Cognitive Rehabilitation and Sensory Integration Therapy

Policy Number: MM.09.001
Original Effective Date: 08/01/2009
Line(s) of Business: HMO; PPO
Current Effective Date: 08/24/2012
Section: Rehabilitative Therapy (PT; OT; Speech)
Place(s) of Service: Outpatient

I. Description

Cognitive rehabilitation is a therapeutic approach 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 integration therapy (or auditory integration therapy (AIT) or facilitated communication (FC)) may be considered a component of cognitive rehabilitation. Sensory integration therapy is a technique that has been investigated as a treatment of autism, mental retardation, or learning disabilities. It is a complex treatment modality consisting of both the sensory stimulation selected to match a child’s sensory needs and the child’s adaptive responses to the sensory stimulation. The therapy usually involves full body movements that provide vestibular, proprioceptive, and tactile stimulation. The goal of therapy is to improve the way the brain processes and organizes sensations, as opposed to teaching higher-order skills themselves.
II. Criteria/Guidelines

A. Cognitive rehabilitation (as a distinct and definable component of the rehabilitation process) is covered when provided by a qualified licensed professional such as a physician, licensed psychologist, speech therapist or occupational therapist (subject to Limitations/Exclusions and Administrative Guidelines) in the rehabilitation of patients with traumatic brain injury.

1. Therapy must be prescribed by the attending physician as part of a written care plan; AND
2. Patient must show potential for improvement (based on pre-injury function) and must be able to actively participate in the program. Active participation requires sufficient cognitive function to understand and participate in the program as well as adequate language expression and comprehension, i.e., participants should not have severe aphasia; AND
3. The patient is expected to show measurable and meaningful functional improvement within a predetermined timeframe (depending on the underlying diagnosis/medical condition) from the start of cognitive rehabilitation therapy. Goals and expected timeframes should be addressed prior to the onset of treatment; AND
4. The treating physician should review the treatment plan periodically to assess the continued need for participation and documented objective evidence of progress.

III. Limitations/Exclusions

A. Cognitive rehabilitation is not covered for all other applications, including, but not limited to, stroke, post-encephalitic or post-encephalopathy patients, and the aging population, including Alzheimer’s patients as it has not been shown to improve health outcomes.

B. Sensory integration therapy is not covered as payment determination criteria are not met.

IV. Administrative Guidelines

A. Precertification is required for cognitive rehabilitation of patients with traumatic brain injury. Providers should submit their precertification request to HMSA’s Medical Management department. The following documentation must be submitted from the medical record:

1. Written care plan
2. Clinical notes
3. Imaging studies for initial requests to confirm the diagnosis of traumatic brain injury

B. Patients requesting services that are not a covered benefit should be informed that they will be responsible to pay for the services. To prevent misunderstandings about financial responsibility, the provider may ask the patient to sign an Agreement of Financial Responsibility prior to performing the services.

<table>
<thead>
<tr>
<th>CPT</th>
<th>Description</th>
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<tbody>
<tr>
<td>97532</td>
<td>Development of cognitive skills to improve attention, memory, problem solving (include compensatory training), direct (one-on-one) patient contact by the provider, each 15 minutes</td>
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V. Scientific Background

Traumatic Brain Injury

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

For the Assessment’s main evidence review, randomized, controlled trials (RCTs) 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. 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. 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 RCTs of cognitive rehabilitation for specific cognitive defects showed inconsistent support for cognitive rehabilitation. (Please refer to the 2008 TEC Assessment for further details of these studies, including the citations.) 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, 2 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 studies assessing cognitive test outcomes was plagued by numerous methodologic 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, the randomized trials reviewed in the TEC Assessment did not show strong evidence for efficacy in the treatment of traumatic brain injury. Many of the 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. (5) This study was intended to be a more rigorous evaluation of the nonrandomized study (4) 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.

**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. It found 6 randomized, controlled trials (RCTs) on cognitive training that met study selection criteria, none of which reported any statistically significant between-group differences on any outcomes. A randomized trial was published in 2003 by Spector et al. A total of 115 subjects were randomized to receive a cognitive stimulation program or to a control group. The intervention program ran for 7 weeks, and patients were only evaluated at this time point. 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 speculate that the intervention would need to be continued on a regular basis beyond 7 weeks. The 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. One study reported on patients who had not yet developed dementia. A study of 2,832 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. 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. 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 cognitive rehabilitation. An additional randomized study of 54 patients evaluated the combined effect of a cognitive-communication therapy plus an acetylcholinesterase inhibitor as compared to drug treatment alone. 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. While the 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. The use of cognition-based interventions for healthy older people and people with mild cognitive impairment was the subject of a Cochrane systematic review published in 2011. The review 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.

Kurz et al. published an RCT in 2011 for patients with Alzheimer’s disease and early dementia. The population consisted of 201 patients with clinical evidence and dementia and a MMSE score of at least 21/30 who were randomized to a 12-week cognitive rehabilitation program. 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 were no between group differences on any of the outcome measures. 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.

**Post-encephalopathy**

Recent reports on cognitive rehabilitation and encephalopathy were limited to 2 small, uncontrolled series. While both series reported favorable results with rehabilitation, the data are inadequate to change the conclusions of the earlier TEC Assessment.

**Stroke**

The effectiveness of cognitive rehabilitation for stroke was assessed in 3 Cochrane reviews that separately evaluated memory deficits, attention deficits, and spatial neglect. The most recent updates of these reviews made the following conclusions.

- Controlled studies investigating the effectiveness of cognitive rehabilitation in improving memory deficits due to stroke were limited to 2 trials of 18 patients. Outcomes showed that memory strategy training had no significant effect on memory impairment or subjective memory complaints.
- Attention deficits following stroke were evaluated in 2 controlled trials involving 56 patients. The review concluded that there is some indication that training improves alertness and sustained attention but no evidence exists to support or refute the use of
cognitive rehabilitation for attention deficits to improve functional independence after stroke.

- The Cochrane review of cognitive rehabilitation for spatial neglect included 12 studies involving 306 subjects. Reported outcome measures varied widely between studies. The reviewers concluded that there is some evidence that cognitive rehabilitation for spatial neglect improves performance on some impairment tests, but its effect on disability is unclear. Further well-designed randomized controlled trials are warranted as well as basic research to develop valid outcome measures.

A second review on the rehabilitative management of post-stroke visuospatial inattention also concluded that the long-term impact of visual scanning and perceptual retraining techniques on overall recovery and functional outcome was unclear.

**Clinical Input Received through Physician Specialty Societies and Academic Medical Centers**

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. 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. The strongest support was for use of cognitive rehabilitation as part of the treatment of those with traumatic brain injuries. The level of support varied for other diagnoses such as use in post-stroke patients.

**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. Based on review of the published trials, together with the clinical input, and consideration of the limited alternative treatments, use of cognitive rehabilitation as a distinct and definable component of the rehabilitation process may be considered medically necessary as part of the treatment of those with traumatic brain injury.

For other indications, the evidence on cognitive rehabilitation is insufficient to permit conclusions, and the clinical input was not uniform in favor of cognitive rehab. Therefore, use of cognitive impairment in disease states other than traumatic brain injury is considered investigational.

**Practice Guidelines and Position Statements**

The Institute of Medicine published a report in October 2011 titled “Cognitive Rehabilitation Therapy for Traumatic Brain Injury” 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
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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.

The VA/Department of Veterans Affairs (DoD) published guidelines on the treatment of concussion/mild traumatic brain injury (TBI) in 2009. 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].

Medicare National Coverage - None

Sensory Integration Therapy

This policy was originally based on a 1999 TEC Assessment that compared the outcomes of sensory integration (SI) therapy with that of standard occupational/physical therapy among children with autism, mental retardation, or learning disabilities. The literature at that time consisted of 1 study that focused on the use of SI therapy in patients with autism and 3 studies that focused on patients with mental retardation; these 3 studies were inconsistent in their results regarding the superiority of SI therapy. Eleven studies were identified that in total included more than 600 learning disabled children. Studies that used random assignment and blinded assessors suggested that SI therapy was not superior to conventional therapy and, in many cases, was not even demonstrably superior to any treatment at all. A 1999 meta-analysis also reported that the most recent studies of SI therapy did not seem to support its effectiveness. Periodic literature searches using the MEDLINE database have been performed regularly since the 1999 TEC Assessment. These updates, with the most recent conducted for the period of September 2010 through July 2011, have primarily identified small case series. Systematic reviews and comparative studies are described here.

Systematic Reviews

Case-Smith and Arbesman reviewed the evidence for SI therapy as part of a systematic review of interventions for autism used in occupational therapy in 2008. The authors identified one level-1 study, which was a systematic review from 2002 that had found only lower quality evidence (levels III and IV, with small sample size and lack of control groups), suggesting that SI intervention was associated with positive changes in social interaction, purposeful play, and decreased sensitivity. It was concluded that “although each of these studies had positive findings, when combined, the evidence remains weak and requires further study.”

May-Benson and Koomar published a systematic review of SI therapy in 2010. The review identified 27 research studies (13 level-I randomized trials) that met the inclusion criteria. Most
of the studies had been performed in children with learning or reading disabilities; there were 2 case reports/small series on the effect of SI therapy in children with autism. The review concluded that although the SI approach may result in positive outcomes, findings may be limited because of small sample sizes, variable intervention dosage, lack of fidelity to intervention, and selection of outcomes that may not be meaningful or may not change with the treatment provided.

Controlled Trials

The Sensory Processing Disorders Scientific Workgroup has discussed the methodologic challenges of conducting intervention effectiveness studies of dynamic interactional processes, the lack of scientific evidence to support current practice, and methods for improving the quality of research in this area. In 2007, members of the workgroup also reported results from a single institution randomized pilot study for a proposed multicenter trial. Thirty families (of approximately 140 who met the inclusion/exclusion criteria) agreed to participate over a 3-year period. The children had a clinical diagnosis of sensory modulation disorder following a comprehensive evaluation with standardized and clinical testing (including responses to sensory stimuli, attempts by the child to self-regulate, behavioral disorganization, and somatic responses to the testing situations). The 24 children who began treatment were randomly assigned to 1 of 3 groups consisting of occupational therapy with SI (2 times per week for 10 weeks, n=7), equivalent activity control sessions (n=10), or a waiting-list control group (n=7). Functional improvements were assessed by 5 validated/standardized parental rating scales. Significant improvements relative to both control groups were obtained for Goal Attainment Scaling (37 vs. 14 vs. 7, consecutively). A number of the other outcome measures (Leitner International Performance Scale, Short Sensory Profile, Internalizing on the Child Behavior Checklist) showed trends for improvement in this small study. Additional study with a larger number of subjects is needed.

Another pilot study, reported in 2011, randomized 37 children with a sensory processing disorder (21 with autism and 16 with pervasive developmental disorder not otherwise specified) to SI interventions or to fine motor interventions (18 treatments over 6 weeks). Fidelity to SI interventions was verified with a fidelity measure developed for research by Parham et al. Blinded evaluation at the conclusion of the intervention found no significant difference between the 2 groups on the Quick Neurological Screening Test (QNST) or sensory processing scores except for Autistic Mannerisms (e.g., stereotyped or self-stimulatory behavior) subscale. The SI group demonstrated greater improvement than the fine motor group on individualized Goal Attainment Scaling. Post-hoc analysis found that more children in the SI group were able to complete parts of the standardized QNST after the intervention. This finding is limited by the post-hoc analysis and the difference in the 2 groups at baseline.

In a 2003 study of 45 children with Down’s syndrome divided into 3 treatment groups (sensory integrative therapy alone, vestibular stimulation combined with sensory integrative therapy, and neurodevelopmental therapy), Uyanik and colleagues reported greater improvements in outcomes in the vestibular stimulation with SI therapy group and in the neurodevelopmental therapy group when compared to the SI therapy alone group. Outcomes assessed were the Ayres Southern California Sensory Integration Test, Pivot Prone Test, Gravitational Insecurity Test, and
Pegboard Test along with physical assessment. The authors concluded all methods of treatment should be considered when planning rehabilitation therapies for children with Down’s syndrome, even though sensory integrative therapy alone was not shown to be superior to the other therapy groups.

**Summary**

Overall, the evidence remains insufficient to evaluate the effect of this treatment on health outcomes. As noted by Kratz, “there exists very little research that supports the effectiveness of any intervention for children with chronic or mild disabilities across all disciplines.” Due to the individual nature of SI therapy and the large variation in individual therapists and patients, large multicenter randomized controlled trials are needed to evaluate the efficacy of this intervention. Therefore, the policy statement remains unchanged.

**Practice Guidelines and Position Statements**


In 2009, the American Occupational Therapy Association (AOTA) stated that the AOTA recognizes sensory integration (SI) as one of several theories and methods used by occupational therapists and occupational therapy assistants working with children in public and private schools to improve a child’s ability to access the general education curriculum and to participate in school-related activities.

**VI. Important Reminder**

The purpose of this Medical Policy is to provide a guide to coverage. This Medical Policy is not intended to dictate to providers how to practice medicine. Nothing in this Medical Policy is intended to discourage or prohibit providing other medical advice or treatment deemed appropriate by the treating physician.

Benefit determinations are subject to applicable member contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control.

This Medical Policy has been developed through consideration of the medical necessity criteria under Hawaii’s Patients’ Bill of Rights and Responsibilities Act (Hawaii Revised Statutes §432E-1.4), generally accepted standards of medical practice and review of medical literature and government approval status. HMSA has determined that services not covered under this Medical Policy will not be medically necessary under Hawaii law in most cases. If a treating physician disagrees with HMSA’s determination as to medical necessity in a given case, the physician may request that HMSA reconsider the application of the medical necessity criteria to the case at issue in light of any supporting documentation.
VIII. References


22. Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Sensory integration therapy. TEC Assessment 1999; Volume 14, Tab 22.
