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Cognitive Rehabilitation (for Louisiana Only) [MEAL]

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[Instructions for Use](#)

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Application

This Medical Policy only applies to the state of Louisiana.

Coverage Rationale

~~Cognitive rehabilitation (CR) is proven and medically necessary when treating individuals following a traumatic brain injury (TBI) or stroke when all of the following criteria are met:~~

- ~~• Individual has the ability to actively participate; and~~
- ~~• Treatment regimen includes:~~
 - ~~○ Specific interventions for functional communication deficits, including pragmatic conversational skills; or~~
 - ~~○ Compensatory memory strategy training~~

Cognitive Rehabilitation (CR) is proven and medically necessary when treating individuals following a traumatic brain injury (TBI) or stroke: For medical necessity clinical coverage criteria, refer to the InterQual® 2022, Mar. 2022 Release, LOC: Outpatient Rehabilitation & Chiropractic.

[Click here to view the InterQual® criteria.](#)

The following are unproven and not medically necessary due to insufficient evidence of efficacy:

- Cognitive Rehabilitation for any other condition or diagnosis

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- Coma Stimulation (also known as Coma arousal, Coma responsiveness, multisensory stimulation, and Coma care therapy/programs) for any indication, including individuals who are comatose, in a Vegetative or Minimally Conscious State

Definitions

Cognitive Rehabilitation (CR): Is a multidisciplinary treatment program designed to improve cognitive function and retrain an individual's ability to think, use judgment and make decisions. The focus of these therapeutic activities is to improve deficits in memory, attention, perception, visual processing, language, reasoning, learning, planning, judgment, and problem-solving. ~~Cognitive rehabilitation~~**CR** comprises tasks to reinforce or reestablish previously learned patterns of behavior or to establish new compensatory mechanisms for impaired neurologic systems. The goal of ~~cognitive rehab~~**CR** is to maximize functional independence with minimal interference from cognitive limitations. (Hayes, 2019; updated 2021).

Coma/Persistent Vegetative State: A profound or deep state of unconsciousness. Higher brain functions are lost, but other key functions such as breathing, and circulation remain relatively intact. Non- cognitive function, and sleep patterns often remain normal, and spontaneous movements may occur. the eyes may open in response to external stimuli, and individuals may occasionally grimace, cry, or laugh (NINDS 2019). ~~A state of unconsciousness from which one cannot be aroused. Coma is the most severe of the alterations of consciousness. It differs from sleep in that comatose patients will not awaken with stimulation. It differs from lethargy, drowsiness, or stupor (states in which patients are slow to respond) in that comatose patients are completely unresponsive. Finally, it differs from delirium, confusion, or hallucinosis (states in which patients' sense of reality is distorted and expressions are bizarre) in that comatose patients cannot express themselves at all (Taber's, 2014).~~

Coma Stimulation: The use of multimodal sensory stimulation in an attempt to speed up the process of recovery from coma or improve arousal level. The efficacy of such approaches remains unestablished (APA). ~~This treatment may include a variety of stimulation techniques designed to awaken the comatose individual. Techniques may include visual activities (i.e. presenting the comatose individual with objects to look at), auditory (i.e. playing music or speaking), tactile (i.e. touching the individual), taste and smell (i.e. offering things for the individual to taste or smell) stimulation. Mobility stimulation may also be included in stable individuals. A stimulus is considered successful if the individual grimaces or moves. Therapists, nurses, physicians, or family members can perform these services in the hospital, the individual's home, or in a nursing home.~~

Executive Functions (also called central processes; higher order processes): Higher level cognitive processes of planning, decision making, problem solving, action sequencing, task assignment and organization, effortful and persistent goal pursuit, inhibition of competing impulses, flexibility in goal selection, and goal-conflict resolution. These often involve the use of language, judgment, abstraction and concept formation, and logic and reasoning. They are frequently associated with neural networks that include the frontal lobe, particularly the prefrontal cortex. Deficits in executive functioning are seen in various disorders, including Alzheimer's disease and schizophrenia (APA).

Minimally Conscious State: A condition in which a person who has experienced severe brain injury or deterioration retains a limited awareness of self and environment through residual cognitive functions. The individual is awake and occasionally able to

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communicate and do simple voluntary activities that demonstrate an engagement with surroundings (APA).

~~A severe alteration in consciousness that does not meet the diagnostic criteria for either Coma or a Persistent Vegetative State, in which patients respond to some sounds and unpleasant stimuli and have a sleep-wake cycle but do not attend to their environment consistently (Taber's, 2014).~~

~~**Persistent Vegetative State:** A continuing and unremitting clinical condition of complete unawareness of the environment accompanied by sleep-wake cycles with either complete or partial preservation of hypothalamic and brainstem autonomic functions. The diagnosis is established if the condition is present for 1 month after acute or nontraumatic brain injury or has lasted for 1 month in patients with degenerative or metabolic disorders or developmental malformations (Taber's, 2014).~~

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by federal, state, or contractual requirements and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

CPT Code	Description
*97129	Therapeutic interventions that focus on cognitive function (e.g., attention, memory, reasoning, executive function, problem solving, and/or pragmatic functioning) and compensatory strategies to manage the performance of an activity (e.g., managing time or schedules, initiating, organizing, and sequencing tasks), direct (one-on-one) patient contact; initial 15 minutes
*97130	Therapeutic interventions that focus on cognitive function (e.g., attention, memory, reasoning, executive function, problem solving, and/or pragmatic functioning) and compensatory strategies to manage the performance of an activity (e.g., managing time or schedules, initiating, organizing, and sequencing tasks), direct (one-on-one) patient contact; each additional 15 minutes (List separately in addition to code for primary procedure)

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HCPSC Code	Description
*S9056	Coma stimulation per diem

Codes labeled with an asterisk (*) are not on the state of Louisiana Fee Schedule and therefore not covered by the State of Louisiana Medicaid Program.

Description of Services

~~According to the Centers for Disease Control and Prevention (CDC), "a TBI is caused by a bump, blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain" (2017).~~

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~~Brain injury is defined as damage to the brain caused by externally inflicted trauma or damage due to stroke, aneurysm, anoxia, encephalitis, brain tumors, and brain toxins. Either type of injury may result in significant physical, cognitive, and psychosocial impairment in functioning and consciousness.~~

An acquired brain injury is one that occurs after birth, and affects the physical integrity, metabolic activity, or functional ability of nerve cells in the brain. Acquired brain injuries may be traumatic, and caused by external trauma to the head such as falls, assaults, car accidents, and sports injuries, or non-traumatic and caused by factors such as a lack of oxygen, exposure to toxins, and surgery and tumors. Regardless of the etiology, these injuries often result in significant physical, cognitive, and psychosocial impairment in functioning and consciousness. Cognitive impairment can include deficits across multiple areas of cognitive function such as memory, attention, executive function, language, and visuosperceptual ability. (Brain Injury Association).

CR targets such functions as attention, memory and learning, affect and expression, problem solving, and executive functions. Two basic approaches to CR are used: (1) restorative (remedial) CR, where intellectual deficits are bolstered by various repetitive exercises; and (2) compensatory (adaptive) CR, where adaptive devices and strategies and modification of the environment are used to restore functioning despite ongoing deficits. These 2 techniques can be used in combination and can also be components of a comprehensive rehabilitation program that involves other forms of remediation and psychosocial therapy. (Hayes, 2017~~8~~; updated 2021).

Virtual Reality (VR) training for cognitive rehabilitation is small but growing field, and is gaining interest as another treatment modality for improving cognitive function. It has the potential to overcome the barriers of other therapies due to its emersive, highly engaging and gamified format (Jahn 2021). Currently, there are no established device protocols or definitive patient selection criteria.

Coma stimulation is proposed to promote awakening of brain-injured patients from a Coma. This may involve stimulation of any or all the senses with various stimuli. There are no established protocols, or definitive patient selection criteria for this type of stimulation.

~~Coma (or sensory) stimulation is proposed to promote awakening of brain-injured patients from a Coma or Vegetative State. This may involve stimulation of any or all of the senses with various stimuli for each sense. There is not an established protocol for completing this type of stimulation or definitive patient selection criteria.~~

Clinical Evidence

Other Disorders

CR has also been investigated for disorders such as cerebral palsy, Down syndrome, Alzheimer disease (AD), schizophrenia, attention deficit hyperactivity disorder (ADHD), multiple sclerosis, developmental disorders such as autism, and Parkinson disease. The medical literature is limited and available studies include small study samples, lack of comparison groups, and long term follow up.

In a 2022 systematic review and meta-analysis, Pigott et al. evaluated the clinical effectiveness of self- management interventions for adults with idiopathic Parkinson's disease and the effects on quality of life (QOL), wellbeing and function. The interventions included group-based self-management education and training programs, either alone, combined with multi-disciplinary rehabilitation, or combined with Cognitive

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Behaviour Therapy (CBT), and a self-guided community-based exercise program. Thirty-six studies from ten countries (the majority were from North America and the United Kingdom) totaling 2,884 participants were included. The results showed that only four studies reported statistically significant improvements in QoL, wellbeing or functional outcomes for the intervention compared to controls. These interventions were group-based self-management education and training programs, either alone, combined with multi-disciplinary rehabilitation, or combined with CBT, and a self-guided community-based exercise program. The authors concluded that the quality of this evidence was very low and the effect of the intervention is uncertain. More high quality research is needed.

In 2021, Jahn et al. conducted a systematic review of randomized controlled trials to assess the pro-cognitive impact of fully immersive virtual reality (VR) as an intervention in transdiagnostic cognitive rehabilitation. Nine studies were selected for review, that met the criteria of individuals with a psychiatric disorder or central nervous system disease or trauma using fully immersive VR intervention with cognitive rehabilitation as the main outcome or key aim. Of the nine selected, one addressed attention deficit hyperactivity disorder (ADHD), three were schizophrenia, four addressed mild cognitive impairment (MCI), and one looked at stroke. Group sizes were small (6-34 participants), and the length and intensity of the VR intervention varied greatly. The Cochrane risk of bias assessments indicated either 'some concerns' or 'high risk of bias' in all studies, due to a lack of blinding of assessors, patients and/or trainers, inadequate statistical analyses and insufficient reporting of the methodology. The results showed visual working memory and executive functions improved significantly after VR training. While the nine studies had different targets and primary cognitive outcome measures, the results showed an overall significant improvement in visual working memory, including visuospatial memory and executive functions which are important for optimization of other cognitive skills. Of note, four studies found that the significant improvements involved activities of daily living (ADL) such as cooking and shopping. The authors concluded that the scarcity of evidence prevents coming to firm conclusions, but this preliminary review of the evidence suggests VR may be useful in improving cognitive function across a range of diagnoses. Future research should focus on larger high-quality studies that focus on standardization of VR training scenarios, control groups and outcome measures.

In 2019, Gómez-Soria et al. conducted a systemic review to evaluate the efficacy of cognitive intervention programs for older adults with amnesic mild cognitive impairment (aMCI), a prodromal stage of Alzheimer disease. Randomized controlled trials and clinical trials published until March 2020 were searched with a total of 7 studies meeting criteria for inclusion in the review. The authors found cognitive intervention programs led to improvements in global cognitive function and some improvements in memory, language, attention, executive function, and visuospatial abilities. Limitations include a small sample size of 18-22 participants, heterogeneity of cognitive interventions and assessment tools, lack of training of some health-care professionals and differences in follow-up analysis. Further well-designed studies of cognitive intervention are recommended to provide more definitive evidence.

Iwata et al. (2017) conducted a multicenter RCT examining whether cognitive remediation is effective in improving both cognitive and social functions in schizophrenia in outpatient settings that provide learning-based psychiatric rehabilitation. Participants were randomly assigned either a cognitive remediation program (n=29) or treatment as usual (n=31). The cognitive remediation intervention included cognitive training using computer software (CogPack) administered twice a week, while the control group met weekly over 12 weeks and was based on the Thinking Skills for Work program. Most participants

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were attending day treatment services where social skills training, psychoeducation for knowledge about schizophrenia, group activities and other psychosocial treatment were offered Cognitive and social functioning were assessed using the Brief Assessment of Cognition in Schizophrenia (BACS) and Life Assessment Scale for Mentally Ill (LASMI) at pre- and postintervention. Processing speed, executive function, and the composite score of the BACS, as well as significant improvement in interpersonal relationships and work skills on the LASMI, showed greater improvement for the cognitive remediation group than the control group. The researchers concluded that cognitive remediation in addition to psychiatric rehabilitation contributed to greater improvement in both cognitive and social functioning than psychiatric rehabilitation alone. Cognitive remediation may enhance the efficacy of psychiatric rehabilitation improving social functioning. Limitations to this study include but were not limited to small study size and absence of long term follow up.

Díez-Cirarda and colleagues assessed structural and functional cerebral changes in 44 PD patients, after attending a three-month integrative cognitive rehabilitation (REHACOP) as part of a RCT. Participants were randomly divided into REHACOP group (cognitive rehabilitation) (CR) and a control group (occupational therapy). T1-weighted, diffusion weighted and functional magnetic resonance images (fMRI) during resting-state and during a memory paradigm were obtained both pre- and post-treatment. Cerebral changes were assessed with repeated measures ANOVA 2 × 2 for group × time interaction. Results demonstrated that the REHACOP group showed significantly increased brain connectivity and activation in both the resting state and recognition fMRIs compared to the control group. The study group showed increased brain activation in the learning fMRI when comparing the post- to the pre-treatment, as well as showing significant and positive correlations between the brain connectivity and activation and the cognitive performance at post-treatment. Researchers concluded that an integrative CR program can produce significant functional cerebral changes in PD patients. Acknowledging the small sample size, future studies with larger samples are needed to replicate these findings (2017).

A systematic review by Isaac and Januel assessed the effect of cognitive remediation programs on neural processes. 15 reports included 19 randomized controlled studies on 455 adult patients suffering from a schizophrenia spectrum disorder. Overall, the reviewers concluded that studies provided interesting conclusions on a possible neuroplastic effect of cognitive remediation in schizophrenia through functional reorganization of neural networks, superior to other interventions or usual care. Specifically, cognitive remediation can improve various cortical and subcortical activations, including frontal activation associated with high-level cognitive and social-cognitive functions. Further randomized controlled studies are needed to confirm or clarify existing results, in order to provide stronger evidence for a neurobiological effect of cognitive remediation programs in schizophrenia spectrum disorders (2016).

A Cochrane review evaluated the efficacy of cognitive training and CR for mild to moderate AD and vascular dementia. The evidence reviewed included 11 trials of cognitive training and a single trial of CR. The authors found no evidence for the efficacy of cognitive training to improve cognitive functioning, mood or activities of daily living (ADL) in individuals with mild to moderate AD or vascular dementia. The single trial of CR provided preliminary indications of the potential benefits of individual CR to improve ADLs in individuals with mild AD. The authors recommend that more high-quality trials of both cognitive training and CR are needed in order to establish the efficacy of cognitive training and CR for individuals with early-stage dementia (Bahar-Fuchs, 2013).

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Sonuga-Barke et al. (2013) conducted a meta-analysis on the efficacy of ADHD treatments that included cognitive training. The authors concluded that better evidence for efficacy from blinded assessments is required for cognitive training before it can be supported as treatments for core ADHD symptoms.

Kurz, et al. (2011) conducted a multicenter RCT on 201 patients with mild dementia in AD. The intervention comprised 12 individual weekly sessions of CR, and combined 4 established strategies adopted from neurorehabilitation and psychotherapy. ADLs were chosen as the primary outcome. The results showed no effect of the intervention on everyday functioning. There were improvements favoring the intervention on QOL and treatment satisfaction and a significant antidepressant effect in female participants. The findings of this study may be helpful for designing further studies that are needed to determine the potential of CR in older adults with dementia.

~~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 evidence in the published medical literature is difficult to assess due to variability in study design, low power to detect difference or variation in treatment. Variation in treatment is related to the heterogeneous nature of the treated population; specific CR interventions are typically targeted to the specific deficit. Given these limitations, the published data provides the most support for effectiveness of CR in individuals with TBI.~~

Brain Injury

~~A Hayes report explored CR for TBI. A search of the published peer reviewed medical literature returned 14 randomized controlled trials (RCTs) with sample sizes ranging from 50-366 participants. Regarding attention, memory, or executive functioning, it was concluded that the moderate quality evidence suggests that CR may improve neuropsychological outcomes. However, specific weaknesses around study design, outcome selection, small sample size, and differences in intervention strategies impede the generalizability of evidence on this topic. Additionally, some important patient groups—such as children or those with milder TBI—are less well represented in the published literature and require further evaluation (2018).~~

~~In a systematic review, Ciccone et al. (2011) evaluated 112 studies to update clinical recommendations for CR in individuals with TBI and stroke. Of the 112 studies, 14 were rated as class I, 5 as class IA, 11 as class II, and 82 as class III. Evidence within each area of intervention was synthesized and recommendations for Practice Standards, Practice Guidelines, and Practice Options were made. The authors concluded that there is substantial evidence to support interventions for attention, memory, social communication skills, executive function, and for comprehensive holistic neuropsychologic rehabilitation after TBI. Evidence supports visuospatial rehabilitation after right hemisphere stroke, and interventions for aphasia and apraxia after left hemisphere stroke. According to the authors, there is sufficient information to support evidence-based protocols and implement empirically-supported treatments for cognitive disability after TBI and stroke.~~

~~Turner-Stokes et al. (2015) investigated multi-disciplinary rehabilitation for acquired brain injury in adults of working age in a Cochrane review. Authors identified 19 studies (3480 people). Twelve studies were of good methodological quality and seven were of lower quality. Within the subgroup of predominantly mild brain injury, 'strong evidence' suggested that most individuals made a good recovery when appropriate information was provided, without the need for additional specific interventions. For moderate to severe~~

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~~injury, 'strong evidence' showed benefit from formal intervention, and 'limited evidence' indicated that commencing rehabilitation early after injury results in better outcomes. For participants with moderate to severe ABI already in rehabilitation, 'strong evidence' revealed that more intensive programs are associated with earlier functional gains, and 'moderate evidence' suggested that continued outpatient therapy could help to sustain gains made in early post-acute rehabilitation. The context of multi-disciplinary rehabilitation appears to influence outcomes. 'Strong evidence' supports comprehensive cognitive rehabilitation in a therapeutic environment that involves a peer group of patients. 'Limited evidence' shows that specialist in-patient rehabilitation and specialist multi-disciplinary community rehabilitation may provide additional functional gains. In conclusion, for mild brain injury, information and advice were usually more appropriate than intensive rehabilitation. Patients with moderate to severe brain injury who received more intensive rehabilitation showed earlier improvement and earlier rehabilitation was better than delayed. It also supports that cognitive rehabilitation be provided in an environment where patients receive group-based therapy with peers facing the same challenges.~~

~~In other Cochrane reviews, analyses by Loetscher and Lincoln (2013) and Bowen et al. (2013) concluded that the long term efficacy of CR remains unconfirmed after examining studies involving 223 and 628 participants respectively. The reviewers concur that further high quality clinical trials are required.~~

Position and Practice Statements

~~The Institute of Medicine released a report on Cognitive Rehabilitation Therapy (CRT) for TBI at the request of the U.S. Department of Defense. The report, which reviewed 90 studies published from 1991 to 2011, states that current evidence provides limited support for the efficacy of CRT for TBI. The report states that there is some evidence about the potential value of CRT for treating TBI, but overall it is not sufficient to develop definitive guidelines on how to apply these therapies and to determine which type of CRT will work best for a particular patient. Despite the methodological shortcomings of the evidence, the authors of the report support the ongoing clinical application of CRT interventions for individuals with cognitive and behavioral deficits due to TBI. (2011).~~

~~The Agency for Healthcare Research and Quality (AHRQ) issued a comparative effectiveness review on multidisciplinary CR for moderate to severe TBI in adults. The goal of the review was to identify the most effective multidisciplinary postacute rehabilitation interventions for this demographic. The report evaluated 16 studies assessing prespecified primary outcomes or secondary patient-centered outcomes. The authors concluded that the body of evidence is not informative regarding effectiveness or comparative effectiveness of multidisciplinary postacute rehabilitation stating that failure to draw broad conclusions must not be misunderstood to be evidence of ineffectiveness. According to the authors, the limited evidence on this topic stems from the complexity of the condition and treatments resulting in limited available research and from limitations within that research to answer salient research questions about what works for which patients. Further research should address methodological flaws common in these studies as well as questions regarding efficacy (Brasure et al. 2012; updated 2016).~~

Stroke

Cochrane Reviews

In a 2016 updated Cochrane review first published in 2000 and subsequently updated in 2007. The objective was to determine whether participants who have received CR for memory problems after a stroke had better outcomes in relation to memory function, functional ability, mood, and quality of life (QOL), than those given no treatment or a placebo control. The review included 13 trials involving 514 participants. The reviewers concluded that no significant effects of treatment were found in subjective reports in the long term or on performance on objective memory measures, mood, functional abilities, or QOL. Benefits were reported in the short term on subjective measures of memory; however, these did not persist. In addition, no benefits were reported in objective memory measures, mood, or daily functioning. There was insufficient evidence to support or refute the effectiveness of memory rehabilitation after stroke. This may be because of poor methodological quality of the included studies, inconsistencies in the choice of outcome measures, and small sample sizes. Furthermore, more robust trials of memory rehabilitation that use standardized activity or participatory level outcome measures are required. (das Nair et al., 2016).

Position and Practice Statements

Guidance from the National Institute for Health and Care Excellence (NICE) on stroke rehabilitation in adults recommends CR with interventions for memory and cognitive functions that focus on the relevant functional tasks, taking into account the underlying impairment. Interventions could include increasing awareness of the memory deficit, enhancing learning using errorless learning and elaborative techniques (making associations, use of mnemonics, internal strategies related to encoding information such as 'preview, question, read, state, test'), external aids (e.g., diaries, lists, calendars and alarms), or environmental strategies (routines and environmental prompts) (2013).

Schizophrenia

Iwata et al. (2017) conducted a multicenter RCT examining whether cognitive remediation is effective in improving both cognitive and social functions in schizophrenia in outpatient settings that provide learning based psychiatric rehabilitation. Participants were randomly assigned either a cognitive remediation program (n=29) or treatment as usual (n=31). The cognitive remediation intervention included cognitive training using computer software (CogPack) administered twice a week, while the control group met weekly over 12 weeks and was based on the Thinking Skills for Work program. Most participants were attending day treatment services where social skills training, psychoeducation for knowledge about schizophrenia, group activities and other psychosocial treatment were offered. Cognitive and social functioning were assessed using the Brief Assessment of Cognition in Schizophrenia (BACS) and Life Assessment Scale for Mentally Ill (LASMI) at pre and postintervention. Processing speed, executive function, and the composite score of the BACS, as well as significant improvement in interpersonal relationships and work skills on the LASMI, showed greater improvement for the cognitive remediation group than the control group. The researchers concluded that cognitive remediation in addition to psychiatric rehabilitation contributed to greater improvement in both cognitive and social functioning than psychiatric rehabilitation alone. Cognitive remediation may enhance the efficacy of psychiatric rehabilitation improving social functioning. Limitations to this study include but were not limited to small study size and absence of long term follow up.

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~~Barlati et al. (2012) reviewed the available literature on cognitive remediation in the early course of schizophrenia. According to the authors, few studies on the effects of cognitive training programs have been conducted in first episode or in early schizophrenia and only one study has been conducted in the prodromal phase (period of decreased functioning that may correlate with the onset of psychotic symptoms of the disease). The authors state that although preliminary positive results have been achieved, more research is needed to confirm the efficacy of cognitive remediation in the early course of schizophrenia.~~

~~A RCT by Eack et al. (2010) compare CR (n=31) to supportive therapy (n=27) in patients with either early schizophrenia (n=35) or schizoaffective disorder (n=18). All patients were stable on anti-psychotic medication. The CR group received 60 hours of weekly computer based neurocognitive training coupled with 45 weekly social cognitive group sessions. The supportive therapy group only received individual psychotherapy. Fifty-three patients (30 CR and 23 supportive therapy subjects) underwent MRI to evaluate gray matter in the brain. The supportive therapy group showed greater loss of gray matter on MRI compared to the CR group. The authors found that the CR group had a decrease in loss of, and, in some cases, an increase in gray matter compared with the supportive therapy group. The area with less loss was related to improved neurocognitive function. The authors concluded that CR can protect against gray matter loss and may therefore decrease cognitive impact in this group of patients. Further studies must compare CR to a treatment of known and predictable effectiveness, e.g., pharmacotherapy with anti-psychotic agents.~~

Other Disorders

~~CR has also been investigated for disorders such as cerebral palsy, Down syndrome, Alzheimer's Disease (AD), attention deficit hyperactivity disorder (ADHD), multiple sclerosis, developmental disorders such as autism, and Parkinson's disease. Based on the peer reviewed literature there is insufficient evidence to support the use of cognitive rehabilitation in all other conditions except for traumatic brain injury and stroke as indicated above, medical literature is limited and available studies include small study samples and lack of comparison groups and long term follow up.~~

~~In 3 separate RCTs, analyses by Hanssen et al. (2016), Campbell et al. (2016), and Rilo et al. (2018) concluded that individuals with multiple sclerosis receiving multicomponent or computerized CR during research periods that ranged from 12 weeks to 7 months demonstrated improvements in several cognitive domains for 120, 38, and 42 participants, respectively. Additional research is needed to further explore the benefits of CR in this patient population.~~

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~~Díez-Cirarda and colleagues assessed structural and functional cerebral changes in 44 PD patients, after attending a three-month integrative cognitive rehabilitation program (REHACOP) as part of a RCT. Participants were randomly divided into REHACOP group (cognitive rehabilitation) and a control group (occupational therapy). T1-weighted, diffusion-weighted and functional magnetic resonance images (fMRI) during resting state and during a memory paradigm were obtained both pre- and post-treatment. Cerebral changes were assessed with repeated measures ANOVA 2 x 2 for group x time interaction. Results demonstrated that the REHACOP group showed significantly increased brain connectivity and activation in both the resting state and recognition fMRIs compared to the control group. The study group showed increased brain activation in the learning fMRI when comparing the post- to the pre-treatment, as well as showing significant and positive correlations between the brain connectivity and activation and the cognitive performance at post-treatment. Researchers concluded that an integrative CR program can produce significant functional cerebral changes in PD patients. Acknowledging the small sample size, future studies with larger samples are needed to replicate these findings (2017).~~

~~In 2013, Reichow et al. reported a systematic review of psychosocial interventions administered by nonspecialists for children and adolescents with intellectual disability or lower-functioning autism-spectrum disorders. Five comparative trials in patients with autism-spectrum disorders (total N=255) who received CR, training, and support were included. Improvements in school performance and developmental outcomes were inconsistent across trials.~~

~~A Cochrane review evaluated the efficacy of cognitive training and CR for mild to moderate AD and vascular dementia. The evidence reviewed included 11 trials of cognitive training and a single trial of CR. The authors found no evidence for the efficacy of cognitive training to improve cognitive functioning, mood or activities of daily living (ADL) in individuals with mild to moderate AD or vascular dementia. The single trial of CR provided preliminary indications of the potential benefits of individual CR to improve ADL in individuals with mild AD. The authors recommend that more high-quality trials of both cognitive training and CR are needed in order to establish the efficacy of cognitive training and CR for individuals with early-stage dementia (Bahar-Fuchs, 2013).~~

~~Kurz, et al. (2011) conducted a multicenter RCT on 201 patients with mild dementia in AD. The intervention comprised 12 individual weekly sessions of CR, and combined 4 established strategies adopted from neurorehabilitation and psychotherapy. ADL were chosen as the primary outcome. The results showed no effect of the intervention on everyday functioning. There were improvements favoring the intervention on QOL and treatment satisfaction and a significant antidepressant effect in female participants. The findings of this study may be helpful for designing further studies that are needed to determine the potential of CR in older adults with dementia.~~

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The findings of this study may be helpful for designing further studies that are needed to determine the potential of CR in older adults with dementia.

~~Riccio and French (2004) evaluated available empirical support regarding the efficacy of treatments for treatment of attention deficits across disorders and age levels. The search of the major databases yielded 83 studies that included treatment of attentional deficits. A review of the studies indicated that, regardless of the treatment program or population, the existing research does not provide sufficient evidence to reach any conclusions about the efficacy of programs designed to address attention deficits. Before any conclusions can be drawn, there is a need for more rigorous study of available treatment programs across age levels and disorders, with sufficient baseline and outcome data as well as control or alternative treatment conditions.~~

~~Wade et al. (2003) evaluated whether a program of multidisciplinary rehabilitation and group support achieves sustained benefit for people with Parkinson's disease. The study was a crossover RCT comparing 144 patients and caregivers who had received rehabilitation four months before assessment with those who had not. Analysis comparing patients, before and six months after treatment showed worsening in disability, QOL, and caregiver strain. The investigators concluded that patients with Parkinson's disease decline significantly over 6 months, but a short spell of multidisciplinary rehabilitation may improve mobility.~~

Coma Stimulation

Controlled trials comparing care with and without coma stimulation programs are limited in current literature that effectively demonstrates a consistent, reproducible and positive impact on health outcomes.

In a systematic literature review, Li et al. (2020) focused on sensory stimulation to improve coma arousal in comatose patients following a TBI. In total, 10 studies were eligible for the analysis. The review included post TBI patients with severe disorders of consciousness who received sensory stimulation with specific intervention protocols, assessment tools, and behavioral/neural responses assessed by standard scales and instruments. Limitations included heterogeneity of outcome evaluation measures, varying interventions, short intervention period, absence of long-term follow-up and small sample size. The authors concluded the sensory stimulation program improved coma arousal and is likely to aid recovery. Overall, sensory stimulation with structured, meaningful, multimodal, familiar and emotional stimuli is recommended. However, the authors noted that additional high-quality clinical trials with larger sample sizes are needed to establish standard sensory stimulation protocols to improve outcomes after TBI.

In 2016, Padilla and colleagues conducted a systematic review to assess the effectiveness of sensory stimulation to improve arousal and alertness of people in a coma or persistent vegetative state following a traumatic brain injury. A total of 9 studies published from 2008 through 2013 were included for analysis. The authors concluded that there is strong evidence for the effectiveness of multimodal sensory stimulation in improving the clinical outcomes after a traumatic brain injury-induced coma or persistent vegetative state. In addition, "Moderate evidence was also provided for auditory stimulation, limited evidence was provided for complex stimuli, and insufficient evidence was provided for median nerve stimulation." This systematic review grouped widely heterogeneous studies in terms of design, outcomes and populations. Furthermore, the clinical significance of the studies chosen for inclusion is not clear. Given the lack of rigorous, clinically meaningful studies for inclusion and the qualitative methodological approach that was used in analysis, more research is needed to confirm the conclusions

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the authors have made from this review. (Megha 2013, which was previously cited in this policy, was included in this systematic review.)

~~Megha (2013) conducted a randomized controlled trial (RCT) to evaluate the effectiveness of multimodal coma stimulation in comatose individuals with traumatic brain injury. Study participants were randomly assigned to one of three groups (group A received 20-minute multimodal coma stimulation sessions, 5 times a day,; group B received 50-minute stimulation twice a day,; group C acted as the control group and received conventional physiotherapy twice a day). Duration of treatment was 2 weeks in all three groups. Prior to coma stimulation, participants' levels of consciousness were assessed using the Western Neuro Sensory Stimulation profile (WNSSP) and the Glasgow Coma Scale (GCS). Final results showed significant improvement in measures of consciousness levels in the respective treatment groups, A and B, when each was compared with the control group C. Specifically, there was a statistically significant difference observed between group A and C in favor of group A for GCS. Similarly, there was a statistically significant difference observed between groups B and C in favor of group B for WNSSP. Despite these early positive findings, the study was characterized by several limitations, including its small size, lack of blinded assessments and lack of follow-up. Without an adequate follow-up period, it is not clear if the improvements in consciousness levels were durable beyond the 2-week treatment duration. Despite the statistically significant findings between groups, the study was also limited by the lack of generalizability and clinical heterogeneity in the baseline characteristics of study participants.~~

~~A Cochrane systematic review was completed evaluating sensory stimulation of brain-injured patients in coma or vegetative state. This study included RCTs and non RCTs. Three studies were identified with 68 patients in total. The overall methodological quality was poor and studies differed widely in terms of outcomes measures, study design and conduct. The conclusion was that there is no reliable evidence which supports or rules out the effectiveness of multisensory programs in patients in coma or vegetative state (Lombardi, 2002).~~

Professional Societies Clinical Practice Guidelines

American Academy of Neurology (AAN)

In a 2018 practice guideline (reaffirmed in September 2021) regarding disorders of consciousness, the AAN does not address the use of stimulation as a treatment modality for patients with a prolonged disorder of consciousness. They recommend families be counseled regarding the limitations of existing evidence associated with interventions that lack support, and there are no established therapies for children with a prolonged disorder of consciousness (Giacino 2018). In their "Practice Parameters: Assessment and Management of Patients in the Persistent Vegetative State," the AAN makes no reference to sensory stimulation as a treatment modality (2006, Updated 2016).

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

Cognitive Rehabilitation is therapy and is not subject to ~~U.S. Food and Drug Administration (FDA)~~ **FDA** regulation.

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Policy History/Revision Information

Date	Summary of Changes
<u>TBD</u>	<p><u>Coverage Rationale</u></p> <ul style="list-style-type: none"> Replaced medical necessity clinical coverage criteria with instruction to refer to the InterQual® LOC: Outpatient Rehabilitation & Chiropractic <p><u>Definitions</u></p> <ul style="list-style-type: none"> Added definition of "Executive Functions" Updated definition of: <ul style="list-style-type: none"> Coma/Persistent Vegetative State Coma Stimulation Minimally Conscious State <p><u>Applicable Codes</u></p> <ul style="list-style-type: none"> Added notation to indicate CPT codes 97129 and 97130 are not on the State of Louisiana Fee Schedule and therefore not covered by the State of Louisiana Medicaid Program <p><u>Supporting Information</u></p> <ul style="list-style-type: none"> Updated Description of Services, Clinical Evidence, FDA, and References sections to reflect the most current information Archived previous policy version CS020LA.J

Instructions for Use

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