Clinical Practice Guideline: **Sensory Integrative (SI) Therapy**

Date of Implementation: **April 19, 2012**

Product: **Specialty**

GUIDELINES

Medically Necessary

Ayres Sensory Integration Therapy® is considered medically necessary for treatment of individuals with autism spectrum disorder when **ALL of the following** have been met:

- The individual's condition has the potential to improve or is improving in response to therapy, maximum improvement is yet to be attained; and there is an expectation that the anticipated improvement is attainable in a reasonable and generally predictable period of time.
- The program is individualized, and there is documentation outlining quantifiable, attainable treatment goals.
    - Progress toward short- and long-term goals is documented to support continuation of treatment and goals are not yet met.
    - Improvement is evidenced by successive objective measurements.
    - Generalization and carryover of targeted skills into natural environment is occurring.
- Individual is actively participating in treatment sessions.
- The services are delivered by a qualified provider of therapy services (i.e., appropriately trained and licensed by the state to perform therapy services).
- Therapy occurs when the judgment, knowledge, and skills of a qualified provider of therapy services (as defined by the scope of practice for therapists in each state) are necessary to safely and effectively furnish a recognized therapy service due to the complexity and sophistication of the plan of care and the medical condition of the individual, with the goal of improvement of an impairment or functional limitation.

Ayres Sensory Integration Therapy is considered unproven for any other indication.

All other forms of sensory integration therapy (SIT) are each considered unproven for any indication.

As stated, under most circumstances, most forms of SI therapy are not medically necessary and would be considered unproven. SI therapy has shown some promise in particular patient populations and would be reviewed on a case-by-case basis for medical necessity.

ALL of the following criteria must be met for consideration of medical necessity on a case-by-case basis:

- The patient is a child or adolescent.
- Other supported therapies have been tried without success.
- SI therapy is provided as one of the components of a comprehensive treatment plan.
- The loss of sensory systems compromises patient safety.
- Therapy must provide adaptions to allow the patient to safely interact with their environment.
- The patient's medical records should document the practitioner's clinical rationale for the services provided and include:
    - Objective assessments of the patient's sensory integration impairments and functional limitations; and
    - Description of the treatment techniques used that will improve sensory processing and promote adaptive responses to environmental demands, and the patient's response to the intervention, to support that the practitioner's skills were required.

CPT® Codes and Descriptions

CPT® Code	CPT® Code Description
97533	Sensory integrative techniques to enhance sensory processing and promote adaptive responses to environmental demands, direct (one-on-one) patient contact, each 15 minutes

BACKGROUND AND DESCRIPTION

Sensory integration (SI) therapy has been proposed as a treatment of developmental disorders in patients with established dysfunction of sensory processing, e.g., children with autism, attention deficit hyperactivity disorder (ADHD), brain injuries, fetal alcohol syndrome, and neurotransmitter disease. Sensory integration therapy may be offered by occupational and physical therapists. Sensory Integrative Techniques (SIT), also known as Sensory Integrative Therapy, are performed to enhance sensory processing and promote adaptive responses to environmental demands. These techniques are performed when a deficit in processing input from one of the sensory systems (e.g., vestibular, proprioceptive, tactile, visual, or auditory) decreases an individual's ability to make adaptive sensory, motor and behavioral responses to environmental demands. Practitioners have used SIT for

years for patients who demonstrate a variety of problems, including sensory defensiveness, over-reactivity to environmental stimuli, attention difficulties, and behavioral problems. Sensory integration techniques are used to organize the sensory system by involvement of full body movements that provide vestibular, proprioceptive, and tactile stimulation. Brushes, swings, balls, and other specially designed therapeutic or recreational equipment are used to provide these stimuli. Proponents believe the goal of SIT is to improve the way the brain processes and organizes sensations, as opposed to teaching higher order skills themselves. Therapy usually involves activities that provide vestibular, proprioceptive, and tactile stimuli, which are selected to match specific sensory processing deficits of the child. For example, swings may be used to incorporate vestibular input, while trapeze bars and large foam pillows or mats may be used to stimulate somatosensory pathways of proprioception and deep touch. Tactile reception may be addressed through a variety of activities and surface textures involving light touch.

Sensory integration techniques are generally provided to pediatric populations. Advocates have proposed SIT as a treatment for developmental disorders in patients with established dysfunction of sensory processing, [e.g., children with autism, attention deficit hyperactivity disorder (ADHD), brain injuries, fetal alcohol syndrome, and neurotransmitter disease]. According to the American Academy of Pediatrics (AAP), (2012) "Sensory-based therapies are increasingly used by occupational therapists and sometimes by other types of therapists in treatment of children with developmental and behavioral disorders. Occupational therapy with the use of sensory-based therapies may be acceptable as one of the components of a comprehensive treatment plan. However, parents should be informed that the amount of research regarding the effectiveness of sensory integration therapy is limited and inconclusive." Additionally, it is unclear whether children who present with sensory-based problems have an actual "disorder" of the sensory pathways of the brain or whether these deficits are characteristics associated with other developmental and behavioral disorders. Because there is no universally accepted framework for diagnosis, sensory processing disorder generally should not be diagnosed. Other developmental and behavioral disorders must always be considered, and a thorough evaluation should be completed. Difficulty tolerating or processing sensory information is a characteristic that may be seen in many developmental behavioral disorders, including autism spectrum disorders, attention-deficit/hyperactivity disorder, developmental coordination disorders, and childhood anxiety disorders.

The therapeutic approach of sensory integration was originally developed by A. Jean Ayres, PhD, OTR, and is known as Ayres Sensory Integration® (ASI®). Once the evaluation is complete, the therapist will design an intervention plan aimed at enhancing

the child's unique ability to utilize sensation. The fidelity principles of Ayres sensory integration include (Parham, et al., 2011):

- Children integrate sensory information from their bodies and the environment.
- Include visual, auditory, tactile, proprioceptive, and vestibular input.
- Individually tailored activities that challenge sensory processing and motor planning, encourage movement and organization of self in time and space, and utilize "just right" challenges.
- Incorporate clinical equipment in purposeful and playful activities to improve adaptive behavior.
- Implemented by trained therapy practitioners.
- Used only after an evaluation is completed and a need for such intervention is identified.

The American Academy of Child and Adolescent Psychiatry (AACAP) practice parameter for "The assessment and treatment of children and adolescents with autism spectrum disorder" (Volkmar et al, 2014) states: "There is a lack of evidence for most other forms of psychosocial intervention, although cognitive behavioral therapy has shown efficacy for anxiety and anger management in high functioning youth with ASD. Studies of sensory oriented interventions, such as auditory integration training, sensory integration therapy, and touch therapy/massage, have contained methodologic flaws and have yet to show replicable improvements." A 2013 practice parameter for the assessment and treatment of children and adolescents with autism spectrum disorder states: "Studies of sensory oriented interventions, such as auditory integration training (AIT), sensory integration therapy (SIT) and touch therapy/massage, have contained methodological flaws and have yet to show replicable improvements."

Lane and Schaaf (2010) sought to critically examine the basic science literature to specifically identify evidence for the assumptions and tenets of Ayres' theory of SI. The review focused on sensorimotor-based neuroplasticity; explored the data that addressed the links among sensory input, brain function, and behavior; and evaluated its relevance in terms of supporting or refuting the theoretical premise of occupational therapy using an SI framework (OT/SI) to treatment. Although direct application from basic science to OT/SI is not feasible, they concluded that there was a basis for the assumptions of Ayes' SI theory. In 2011, AOTA published evidence-based occupational therapy practice guidelines for children and adolescents with challenges in sensory processing and sensory integration (SI). AOTA gave a level B recommendation for sensory integration for gross motor and motor planning skills for children with learning disabilities, sensory integration to address maladaptive behaviors in children with problems in sensory processing, and sensory integration to address self-esteem in children with learning disabilities and sensory

integrative dysfunction. Level B means there is moderate evidence that occupational therapy practitioners should routinely provide the intervention to eligible clients. At least fair evidence was found that the intervention improves important outcomes and concludes that benefits outweigh harm.

AOTA gave a level C recommendation for SI therapy for sensory integration, sensory diets, and therapeutic riding to address performance on functional, parent-centered goals in children with problems with sensory processing, individual functional goals for children, for parent-centered goals, for participation in active play in children with sensory processing disorder, to address play skills and engagement in children with autism, for visual perception in children with Developmental Coordination Disorder (DCD), for sensory integration combined with perceptual–motor curriculum for visual, auditory, and tactile perception for children with suspected neurological problems, for occupational therapy using a sensory integration approach for decreasing externalizing and internalizing behaviors in children with problems in sensory processing, for engagement and reduced aggression in children with sensory modulation disorder, for improved social interaction and reduced disruptive behaviors in children with autism, for attention in children with autism, and to address tactile discrimination for children with suspected neurological problems. A level C recommendation is based on weak evidence that the intervention can improve outcomes, and the balance of the benefits and harms may result in a recommendation that occupational therapy practitioners routinely provide the intervention to eligible clients or in no recommendation because the balance of the benefits and harm is too close to justify a general recommendation. Specific performance skills evaluated were motor and praxis skills, sensory-perceptual skills, emotional regulation, and communication and social skills. There was insufficient evidence to provide a recommendation on sensory integration for academic and psychoeducational performance (e.g., math, reading, written performance).

Case-Smith et al. (2015) completed a systematic review of sensory processing interventions for children with autism spectrum disorders. Children with autism spectrum disorders often exhibit sensory processing problems and receive interventions that target self-regulation. This systematic review examined the research evidence (2000-2012) of two forms of sensory interventions, sensory integration therapy and sensory-based intervention, for children with autism spectrum disorders and concurrent sensory processing problems. A total of 19 studies were reviewed: 5 examined the effects of sensory integration therapy, and 14 sensory-based interventions. The studies defined sensory integration therapies as clinic-based interventions that use sensory-rich, child-directed activities to improve a child's adaptive responses to sensory experiences. Sensory-based interventions are characterized as classroom-based interventions that use single-sensory strategies such as weighted vests or therapy balls to influence a child's state of

arousal. Few positive effects were found in sensory-based intervention studies. Studies of sensory-based interventions suggest that they may not be effective; however, these studies did not follow recommended protocols or target sensory processing problems. Although small randomized controlled trials resulted in positive effects for sensory integration therapies, additional rigorous trials using consistent protocols for sensory integration therapy are needed to evaluate effects for children with autism spectrum disorders and sensory processing problems. Barton et al. (2015) conducted a comprehensive and methodologically sound evaluation of the efficacy of sensory-based treatments for children with disabilities. Thirty studies involving 856 participants met their inclusion criteria and were included in this review. Considerable heterogeneity was noted across studies in implementation, measurement, and study rigor. The research on sensory-based treatments is limited due to insubstantial treatment outcomes, weak experimental designs, or high risk of bias. Authors conclude that although many people use and advocate for the use of sensory-based treatments and there is substantial empirical literature on sensory-based treatments for children with disabilities, insufficient evidence exists to support their use. Watling and Hauer (2015) completed a systematic review on the effectiveness of Ayres Sensory Integration® and Sensory-Based Interventions for People with Autism Spectrum Disorder. Of the 368 abstracts screened, only 23 met the inclusion criteria and were reviewed. Moderate evidence was found to support the use of ASI. The results for sensory-based methods were mixed.

Weitlauf et al. (2017) evaluated the effectiveness and safety of interventions targeting sensory challenges in ASD. Twenty-four studies, including 20 randomized controlled trials (RCTs), were included. Limited, short-term studies reported potential positive effects of several approaches in discrete skill domains. Specifically, sensory integration-based approaches improved sensory and motor skills-related measures (low strength of evidence). Schaaf et al. (2018) addressed the question "What is the efficacy of occupational therapy using Ayres Sensory Integration® (ASI) to support functioning and participation as defined by the International Classification of Functioning, Disability and Health for persons with challenges in processing and integrating sensory information that interfere with everyday life participation?" Three randomized controlled trials, one (1) retroactive analysis, and one (1) single-subject ABA design published from 2007 to 2015, all of which happened to study children with autism, met inclusion criteria. The evidence is strong that ASI intervention demonstrates positive outcomes for improving individually generated goals of functioning and participation as measured by Goal Attainment Scaling for children with autism. Moderate evidence supported improvements in impairment-level outcomes of improvement in autistic behaviors and skills-based outcomes of reduction in caregiver assistance with self-care activities. Child outcomes in play, sensory-motor, and language skills and reduced caregiver assistance with social skills had emerging but insufficient evidence. Pfeiffer et al. (2017) examined the evidence for the effectiveness of cognitive

and occupation-based interventions to improve self-regulation in children and youth who have challenges in processing and integrating sensory information in a systematic review. Five studies were identified through a comprehensive database search and met the inclusion criteria and were separated into categories of cognitive and occupation-based interventions. Synthesis of the articles suggests that self-regulation (e.g., sensory processing, emotional regulation, executive functioning, social function) improved with cognitive and occupation-based interventions. Because the number of studies that measured sensory processing or SI challenges was limited, authors suggest that researchers should include these measures in future research to understand the impact of a broader range of cognitive and occupation-based interventions.

Kashefimehr et al. (2018) examined the effect of sensory integration therapy (SIT) on different aspects of occupational performance in children with ASD. The Short Child Occupational Profile (SCOPE) and the Sensory Profile (SP) were used to assess outcomes. The intervention group showed significantly greater improvement in all the SCOPE domains, as well as in all the SP domains, except for the "emotional reactions" and "emotional/social responses" domains, ($p < .05$). The authors concluded that the effectiveness of SIT in improving occupational performance in children with ASD as a health-related factor is supported by their findings. Schoen et al. (2019) evaluated the effectiveness research from 2006 to 2017 on Ayres Sensory Integration (ASI) intervention for children with autism using Council for Exceptional Children (CEC) Standards for Evidence-Based Practices in Special Education. The results of this systematic review indicate that SIT meets the criteria for an evidence-based practice according to the CEC Standards for Evidence-Based Practices in Special Education. It also appears to meet the criteria for an evidence-based practice as defined by the United States Preventative Services Task Force and the FPG Child Development Institute Guidelines. Authors concluded that consumers, third-party payers, and professionals concerned with the well-being of children with autism spectrum disorders can feel confident that ASI is an effective intervention for this population, particularly for those with IQs above 65 and who are 4–12 years of age. However, authors caveat this conclusion by stating it is critical that therapists providing ASI intervention adhere to the essential elements of this intervention, to ensure that the intervention delivered is in keeping with an evidence-based practice.

For adult patients, sensory integration techniques have been used for acquired sensory problems resulting from head trauma, illness, or acute neurologic events including cerebrovascular accidents. They are not appropriate for patients with progressive neurological conditions without potential for functional adaptation. Therapy is not considered a cure for sensory integrative impairments but is used to facilitate the development of the patient's ability to process sensory input differently. Research studies are lacking for the adult population and SI therapy.

Due to the individual nature of sensory integration therapy and the large variation in individual therapists and patients, large multicenter randomized controlled trials are needed to evaluate the efficacy of this intervention. The most direct evidence related to outcomes from SI therapy comes from small, randomized trials. Although some of the studies demonstrated some improvements on subsets of the outcomes measured, the studies are limited by small sizes, heterogeneous patient populations, and variable outcome measures. As a result, the evidence is insufficient to draw conclusions about the effects of and the most appropriate patient populations for SI therapy.

Camarata et al. (2020) Reviewed sensory integration/processing treatments (SI/SP) and the objective analysis challenges for children with autism spectrum disorders (ASD), ADHD and disruptive behavioral dysfunction secondary to impaired sensory modulation and integration of sensory stimuli. The treatment modalities reviewed focused on tactile, proprioceptive, and vestibular systems, utilizing equipment, devices, and activities of daily living. Treatments were based on the theories of Ayres (1975) which suggest the previously mentioned modalities may facilitate the organization and use of sensory stimulation in conjunction with motor activities to enhance sensory integration and processing skills. The review included discussions of emerging evidenced based treatments such as NDBI (Naturalistic Behavioral Intervention) treatment, Multisensory Integration, and Auditory-visual integration as approaches to control confounds to objectively test the sensory integration and processing theory and outcome changes. The review included case presentations which identified factors that may have influenced the outcomes rather than the sensory integration treatment approach effect. Consideration is needed to systemically control the factors that account for the behavior changes. Based on this review, the research supporting the effectiveness of SI/SP is not conclusive. There are few larger-scale, randomized control trials that directly test the intervention with control for confounds and include objective measurements to support evidence of the SI/SP approaches as the treatment which impacted functional change. Standardized outcome measurements and data collection are needed that reflect daily functional changes**.** Therefore**,** insufficient evidence was found to determine that the effects of sensory integration training on communication and daily activities impacted outcomes for children with ASD, ADHA and disruptive behavioral dysfunction.

Lane (2020) reviewed the current best evidence regarding measurement of and interventions for sensory symptoms. She notes there is ample evidence to support the association of sensory symptoms with childhood function including social engagement, repetitive behaviors, anxiety, and participation in self-care routines. The evidence for interventions for sensory symptoms is emerging but still limited by low quantity and methodological concerns. This author concluded that effective management of sensory symptoms may mitigate the burden of neurodevelopmental disability and mental illness in young people. Identification of sensory symptoms should be conducted by a skilled practitioner utilizing multiple measurement methods. Intervention protocols for sensory

symptoms should be informed by current best evidence which is strongest for Ayres Sensory Integration®, Qigong massage, the Alert Program®, and Social Stories.

Mailloux et al. (2021) reported on reliability and validity of six tests of vestibular and proprioceptive functions of the Evaluation in Ayres Sensory Integration (EASI). The sample contained typically developing children (*n* = 150) and children with sensory integration concerns (*n* = 84); all participated voluntarily. Outcomes and Measures: The EASI is used to measure sensory and motor functions in children ages 3 to 12 yr. The six tests of vestibular and proprioceptive functions were analyzed in this study. Data from >96% of items conformed to the expectations of the model. Authors found statistically significant group differences with the typically developing children group scoring significantly higher on all but one test, and moderate to strong evidence of internal consistency for five of six tests. Authors concluded that the EASI vestibular and proprioceptive tests have strong construct validity and internal reliability, indicating that they are psychometrically sound clinical measures. Authors also state that the development of occupational therapy assessments with strong psychometric properties, such as the EASI tests of vestibular and proprioceptive functions, enhances clinical practice and research by elucidating the factors affecting participation in accurate and dependable ways so that occupational therapy interventions can be focused and effective.

Randell et al. (2022) aimed to determine the clinical effectiveness and cost-effectiveness of sensory integration therapy for children with autism and sensory difficulties across behavioral, functional, and quality-of-life outcomes. Inclusion criteria were having an autism diagnosis, being in mainstream primary education and having definite/probable sensory processing difficulties. Exclusion criteria were having current/previous sensory integration therapy and current applied behavior analysis therapy. The intervention was manualized sensory integration therapy delivered over 26 weeks, and the comparator was usual care. The primary outcome was problem behaviors (determined using the Aberrant Behavior Checklist), including irritability/agitation, at 6 months. Secondary outcomes were adaptive behavior, functioning and socialization (using the Vineland Adaptive Behavior Scales); carer stress (measured using the Autism Parenting Stress Index); quality of life (measured using the EuroQol-5 Dimensions and Carer Quality of Life); functional change (according to the Canadian Occupational Performance Measure); sensory processing (determined using the Sensory Processing Measure™ at screening and at 6 months to examine mediation effects); and cost-effectiveness (assessed using the Client Service Receipt Inventory). Every effort was made to ensure that outcome assessors were blind to allocation. A total of 138 participants were randomized (*n* = 69 per group). Usual care was significantly different from the intervention, which was delivered with good fidelity and adherence and minimal contamination and was associated with no adverse effects. Trial procedures and outcome measures were acceptable. Carers and therapists reported improvement in daily functioning. The primary analysis included 106 participants. There were no significant main effects of the intervention at 6 or 12 months. Health economic

evaluation suggests that sensory integration therapy is not cost-effective compared with usual care alone. Authors concluded that the intervention did not demonstrate clinical benefit above standard care.

Omairi et al. (2022) evaluated the outcomes of occupational therapy using Ayres Sensory Integration in a sample of Brazilian children with ASD. Seventeen children with ASD ages 5-8 yr (n = 9 in the intervention group, n = 8 in the usual-care control group) participated in this study. The intervention group received occupational therapy using Ayres Sensory Integration, and the control group received usual therapeutic and educational services only. Participants in the intervention group scored significantly higher on outcome measures of self-care, social function, and parent-identified goal attainment compared with the control group. Authors recognize the small sample size but conclude that occupational therapy using Ayres Sensory Integration was effective in enhancing self-care, socialization, and goal attainment for children with ASD in a Brazilian cohort. This study contributes further support from outside the United States that occupational therapy using Ayres Sensory Integration is an effective evidence-based intervention to improve self-care, socialization, and parent-identified goal attainment in children with ASD.

Raditha et al. (2023) evaluated the effect of Sensory integration occupational therapy (SI-OT) in improving positive behaviors of ASD children aged 2-5 years. A total of 72 subjects were studied. Following SI-OT, communication skills (expressive, receptive), socialization (coping skills), and daily living skills (personal, community) were improved significantly. Authors concluded that SI-OT with Ayres theory in 60 min, twice a week for 12 weeks improved positive behaviors.

Oh et al. (2024) sought to prove the effectiveness of sensory integration therapy, examine the latest trend of sensory integration studies in Korea, and provide clinical evidence for sensory integration therapies. The keywords, "Children", "Sensory integration", "Integrated sensory", "Sensory motor", and "Sensory stimulation" were used in this search. Then, a meta-analysis was conducted on 24 selected studies. According to authors, sensory integration intervention has been proven effective in children with cerebral palsy, autism spectrum disorder, attention deficit/hyperactivity disorder, developmental disorder, and intellectual disability in relation to the diagnosis of children. Regarding sensory integration therapies, 1:1 individual treatment with a therapist or a therapy session lasting for 40 min was most effective. In terms of dependent variables, sensory integration therapy effectively promoted social skills, adaptive behavior, sensory processing, and gross motor and fine motor skills. It is important to keep in mind that SIT was not limited to Ayres SIT and thus, protocols may differ and not allow for confirmation of these results.

PRACTITIONER SCOPE AND TRAINING

Practitioners should practice only in the areas in which they are competent based on their education training and experience. Levels of education, experience, and proficiency may

vary among individual practitioners. It is ethically and legally incumbent on a practitioner to determine where they have the knowledge and skills necessary to perform such services and whether the services are within their scope of practice.

It is best practice for the practitioner to appropriately render services to a patient only if they are trained to competency, equally skilled, and adequately competent to deliver a service compared to others trained to perform the same procedure. If the service would be most competently delivered by another health care practitioner who has more skill and training, it would be best practice to refer the patient to the more expert practitioner.

Best practice can be defined as a clinical, scientific, or professional technique, method, or process that is typically evidence-based and consensus driven and is recognized by a majority of professionals in a particular field as more effective at delivering a particular outcome than any other practice (Joint Commission International Accreditation Standards for Hospitals, 2020).

Depending on the practitioner's scope of practice, training, and experience, a patient's condition and/or symptoms during examination or the course of treatment may indicate the need for referral to another practitioner or even emergency care. In such cases it is essential for the practitioner to refer the patient for appropriate co-management (e.g., to their primary care physician) or if immediate emergency care is warranted, to contact 911 as appropriate. See the *Managing Medical Emergencies in a Health Care Facility (CPG 159 – S)* clinical practice guideline for information.

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