Medical Policy

Blue Cross Blue Shield Blue Care Network of Michigan

Nonprofit corporations and independent licensees of the Blue Cross and Blue Shield Association

Current Policy Effective Date: 3/1/16
(See policy history boxes for previous effective dates)

Title: Cognitive Rehabilitation

Description / Background

Cognitive rehabilitation is a therapeutic approach designed to improve cognitive functioning after central nervous system insult. It includes an assembly of therapy methods that retrain or alleviate problems caused by deficits in attention, visual processing, language, memory, reasoning, problem solving and executive functions. Cognitive rehabilitation consists of tasks designed to reinforce or re-establish previously learned patterns of behavior or to establish new compensatory mechanisms for impaired neurological systems. Cognitive rehabilitation may be performed by a physician, psychologist, or a physical, occupational, or speech therapist.

Cognitive rehabilitation must be distinguished from occupational therapy (CPT codes 97535–97537); occupational therapy describes rehabilitation that is directed at specific environments (i.e., home or work). In contrast, cognitive rehabilitation consists of tasks designed to develop the memory, language, and reasoning skills that can then be applied to specific environments, as described by the occupational therapy codes. Sensory integrative therapy may be considered a component of cognitive rehabilitation. However, sensory integration therapy is considered separately in another policy.

Medical Policy Statement

The safety and effectiveness of cognitive rehabilitation (as a distinct and definable component of the rehabilitation process) have been established. It may be considered a useful therapeutic option in the rehabilitation of patients meeting specific selection criteria.

NOTE: Please check individual contract, certificate and rider for specific coverage information.

Inclusionary and Exclusionary Guidelines (Clinically based guidelines that may support individual consideration and pre-authorization decisions)

Inclusions:
Cognitive rehabilitation is an established procedure when used an as adjunctive treatment of cognitive deficits (e.g., attention, language, memory, reasoning, executive functions, problem solving and visual processing) when all of the following criteria are met:

1. The cognitive deficits have been acquired as a result of neurologic impairment due to traumatic brain injury or stroke, and
2. Services must be provided by a qualified licensed professional and must be prescribed by the attending physician as part of the written care plan, and
3. There must be documentation of potential for improvements based on the patient's pre-injury function, and
4. Patients must be able to actively participate in the program. The patient must have sufficient cognitive function to understand and participate in the program as well as adequate language expression and comprehension (i.e., the patient should not have severe aphasia).
5. The member is expected to make significant cognitive improvement (e.g., member is not in a vegetative or custodial state).

Excluded diagnoses include, but are not limited to:

- Mental retardation
- Multiple sclerosis
- Cerebral palsy
- Encephalopathy
- S/P brain surgery
- Dementia (e.g., from Alzheimer's disease, HIV-infection or Parkinson's disease)
- Cognitive decline chronic obstructive pulmonary disease
- Behavioral or psychiatric disorders such as attention-deficit/hyperactivity disorder and schizophrenia
- Pervasive developmental disorders

CPT / HCPCS Level II Codes *(Note: The inclusion of a code in this list is not a guarantee of coverage. Please refer to the medical policy statement to determine the status of a given procedure)*

Established codes:

97532

Regulatory Status:

N/A

Rationale

This policy was originally created by BCBSA in 1997 and has been updated periodically with literature review. This policy was originally based on a 1997 TEC Assessment. (1) The Assessment addressed a broad range of patient indications resulting from neurological insults,

including traumatic brain injury, stroke, post-encephalopathy, and aging (including Alzheimer's disease). Eighteen controlled trials were reviewed, primarily focusing on stroke and traumatic brain injury. No controlled trials were available that specifically addressed the remaining patient indications. No clear answer regarding the efficacy of cognitive rehabilitation emerged from the Assessment. The evidence was conflicting either because of study design, low power to detect differences, or variation in treatment. The Assessment concluded that data were inadequate in the published peer-reviewed literature to validate the effectiveness of cognitive rehabilitation as either an isolated component or 1 component of a multimodal rehabilitation program.

In 2013, the Cognitive Rehabilitation Task Force of the American Congress of Rehabilitation Medicine (ACRM) published a systematic review of cognitive rehabilitation in medical conditions affecting cognitive function. (2) Literature was searched through the end of 2008. Of 11 clinical conditions reviewed (anoxia/hypoxia, encephalitis, epilepsy, HIV-AIDS encephalopathy, Huntington disease, systemic lupus erythematosus, Lyme disease and other tick-borne encephalopathy, neoplasms, Parkinson disease, and metabolic encephalopathy), there was evidence to support a practice guideline only for children and adolescents with brain tumors who undergo surgical resection and/or radiation therapy . A practice option (based on lower quality evidence) for patients with seizure-related cognitive impairments is discussed next.

Traumatic Brain Injury

A 2008 TEC Assessment was completed on cognitive rehabilitation in traumatic brain injury.(3) The objective of this Assessment was to determine whether there is adequate evidence to demonstrate that cognitive rehabilitation results in improved health outcomes. For the purposes of this Assessment, cognitive test performance is not considered a health outcome. Results of instruments assessing daily functioning or quality of life are considered health outcomes.

For the Assessment's main evidence review, randomized, controlled trials of cognitive rehabilitation were selected. A nonrandomized study of a comprehensive holistic program of cognitive rehabilitation was also included. Two studies of comprehensive holistic cognitive rehabilitation were reviewed. The one randomized study found no differences in the outcomes of return to work, fitness for military duty, quality of life, and measures of cognitive and psychiatric function at 1 year. (4) Rates of returning to work were greater than 90% for both the intervention and control groups, raising the question whether the subjects included in the study were not severely injured enough to be able to demonstrate an effect of rehabilitation. The other study of comprehensive rehabilitation was nonrandomized. (5) The intervention group showed greater improvements in functioning as assessed by a questionnaire that evaluated community integration, home integration and productivity assessed on completion of the intervention. However, there were many differences in baseline characteristics between intervention and control groups, particularly regarding the time since injury. Patients were not followed up beyond completion of the intervention program.

Eleven randomized, controlled trials of cognitive rehabilitation for specific cognitive defects showed inconsistent support for cognitive rehabilitation. Out of the 11 studies, 8 reported on health outcomes. Three of the studies showed statistically significant differences between intervention groups and control groups on one outcome. However, two of the studies were extremely small. The findings were not consistent across other outcomes measured in the studies, and in one study, significant findings after the intervention were no longer present at 6 months of follow-up. All 11 studies also reported outcomes of various cognitive tests. These were not considered to be valid outcomes for the purposes of assessing health benefit. Evaluation of these cognitive test outcomes is plagued by numerous methodological problems, such as small

sample size, lack of long-term follow-up, minimal interventions, and multiple outcomes. Seven of the studies reported at least one outcome showing that cognitive rehabilitation was associated with better performance on a specific cognitive test. Of these positive studies, 2 of them had no follow-up beyond the time of treatment, and 2 had sample sizes smaller than 20. In only 1 study was there consistency across several cognitive test scores showing better performance with cognitive rehabilitation.

In summary, randomized trials reviewed in the 2008 TEC Assessment did not show strong evidence for efficacy in the treatment of traumatic brain injury. Several clinical trials of specific cognitive rehabilitation interventions evaluated cognitive tests rather than health outcomes.

Since the TEC Assessment was completed, an additional RCT was published in 2008 comparing a comprehensive program of neuropsychologic rehabilitation to standard rehabilitation. (6) This study was intended to be a more rigorous evaluation of the nonrandomized study (5) reviewed in the 2008 TEC Assessment. Sixty-eight patients were randomized to the 2 intervention groups. The principal outcomes measured were the Community Integration Questionnaire (CIQ) and the Perceived Quality of Life scale (PQOL). Effectiveness of the intervention was evaluated by an interaction between intervention and pre- to post-treatment. Such an interaction was significant for the CIQ (p=0.042) and the PQOL (p=0.049) but not for any of the secondary neuropsychologic outcomes. It should be noted that there was a much smaller increment of improvement in the CIQ (from 11.2 to 12.9) then was observed in the prior nonrandomized trial (11.6 to 16.1). The proportion of patients having a clinically significant improvement in CIQ (4.2 points) is not reported but is likely to be smaller than the 52% reported in the prior non-randomized study. Follow-up assessments were also done at 6 months after treatment, but these were not subjected to formal statistical analysis. It appears that the standard treatment group had further improvements in the CIQ such that their mean follow-up CIQ score is very similar to the intervention group (12.9 versus 13.2) and likely to be nonsignificant. For the PQOL, it appears that the differences observed at the end of treatment were maintained or magnified somewhat by 6 months. This randomized trial, thus, has mixed findings of efficacy of comprehensive neuropsychologic rehabilitation for traumatic brain injury.

A 2013 Cochrane review assessed cognitive rehabilitation for executive dysfunction (planning, initiation, organization, inhibition, problem solving, self-monitoring, error correction) in adults with nonprogressive acquired brain damage. (7) Sixteen RCTs (total N=660; 395 traumatic brain injury, 234 stroke, 31 other acquired brain injury) were included in pooled analyses. No statistically significant effects on measures of global executive function or individual component functions were found.

Dementia, including Alzheimer's Disease

The use of cognitive training or rehabilitation in Alzheimer's disease and vascular dementia was evaluated in a 2003 Cochrane review. (8) Evidence from 11 RCTs did not demonstrate improved cognitive function, mood, or activities of daily living in patients with mild to moderate Alzheimer disease or vascular dementia with cognitive training. One high-quality RCT (9) of cognitive rehabilitation in 69 patients with early-stage Alzheimer disease (Mini-Mental Status Exam [MMSE] ≥18) showed short-term improvements in patient-rated goal performance and satisfaction, and 6-month improvements in patient-rated memory performance. It found 6 randomized, controlled trials on cognitive training that met study selection criteria, none of which reported any statistically significant between-group differences on any outcomes.

In a 2013 Cochrane review, Bahar-Fuchs evaluated the use of cognitive training (task-focused) or

rehabilitation (strategy-focused) in AD and vascular dementia. (8) Evidence from 11 RCTs did not demonstrate improved cognitive function, mood, or activities of daily living in patients with mild to moderate AD or vascular dementia with cognitive *training*. One high-quality RCT (9) of cognitive rehabilitation in 69 patients with early-stage AD (Mini-Mental Status Exam [MMSE] score, ≥18) showed short-term improvements in patient-rated goal performance and satisfaction, and 6-month improvement patient-rated memory performance.

Kurz et al. (2012) conducted an RCT of patients with Alzheimer's disease and early dementia. (10) The population consisted of 201 patients with clinical evidence and dementia and a MMSE score of at least 21/30 points who were randomized to a 12-week cognitive rehabilitation program or standard medical management (site-specific). There were baseline imbalances among the groups, with the intervention group having a lower mean age and higher scores on measures of functional status and quality of life. Outcomes were assessed at 3 months and 9 months following intervention and included a range of measures of functional status, quality of life, cognition, and caregiver burden. There also were no between group differences on any outcome measure. There were also no group differences on subgroup analyses by age, gender, educational level, or baseline cognitive ability, except that depression scores improved significantly for females, but not males, in the intervention group.

In 2003, Spector et al (11) published a randomized trial of 115 patients who were randomized to a cognitive stimulation program or to a control group. The intervention program ran for 7 weeks, and patients were only evaluated at completion. The treatment group had significantly higher scores on the principal outcome, the mini-mental status exam (MMSE), with a group difference of 1.14 points. Differences were also significant for the secondary outcomes, a quality-of-life score for Alzheimer's disease and an Alzheimer's disease assessment scale. The study did not assess any outcomes beyond the 7-week period of treatment, and the authors speculated that the intervention would need to be continued on a regular basis beyond 7 weeks. Results of this trial are not definitive in determining whether cognitive rehabilitation therapy is effective among patients with dementia. Limitations of the existing literature were discussed in a 2006 meta-analysis on cognitive training in Alzheimer's disease. (12) One study reported on patients who had not yet developed dementia.

In a 2002 study, 2832 seniors living independently with good functional and cognitive status were randomized to 1 of 3 training groups (memory, reasoning, speed of processing) or a no-contact control group. (13) While selected cognitive functioning measures showed immediate improvements, no significant improvements were found on everyday functioning measures at 2 years. A controlled study reported on 25 mildly impaired patients on cholinesterase inhibitors. (14) Patients were assigned to either cognitive rehabilitation or equivalent therapist contact in a mental stimulation program. Beneficial effects were observed for cognitive rehabilitation on tasks that duplicated those used in training, although generalized functional improvements were not reported. Moreover, the differences between the 2 interventions are not completely clear, in that both used methodologies considered to be cognitive rehabilitation. Another randomized study of 54 patients evaluated the combined effect of a cognitive-communication therapy plus an acetylcholinesterase inhibitor as compared to drug treatment alone. (15) A positive effect for the drug plus cognitive rehabilitation group was found in the areas of discourse abilities, functional abilities, emotional symptoms, and overall global performance. Beneficial effects were reported up to 10 months after active intervention. Although available evidence on cognitive rehabilitation for Alzheimer's disease and related dementias is inadequate to permit conclusions, this last study provides some encouraging evidence. Additional collaborative data are needed to form conclusions about the effectiveness of a combined treatment of cognitive rehabilitation and

acetylcholinesterase inhibitors in patients with Alzheimer's disease. A Cochrane systematic review published in 2011 evaluated cognition-based interventions for healthy older people and people with mild cognitive impairment. (16) Reviewers concluded there was little evidence on the effectiveness and specificity of such interventions, as improvements observed were similar to effects seen with active control interventions.

Thivierge et al (2014) in Canada reported a small (N=20), assessor-blinded, block-randomized, crossover trial of an individualized memory rehabilitation program in patients with mild to moderate AD. (17) The Memory Rehabilitation Program comprised 4 weeks of training by a patient's caregiver to improve performance of 1 instrumental activity of daily living (IADL) selected by the patient and caregiver. Errorless learning (assistance provided to minimize errors) and spaced retrieval (expanded delays, from 30 seconds to 8 minutes, between each correct performance of the task) were used to facilitate learning at each patient's own pace. The primary outcome was a measure of assistance required to perform the task correctly at 1, 4, and 8 weeks after training. In comparison with untrained (in period 1) or previously trained (in period 2) controls, statistically significant improvements in performance were observed immediately after training (i.e., at post treatment week 1) in both periods and at post treatment week 4 in period 2. A spontaneous, statistically significant (compared with baseline) improvement in performance occurred in period 1 controls. Performance of the target IADL declined within 2 to 3 months after completion of training. Improvements in other outcomes (general memory and cognitive ability, overall function, quality of life, and behavioral/psychological symptoms [18]) were not observed. Aberrant motor behaviors increased significantly from baseline in treated groups. (18)

Post-encephalopathy

The 2013 systematic review by ACRM's Cognitive Rehabilitation Task Force evaluated cognitive rehabilitation for postencephalitis cognitive deficits. (2) Eight identified studies were considered poor quality evidence, insufficient for forming conclusions. Two small, uncontrolled series (1997) reported favorable results with cognitive rehabilitation. (19, 20) These data are inadequate to change the conclusions of the earlier TEC Assessment.

Stroke

Three Cochrane reviews assessed the effectiveness of cognitive rehabilitation for recovery from stroke. (21-23) Each separately evaluated spatial neglect, attention deficits, and memory deficits. The most recent updates of these reviews made the following conclusions:

- Spatial neglect: A 2013 update identified 23 RCTs with 628 patients. (21) There was very limited evidence of short-term improvements on tests of neglect with cognitive rehabilitation. However, for reducing disability due to spatial neglect and increasing independence, effectiveness of cognitive rehabilitation remained unproven.
- Attention: A 2013 update identified 6 RCTs with 223 patients. (22) There was limited evidence of short-term improvement in divided attention (ability to multitask), but no indication of short-term improvements in other aspects of attention. Evidence for persistent effects of cognitive rehabilitation on attention or functional outcomes was lacking.
- Memory: This review has not been updated since 2007. (23) At that time, there were 2 controlled studies of cognitive rehabilitation for memory deficits due to stroke (total N=18). Memory strategy training had no significant effect on memory impairment or subjective memory complaints.

In 2014, Gillespie et al published a review of Cochrane reviews and one subsequently published RCT assessing rehabilitation for post stroke cognitive impairment. (24) Data from 44 trials involving more than 1500 patients were summarized. In addition to poststroke spatial neglect and

attention and memory deficits (addressed in the 3 Cochrane publications previously described), poststroke perceptual disorders, motor apraxia, and executive dysfunction were reviewed. Conclusions were:

- Very little high-quality evidence for the effectiveness of cognitive rehabilitation for poststroke cognitive deficits exists.
- Current evidence indicates that cognitive rehabilitation for spatial neglect, attention deficits, and motor apraxia improve standardized assessments of impairment immediately after treatment. However, durability and clinical significance of these improvements is unclear.
- Evidence for the effectiveness of cognitive rehabilitation for poststroke memory deficits, perceptual disorders, or executive dysfunction was not identified.

A 2001 review of the rehabilitative management of poststroke visuospatial inattention also concluded that long-term impacts of visual scanning and perceptual retraining techniques on overall recovery and functional outcome were unclear. (25)

Zucchella et al (2014) conducted an assessor-blinded RCT of comprehensive cognitive rehabilitation, combining computer training and metacognitive strategies within 4 weeks after stroke. (26) Of 288 consecutive stroke survivors admitted to a neurorehabilitation unit in Italy, 92 (32%) met inclusion criteria and were randomized to cognitive rehabilitation (n=45) or control (n=47). Treatment sessions were held 4 times weekly for 4 weeks and comprised 45 minutes of therapist-guided computer exercises in 6 cognitive domains (time and spatial orientation, visual attention, logical reasoning, memory, executive function) and 15 minutes of cognitive strategizing. Control sessions were held for the same amount of time and comprised conversations with a psychologist discussing general topics, news, and recent events. At the end of treatment (i.e., at week 4), no statistically significant difference was found between groups on any neuropsychological measure.

Epilepsy/Seizure Disorders

Farina et al (2015) in Italy conducted a systematic review of the literature on cognitive rehabilitation in epilepsy. (27) Literature was searched through December 2013, and 18 articles of different types (reviews, methodologic papers, case reports, and experimental studies) were identified. Studies were heterogeneous in patient characteristics (type of epilepsy, type of previous treatment [surgery, antiepileptic drugs]), intervention modalities (e.g., holistic or focused) and duration, and outcome measures. Reviewers considered the overall quality of the body of evidence to be moderate to low, and results inconsistent (e.g., not all studies showed benefit; some studies showed greater benefit in left-sided seizures and others showed greater benefit in right-sided seizures).

The 2013 systematic review by ACRM's Cognitive Rehabilitation Task Force evaluated cognitive rehabilitation in epilepsy. (2) Based on 2 comparative studies (1 randomized; total N=156)), the Task Force recommended cognitive rehabilitation for attention and memory deficits as a "possibly effective" practice option for seizure-related attention and memory deficits. The randomized trial (28) prospectively enrolled 50 patients with focal seizures who were receiving carbamazepine monotherapy. Patients were randomized to a retraining method, aimed at retraining impaired cognitive functions (n=19); a compensation method, aimed at teaching compensatory strategies (n=17); or a waiting-list control group (n=8). Both interventions focused on divided attention (ability to multi-task). At 6-month follow-up, performance on cognitive tests improved more in both intervention groups compared with control. No difference in inhibitory capacity was observed.

Self-reported cognitive complaints, absentmindedness, and quality of life improved more with cognitive rehabilitation. Overall, rehabilitation methods were similarly effective.

The nonrandomized study (29) assessed short-term effects of cognitive rehabilitation on memory deficits in 2 retrospective, matched cohorts of temporal lobe epilepsy surgical patients. Mean age (SD) was 36 (10) years; mean age (SD) at onset of epilepsy was 4 (1) years; and mean IQ was 105. Patients who received cognitive rehabilitation (n=55) participated in a 1-month program comprising educational sessions about brain function and cognitive exercises. A cohort of 57 patients received no cognitive rehabilitation. Statistically significant improvements in verbal learning and recognition were observed in right-resected patients who received cognitive rehabilitation. Cognitive rehabilitation had nonsignificant effects in left-resected patients. Limitations of the study include its retrospective design and baseline imbalances in memory and attention deficits (more severe deficits in the control cohort).

Koorenhof et al (2012) studied left temporal lobe epilepsy surgical patients. (30) Twenty (87%) of 23 recruited surgical candidates completed a total of 4 hours of pre- and/or postoperative memory training and up to 40 sessions of Lumosity©, a web-based cognitive training program. Three to 6 months after surgery, statistically significant improvements on verbal learning and recall tests were observed. After training, patients reported subjective improvements in memory failures (repeated-measures MANOVA, $p<0.3$) and memory nuisance ($p<0.005$). Preoperative memory training was not associated with better outcomes than postoperative training. Improvements in verbal learning were associated with improved mood ($r= -0.58$, $p<0.008$).

Chiappedi et al (2011) reported a retrospective cohort study of 156 children (mean age [SD], 7.6 [6.4] years) with developmental disorders (e.g., cerebral palsy, congenital anomalies) and epilepsy who received comprehensive rehabilitation in Italy. (31) Programs comprised physical therapy, psychomotor rehabilitation including cognitive training, and/or speech and language rehabilitation. Most patients (62%) had severe disability, most (62%) had severe or profound cognitive deficits, and 22% had daily seizures. Because patients were heterogeneous, validated assessment tools were not identified; instead, response to rehabilitation was defined by the treating physician as present or absent. More children who received speech and language rehabilitation responded compared with those who did not ($p<0.001$). The proportion of responders was similar between groups that did or did not receive psychomotor rehabilitation ($p=0.10$). In multivariate analysis, negative predictors of treatment response were severity of impairment (odds ratio [OR], 0.02; 95% confidence interval [CI], 0.01 to 0.14) and daily seizures (OR=0.22; 95% CI, 0.08 to 0.58).

Autism Spectrum Disorders

In 2013, Reichow et al reported a systematic review of psychosocial interventions administered by nonspecialists for children and adolescents with intellectual disability (IQ<70) or lower-functioning autism-spectrum disorders. (32) Five comparative trials in patients with autism-spectrum disorders (total N=255) who received cognitive rehabilitation, training, and support were included. Improvements in school performance and developmental outcomes were inconsistent across trials.

Wang et al (2013) conducted a pilot study of a novel virtual reality-cognitive rehabilitation intervention in 4 children (mean age, 7.4 years) with autism. (33) Children with autism, who are difficult to engage, may respond better to virtual reality approaches than to traditional cognitive rehabilitation. Mean nonverbal IQ ranged from 93 to 139. Each child viewed training programs on laptop computers equipped with tracking webcams; the child's image and movements were

projected into virtual environments where he/she was required to manipulate virtual objects. Outcomes were measures of contextual processing, defined as “the ability to determine an object’s meaning or relevance in a particular context,” and of abstraction and cognitive flexibility, executive functions considered components of contextual processing. After 4 to 6 weeks, all children demonstrated statistically significant improvements in contextual processing and cognitive flexibility. Abstraction scores at baseline were at or close to maximum.

Eack et al (2013) conducted a feasibility study of a comprehensive cognitive rehabilitation intervention, called Cognitive Enhancement Therapy, in 14 “high-functioning” adults (mean age [SD], 25 [6] years) with autism-spectrum disorders. (34) Cognitive Enhancement Therapy, originally developed for schizophrenic patients, provides social interaction and cognitive training focused on attention, memory, and problem solving. Mean full scale IQ of the patient sample was 118 (range, 92-157). Eleven (79%) of 14 patients completed 18 months of treatment. Statistically significant changes from baseline were observed in mean composite measures of neurocognition, cognitive style, social cognition, and social adjustment. All components of neurocognition (e.g., processing speed, working memory) improved statistically except attention/vigilance.

Multiple Sclerosis

Two Cochrane reviews evaluated cognitive rehabilitation in patients with multiple sclerosis (MS) and cognitive impairments. (35,36) In 2012, das Nair et al identified 8 RCTs in patients with MS and memory deficits (total N=521).(35) Cognitive rehabilitation techniques, control interventions, types of MS, and types of memory impairments varied across trials. Five trials had low risk of bias, and 3 trials had high risk of bias. Meta-analysis showed no statistically significant effects of cognitive rehabilitation on memory function or functional abilities immediately after treatment or longer term (any subsequent follow-up). Performance of activities of daily living was statistically worse in the cognitive rehabilitation groups compared with controls at later follow-up.

Rosti-Otajarvi et al (2014) conducted a subsequent Cochrane review of neuropsychological rehabilitation in MS. (36) Twenty RCTs met inclusion criteria (total N=986), including 7 of the 8 trials in the Cochrane review previously described. Overall quality and comparability of included trials was low due to methodologic limitations and variation in interventions and outcome measures across trials, respectively. In meta-analysis, statistically significant improvements in memory span (based on 2 low-quality trials, total N=150; standardized mean difference [SMD], 0.54 [95% CI, 0.20 to 0.88], p=0.002, I^2=0%) and working memory (3 very low-quality trials, total N=288; SMD=0.33 [95% CI, 0.09 to 0.57], p=0.006, I^2=0%) were observed with cognitive training compared with controls. Statistically significant improvements in attention, information processing speed, immediate verbal memory, executive functions, or depression were not observed.

Chiaravalloti et al conducted 2 RCTs in patients with primarily relapsing remitting MS in the United States (total N=117). (37,38) In a 2005 RCT that was included in both Cochrane reviews previously described, 29 (67%) of 43 screened patients who met inclusion criteria were randomized to 8 biweekly 45-minute cognitive rehabilitation sessions (n=15) or control sessions with the same therapist at the same frequency, engaging in nontraining tasks (e.g., reading and recalling a story; n=14). (37) All patients demonstrated baseline impairment in new learning ability in the presence of intact attention/concentration and language comprehension. Cognitive rehabilitation comprised training in the Story Memory Technique; during weeks 1 and 2, patients used imagery to facilitate recall, and during weeks 3 and 4, patients used context to aid new learning. Neuropsychologic assessments in 7 domains (attention/concentration, language, intelligence, information processing, emotional functioning, episodic memory, metamemory

[self-assessment]) were made at baseline, immediately after treatment (week 5), and 5 weeks later (during week 11). At 5 weeks and 11 weeks, there was no statistical difference between groups in new learning (episodic memory) or emotional functioning. Self-reported improvements in memory were greater in the cognitive rehabilitation group compared with the control group at both time points. Results for other neuropsychological assessments were not reported. Analysis of subgroups defined by level of cognitive impairment (mild vs. moderate-severe) showed statistically significant between-group differences in episodic memory, but because patient numbers were very small and there was no correction for multiple testing, this analysis must be considered exploratory.

In a 2013 RCT, Chiaravalloti et al randomized 88 patients with MS to 10 biweekly 45- to 60-minute sessions of modified Story Memory Technique training (mSMT; n=46) or control (n=42). (38) All patients demonstrated new learning impairment on baseline neuropsychological screen. The mSMT training and the control intervention were carried out as previously described, with the addition of 2 additional sessions for patients in the treatment group to apply mSMT to real-world settings. Primary outcome was learning efficiency (rate of improvement in objective memory) during the first 8 sessions of training at 5 weeks (immediately after treatment) and at 6-month follow-up. At 5 weeks, learning efficiency was greater in the cognitive rehabilitation group compared with controls. Improvements in objective everyday memory, general contentment (subjective everyday cognition and emotional functioning), apathy, and executive dysfunction also were greater in the cognitive rehabilitation group. Between-group differences in awareness level, depression, or anxiety were not statistically significant. At 6-month follow-up, the only persistent between-group difference was in general contentment.

In 2014, Rosti-Otajarvi et al (39) reported 1-year follow-up results of a multicenter RCT that was included in the later Cochrane review previously described. Patients with relapsing remitting MS and attentional deficits were randomized 3:2 to receive strategy-oriented neuropsychological rehabilitation (13 weekly 60-minute sessions) or no intervention (N=102). In the original trial, (40) neuropsychological rehabilitation did not improve cognitive performance immediately after the intervention (at week 13) or at 6 months, but statistically significant improvements in perceived cognitive deficits were observed at both time points. In the follow-up report, statistically significant differences in perceived cognitive deficits persisted for an additional 6 months (1 year from baseline). However, only 78 (76%) of 102 randomized patients completed 1-year follow-up, and dropout was differential (83% completers in the neuropsychological rehabilitation group vs. 67% in the control group). Due to the likely possibility that dropout was related to the outcome of interest (e.g., patients with perceived cognitive decline may have been more likely to drop out), cautious interpretation of the findings is warranted.

Studies of self-administered computer programs in patients with MS (41-43) are not considered cognitive rehabilitation for the purposes of this policy and are not reviewed here.

Section Summary
Although numerous RCTs have investigated cognitive rehabilitation in MS, large, high-quality trials are lacking. The ability to make conclusions based on the overall body of evidence is limited by heterogeneity of patient samples, interventions, and outcome measures. Further, results of the available RCTs are mixed, with positive studies mostly reporting short-term benefits. Evidence for clinically significant, durable improvements in cognition is currently lacking.

Cancer

Cognitive rehabilitation has been investigated in 2 cancer-related settings: in patients with brain tumors and in cancer survivors whose cognitive deficits are attributed to cancer treatment.

Brain Tumors

The 2013 systematic review by ACRM's Cognitive Rehabilitation Task Force evaluated cognitive rehabilitation for adults with brain tumors. (2) In 5 case reports and case series (total N=36), some patients showed benefit with various cognitive rehabilitation interventions. This evidence was considered insufficient to support any recommendation.

Zucchella et al (2013) conducted an RCT of cognitive rehabilitation in postneurosurgical adults at a single rehabilitation facility in Italy. (44) Time since craniotomy was not reported. Adjuvant chemotherapy or radiotherapy was not administered until after the study. Of 109 consecutive patients screened for trial participation, 62 (57%) met minimum cognitive deficit and other criteria and were randomized to usual rehabilitative care with (n=30) or without (n=32) cognitive rehabilitation. Treatment sessions were held 4 times weekly for 4 weeks and comprised 45 minutes of therapist-guided computer exercises in 6 cognitive domains (time and spatial orientation, visual attention, logical reasoning, memory, executive function) and15 minutes of cognitive strategizing. At the end of treatment (i.e., at week 4), statistically significant improvements in visual attention and verbal memory were observed in the treatment group compared with controls. Improvements in logical-executive function were not statistically significant. Because of limited follow-up in this study, clinical significance of the findings is unclear.

Cancer Survivorship

The 2013 systematic review by ACRM's Cognitive Rehabilitation Task Force evaluated cognitive rehabilitation for cognitive impairments in adult and pediatric cancer survivors. (2) One German RCT showed no benefit with cognitive rehabilitation in 157 adult inpatients who had cognitive impairments after hematopoietic stem cell transplantation. (45) In children and adolescents, 2 prospective, comparative studies (1 RCT [46]) evaluated cognitive rehabilitation in survivors of treatment (resection, cranial radiation, and/or chemotherapy) involving the central nervous system (total N=192). Reviewers concluded that process based cognitive rehabilitation techniques (e.g., strategy acquisition and corrective feedback) are "probably effective" in treating attention and memory deficits in these patients. However, the RCT had several methodologic limitations:(46) Butler et al (2008) randomized 161 pediatric survivors of treatment for brain tumors, leukemia, bone marrow transplant involving total body irradiation, and non-Hodgkin lymphoma 2:1 to a cognitive remediation program (n=108) or waiting-list control (n=53). Documented attentional deficit was required for trial eligibility. The cognitive remediation program comprised 2-hour weekly sessions of practice, strategy acquisition, and cognitive-behavioral interventions for up to 20 sessions. Both groups were assumed to receive special education services if needed; this factor was not evaluated in results analysis. The primary outcome was change from baseline in 5 investigator-developed, multitest indices (academic achievement, brief focused attention, working memory, memory recall, vigilance) at approximately 6 months after baseline assessments. These indices incorporated results from 11 validated scales completed by blinded study assessors and unblinded parents, teachers, and patients. Mean (SD) patient age was 11 (3) years. Sixty percent of patients in the cognitive remediation group completed the entire program; 80% completed 75% (15 sessions). Six-month follow-up was differential between groups (83% in the cognitive remediation group vs. 98% in the control group). Analysis was intention to treat.

Statistically greater improvement was observed in the cognitive remediation group compared with the control group only in academic achievement, although the treatment effect was small (SMD=0.24), and clinical relevance is uncertain. Given the lack of improvement on neurocognitive scales, it does not appear that improved academic achievement was due to improved neurocognitive function. Overall, this RCT does not demonstrate improved outcomes with cognitive rehabilitation.

Cherrier et al (2013) evaluated group cognitive rehabilitation in adult cancer survivors. (47) Patients from the local area who completed cancer treatment 6 or more months previously (median, 3 years) and had subjective concerns about cognitive decline related to their cancer diagnosis or treatment were eligible. Primary cancer diagnoses included breast, bladder, prostate, colon, and uterine. Of 53 patients screened, 28 patients (53%) were randomized to 7 weekly, hour-long workshops focusing on memory and attention techniques, or to a waiting-list control group. Four patients in the treatment group who attended less than 2 group sessions were excluded from analysis. At 1 to 2 weeks after completion of 7 treatment sessions (7-8 weeks after baseline assessments for controls), there were statistically greater improvements in cognition-related quality-of-life measures in the cognitive rehabilitation group compared with controls, but most neurocognitive tests showed no statistical difference between groups.

Studies of self administered computer programs in pediatric (48) and adult (49) cancer survivors are not considered cognitive rehabilitation for the purposes of this policy and are not reviewed here.

Ongoing and Unpublished Clinical Trials

Some currently unpublished trials that might influence this policy are listed in Table 1. ClinicalTrials.gov currently lists approximately 40 studies of cognitive rehabilitation for the following clinical conditions: TBI; AD and mild cognitive impairment; breast and pediatric cancer survivorship; cancer chemotherapy induced cognitive impairment; postmalaria cognitive impairment in children; cocaine abuse; MS; Parkinson disease; posttraumatic stress disorder in veterans; schizophrenia; and stroke. Most are randomized trials.

Table 1. Summary of Key Trials

NCT No. Ongoing	Trial Name	Planned Enrollment	Completion Date
NCT02265757	Comparative Effectiveness of Behavioral Interventions to Prevent or Delay Dementia (CEBIPODD)	600	Jun 2017
NCT01788618	Cancer and Disorders of Cognitive Functions and Quality of Life: “Cognitive Rehabilitation in Patients Suffering from Cancer and Treated with Chemotherapy”	168	Jun 2015
NCT02091453	The Protocol and Design of a Randomized Controlled Study on Attention Training in First Year After Acquired Brain Injury	120	Dec 2016

NCT: national clinical trial.

Summary

For patients with traumatic brain injury, there are numerous RCTs evaluating the efficacy of cognitive rehabilitation. However, these trials have methodologic limitations and report mixed results, indicating that there is not a uniform or consistent evidence base supporting the efficacy

of this technique. However, alternative treatments for cognitive deficits due to TBI are limited, and there is potential for significant reduction in adverse outcomes. Evidence is therefore considered sufficient to determine that cognitive rehabilitation as a distinct and definable component of the rehabilitation process improves the net health outcome in patients with cognitive deficits due to TBI.

For the aging population, including patients with Alzheimer disease, and for patients with cognitive deficits due to stroke, postencephalopathy, autism spectrum disorder, seizure disorder, multiple sclerosis (MS), brain tumor, or previous treatment for cancer, evidence on cognitive rehabilitation is insufficient to permit conclusions, and clinical input did not uniformly favor cognitive rehabilitation. Although the body of evidence includes RCTs, methodologic limitations limit conclusions that may be drawn. Larger studies with longer follow-up are needed to demonstrate durable benefits of cognitive rehabilitation therapy in these patients.

Clinical Input Received From Physician Specialty Societies and Academic Medical Centers
While the various physician specialty societies and academic medical centers may collaborate with and make recommendations during this process through the provision of appropriate reviewers, input received does not represent an endorsement or position statement by the physician specialty societies or academic medical centers, unless otherwise noted.

2015 Input
In response to requests, input was received from 3 physician specialty societies and 5 academic medical centers while this policy was under review in 2015. Input was mixed on cognitive rehabilitation for patients with stroke, MS, brain tumors, or cognitive impairments after previous treatments for cancer.

2009/2010 Input
In response to requests, input was received from 2 physician specialty societies and 5 academic medical centers while this policy was under review in 2009 and 2010.The strongest support was for use of cognitive rehabilitation as part of the treatment of those with TBIs. The level of support varied for other diagnoses such as use in poststroke patients.

Practice Guidelines and Position Statements

American Congress of Rehabilitation Medicine
Based on a 2013 systematic review, the American Congress of Rehabilitation Medicine's Cognitive Rehabilitation Task Force recommended process-based cognitive rehabilitation strategies (e.g., attention process training, strategy acquisition and internalization, self-monitoring, and corrective feedback) to treat attention and memory deficits in children and adolescents with brain cancers who undergo surgical resection and/or radiotherapy. (2)

National Institute for Health and Care Excellence
NICE guidance (2013) on stroke rehabilitation recommends cognitive rehabilitation for visual neglect and memory and attention deficits that impact function. (50) Interventions should focus on relevant functional tasks, e.g., errorless learning and elaborative techniques (mnemonics, encoding strategies) for memory impairments.

Institue of Medicine
The Institute of Medicine published a report in October 2011 titled "Cognitive Rehabilitation Therapy for Traumatic Brain Injury" (51) that included a comprehensive review of the literature

and recommendations. The report concluded that … “current evidence provides limited support for the efficacy of CRT interventions. The evidence varies in both the quality and volume of studies and therefore is not yet sufficient to develop definitive guidelines for health professionals on how to apply CRT in practice.” The report recommended that standardization of clinical variables, intervention components, and outcome measures was necessary in order to improve the evidence base for this treatment. They also recommended that future studies are needed that have larger sample sizes and include a more comprehensive set of clinical variables and outcome measures.

Veterans Administration
The VA/Department of Veterans Affairs (DoD) published guidelines on the treatment of concussion/mild traumatic brain injury (TBI) in 2009. (52) These guidelines address cognitive rehab in the setting of persistent symptoms. The guidelines state: “Individuals who present with memory, attention, and/or executive function problems which did not respond to initial treatment (e.g., reassurance, sleep education, or pain management) may be considered for referral to cognitive rehabilitation therapists with expertise in TBI rehabilitation (e.g., speech and language pathology, neuropsychology, or occupational therapy) for compensatory training **[Strength of Recommendation = C]**; and/or instruction and practice on use of external memory aids such as a personal digital assistant (PDA) **[Strength of Recommendation = C].**”

Government Regulations

National:
There is no NCD on this topic. In the absence of an NCD, coverage decisions are left to the discretion of local Medicare carriers.

Local:
National Government Services (NGS) LCD, “LCD for Outpatient Physical and Occupational Therapy Services (L26884).” MI. Fiscal Intermediary #00452:

CPT Code 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:

This activity is designed to improve attention, memory, and problem-solving, including the use of compensatory techniques. Cognitive skill training may be medically necessary for patients with acquired cognitive deficits resulting from head trauma, or acute neurologic events including cerebrovascular accidents. Impaired functions may include but are not limited to ability to follow simple commands, attention to tasks, problem solving skills, memory, ability to follow numerous steps in a process, perform in a logical sequence and ability to compute. Conditions without potential for improvement or restoration, such as chronic progressive brain conditions, would not be appropriate. Evidence-based reviews indicate that cognitive rehabilitation (and specifically memory rehabilitation) is not recommended for patients with severe cognitive dysfunction. Cognitive skill training should be aimed towards improving or restoring specific functions which were impaired by an identified illness or injury, and expected outcomes should be reasonably attainable by the patient as specified by the plan of care.

Activities billed as cognitive skills development include only those that require the skills of a therapist and must be provided with direct (one-on-one) contact between the patient and the

qualified professional/auxiliary personnel. These services are also reimbursable when billed by clinical psychologists. Those services that a patient may engage in without a skilled therapist qualified professional/auxiliary personnel are not covered under the Medicare benefit.

Coverage for 97532 is limited to the following conditions.

- 310.1 Personality change due to conditions classified elsewhere
- 310.81 Pseudobulbar affect
- 310.89 Other specified nonpsychotic mental disorders following organic brain damage
- 310.9 Unspecified nonpsychotic mental disorder following organic brain damage

Please also add the ICD-9-CM code for the underlying disorder (cause).

Supportive Documentation Requirements (required at least every 10 visits) for 97532

- Objective assessment of the patient's cognitive impairment and functional abilities
- Prognosis for recovery of the specific impaired cognitive abilities (remediation)
- A determination of a range of compensatory strategies that the individual can realistically utilize to improve daily functioning in a meaningful way
- Specific cognitive activities performed, amount of assistance, and the patient's response to the intervention, to demonstrate that the skills and expertise of the therapist were required.

Michigan Department of Community Health:

For cognitive rehabilitation, Medicaid allows 144 units per 12 months; must be reauthorized every 2 months. The Michigan Department of Community Health (MDCH) offers a Traumatic Brain Injury Rehabilitation Program for Medicaid eligible persons who have experienced a brain injury within the previous 15 months and meet medical eligibility criteria. Additional income and asset criteria may be required for eligibility. The program offers comprehensive rehabilitation services for individuals with a brain injury for three to six months. This program does not offer a cognitive rehabilitation (retraining) program for persons who do not also need physical therapy. Moreover, at any given time, there are few individuals in Michigan who meet the eligibility criteria.

Cognitive rehabilitation can be billed only as an outpatient service and there is no practitioner billing coverage. The fee for this CPT code with the appropriate revenue code can be billed *only* during the summer months for school-aged children to replace the school-based services that they are receiving. Therapies that are provided by school-based services are generally excluded by the health plan.

(The above Medicare information is current as of the review date for this policy. However, the coverage issues and policies maintained by the Centers for Medicare & Medicare Services [CMS, formerly HCFA] are updated and/or revised periodically. Therefore, the most current CMS information may not be contained in this document. For the most current information, the reader should contact an official Medicare source.)

Related Policies

- Sensory Integration Therapy
- Coma Stimulation

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The articles reviewed in this research include those obtained in an Internet based literature search for relevant medical references through 9/9/15, the date the research was completed.

Joint BCBSM/BCN Medical Policy History

Policy Effective Date	BCBSM Signature Date	BCN Signature Date	Comments
4/6/03	4/6/03	4/9/03	Joint policy established; procedure considered experimental and investigational.
08/2005	N/A	N/A	Policy changed to BCN-only policy (see history below)
11/1/12	6/12/12	6/15/12	Policy brought back as a joint policy; policy status changed to established for selected patients with TBI or other neurological injuries including stroke.
4/16/13	4/16/13	4/22/13	Policy references updated; added information to medical policy statement to check individual contract, certificate or rider regarding coverage of cognitive rehab.
1/1/15	10/21/14	11/3/14	Routine maintenance; added additional covered ICD9 diagnosis codes in 432-433 range. Rationale and references updated.
1/1/16	12/10/15	12/10/15	Routine maintenance; added additional references. No change in policy status.

Next Review Date: 4th Qtr, 2016

BCN Medical Policy History

Policy Date	Comments
10/12/98	BCN policy established
6/14/01	Policy updated
4/6/03 (Joint policy)	Policy converted to a joint policy
11/21/06	Reverted to BCN only policy
6/27/08	Routine maintenance; added BlueCaid coverage information
9/23/09	Policy updated

BLUE CARE NETWORK BENEFIT COVERAGE POLICY: COGNITIVE REHABILITATION

I. Coverage Determination:

Commercial HMO (includes Self-Funded groups unless otherwise specified)	Coverage for cognitive rehabilitation is available **only** if one of the following conditions are met: 1. The member's certificate does not specifically exclude cognitive rehabilitation (e.g., BCN1, BCN Basic, FEHBP, Non-Group); OR 2. The patient has a specific rider covering cognitive rehabilitation. If eligible for coverage, cognitive rehabilitation is covered only for the diagnosis of either traumatic brain injury or stroke. It is not covered for treatment of patients with chronic progressive brain conditions without reasonable potential for restoration (e.g., Alzheimer's disease, etc.). For BCN certificates that list cognitive rehabilitation as a general benefit exclusion, cognitive rehabilitation is not covered for any condition.
BCNA (Medicare Advantage)	Cognitive rehabilitation is covered for patients with traumatic brain injury and acute neurologic injury, including stroke (acute cerebrovascular accidents). Not covered for treatment of patients with chronic progressive brain conditions without reasonable potential for restoration (e.g., Alzheimer's disease, etc.). Covered for the following diagnosis codes only: • 310.1 Personality change due to conditions classified elsewhere • 310.81 Other specified nonpsychotic mental disorders following organic brain damage-Pseudobulbar affect • 310.89 Other specified nonpsychotic mental disorders following organic brain damage • 310.9 Unspecified nonpsychotic mental disorder following organic brain damage Supportive documentation required at least every 10 visits.
BCN65 (Medicare Complementary)	Coinsurance covered if primary Medicare covers the service.
Blue Cross Complete of Michigan	Medicaid allows 144 units per 12 months; must be reauthorized every 2 months. The Michigan Department of Community Health (MDCH) offers a Brain Injury

	Rehabilitation Program for Medicaid eligible persons who have experienced a brain injury within the previous 15 months and meet medical eligibility criteria. Additional income and asset criteria may be required for eligibility. The program offers comprehensive rehabilitation services for individuals with a brain injury for three to six months. This program does not offer a cognitive rehabilitation (retraining) program for persons who do not also need physical therapy. Moreover, at any given time, few individuals in Michigan meet the eligibility criteria. Cognitive rehabilitation can be billed only as an outpatient service and there is no practitioner billing coverage. But the fee for this CPT code with the appropriate revenue code can be billed *only* during the summer months for school aged children to replace the school based services that they are receiving. Therapies that are provided by school based services are generally excluded by the health plan.

II. Administrative Guidelines:

- The member's contract must be active at the time the service is rendered.
- The patient's certificate MUST NOT specifically exclude cognitive rehabilitation services (e.g., BCN1 etc.), OR the patient the patient MUST have a rider explicitly covering cognitive rehabilitation, Check the member's certificate and rider for eligibility for cognitive rehabilitation.
- The service must be authorized by the member's PCP except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Services must be performed by a BCN-contracted provider, if available, except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Payment is based on BCN payment rules, individual certificate and certificate riders.
- Appropriate copayments will apply. Refer to certificate and applicable riders for detailed information.
- CPT - HCPCS codes are used for descriptive purposes only and are not a guarantee of coverage.