecified, with loss of consciousness of unspecified duration, sequela
S06.370S	Contusion, laceration, and hemorrhage of cerebellum, without loss of consciousness, sequela
S06.371S	Contusion, laceration and hemorrhage of cerebellum with loss of consciousness of 30 minutes or less, sequela

S06.372S	Contusion, laceration and hemorrhage of cerebellum with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.373S	Contusion, laceration and hemorrhage of cerebellum, with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.374S	Contusion, laceration and hemorrhage of cerebellum, with loss of consciousness of 6 hours to 24 hours, sequela
S06.375S	Contusion, laceration and hemorrhage of cerebellum, with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.376S	Contusion, laceration, and hemorrhage of cerebellum with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.379S	Contusion, laceration, and hemorrhage of cerebellum with loss of consciousness of unspecified duration, sequela
S06.380S-	Contusion, laceration, and hemorrhage of brainstem, without loss of consciousness, sequela
S06.381S	Contusion, laceration and hemorrhage of brainstem with loss of consciousness of 30 minutes or less, sequela
S06.382S	Contusion, laceration and hemorrhage of brainstem with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.383S	Contusion, laceration and hemorrhage of brainstem with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.384S	Contusion, laceration and hemorrhage of brainstem with loss of consciousness of 6 hours to 24 hours, sequela
S06.385S	Contusion, laceration and hemorrhage of brainstem with loss of consciousness greather than 24 hours with return to pre-existing conscious level, sequela
S06.386S	Contusion, laceration, and hemorrhage of brainstem with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.389S	Contusion, laceration, and hemorrhage of brainstem with loss of consciousness of unspecified duration, sequela
S06.4X0S-	Epidural hemorrhage without loss of consciousness, sequela
S06.4X1S	Epidural hemorrhage with loss of consciousness of 30 minutes or less, sequela
S06.4X2S	Epidural hemorrhage with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.4X3S	Epidural hemorrhage with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.4X4S	Epidural hemorrhage with loss of consciousness of 6 hours to 24 hours, sequela
S06.4X5S	Epidural hemorrhage with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.4X6S	Epidural hemorrhage with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.4X9S	Epidural hemorrhage with loss of consciousness of unspecified duration, sequela
S06.5X0S	Traumatic subdural hemorrhage without loss of consciousness, sequela
S06.5X1S	Traumatic subdural hemorrhage with loss of consciousness of 30 minutes or less, sequela
S06.5X2S	Traumatic subdural hemorrhage with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.5X3S	Traumatic subdural hemorrhage with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.5X4S	Traumatic subdural hemorrhage with loss of consciousness of 6 hours to 24 hours, sequela
S06.5X5S	Traumatic subdural hemorrhage with loss of consciousness of 24 hours or greater with return to pre-existing conscious level, sequela
S06.5X6S	Traumatic subdural hemorrhage with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.5X9S	Traumatic subdural hemorrhage with loss of consciousness of unspecified duration, sequela

S06.6X0S	Traumatic subarachnoid hemorrhage without loss of consciousness, sequela
S06.6X1S	Traumatic subarachnoid hemorrhage, with loss of consciousness 30 minutes or less, sequela
S06.6X2S	Traumatic subarachnoid hemorrhage, with loss of consciousness 31 minutes to 59 minutes, sequela
S06.6X3S	Traumatic subarachnoid hemorrhage, with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.6X4S	Traumatic subarachnoid hemorrhage, with loss of consciousness of 6 hours to 24 hours, sequela
S06.6X5S	Traumatic subarachnoid hemorrhage, with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.6X6S	Traumatic subarachnoid hemorrhage with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.6X9S	Traumatic subarachnoid hemorrhage with loss of consciousness of unspecified duration, sequela
S06.810S-	Injury of right internal carotid artery, intracranial portion, not elsewhere classified, without loss of consciousness, sequela
S06.811S	Injury of right internal carotid artery, intracranial portion, not elsewhere classified, with loss of consciousness of 30 minutes or less, sequela
S06.812S	Injury of right internal carotid artery, intracranial portion, not elsewhere classified, with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.813S	Injury of right internal carotid artery, intracranial portion, not elsewhere classified, with loss of consciousness of 1 hour to 59 minutes, sequela
S06.814S	Injury of right internal carotid artery, intracranial portion, not elsewhere classified, with loss of consciousness 6 hours to 24 hours, sequela
S06.815S	Injury of right internal carotid artery, intracranial portion, not elsewhere classified, with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.816S	Injury of right internal carotid artery, intracranial portion, not elsewhere classified with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.819S	Injury of right internal carotid artery, intracranial portion, not elsewhere classified with loss of consciousness of unspecified duration, sequela
S06.820S	Injury of left internal carotid artery, intracranial portion, not elsewhere classified, without loss of consciousness, sequela
S06.821S	Injury of left internal carotid artery, intracranial portion, not elsewhere classified, with loss of consciousness of 30 minutes or less, sequela
S06.822S	Injury of left internal carotid artery, intracranial portion, not elsewhere classified, with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.823S	Injury of left internal carotid artery, intracranial portion, not elsewhere classified, with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.824S	Injury of left internal carotid artery, intracranial portion, not elsewhere classified, with loss of consciousness of 6 hours to 24 hours, sequela
S06.825S	Injury of left internal carotid artery, intracranial portion, not elsewhere classified with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.826S	Injury of left internal carotid artery, intracranial portion, not elsewhere classified with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.829S	Injury of left internal carotid artery, intracranial portion, not elsewhere classified with loss of consciousness of unspecified duration, sequela
S06.890S	Other specified intracranial injury, without loss of consciousness, sequela
S06.891S	Other specified intracranial injury, with loss of consciousness of 30 minutes or less, sequela
S06.892S	Other specified intracranial injury, with loss of consciousness of 31 minutes to 59 minutes, sequela

S06.893S	Other specified intracranial injury, with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.894S	Other specified intracranial injury, with loss of consciousness of 6 hours to 24 hours, sequela
S06.895S	Other specified intracranial injury, with loss of consciousness greater than 24 hours with return to pre-existing conscious level, sequela
S06.896S	Other specified intracranial injury with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.899S	Other specified intracranial injury with loss of consciousness of unspecified duration, sequela
S06.9x0S	Unspecified intracranial injury, without loss of consciousness, sequela
S06.9X1S	Unspecified intracranial injury , with loss of consciousness of 30 minutes or less, sequela
S06.9X2S	Unspecified intracranial injury, with loss of consciousness of 31 minutes to 59 minutes, sequela
S06.9X3S	Unspecified intracranial injury, with loss of consciousness of 1 hour to 5 hours 59 minutes, sequela
S06.9X4S	Unspecified intracranial injury, with loss of consciousness of 6 hours to 24 hours, sequela
S06.9X5S	Unspecified intracranial injury, with loss of consciousness of greater than 24 hours with return to pre-existing conscious level, sequela
S06.9X6S	Unspecified intracranial injury with loss of consciousness greater than 24 hours without return to pre-existing conscious level with patient surviving, sequela
S06.9x9AS	Unspecified intracranial injury with loss of consciousness of unspecified duration, sequela
Z87.820	Personal history of traumatic brain injury

Not Medically Necessary /Not Covered:

ICD-9-CM Diagnosis Codes	**Description**
V57.22	Encounter for vocational therapy

ICD-10-CM Diagnosis Codes (Effective 10/01/2015)	**Description**
Z51.89	Encounter for other specified aftercare

Experimental/Investigational/Unproven/Not Covered:

ICD-9-CM Diagnosis Codes	**Description**
	All other codes

ICD-10-CM Diagnosis Codes (Effective 10/01/2014)	**Description**
	All other codes

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