Anthem

Medical Policy

Subject: Sensory Stimulation for Brain-Injured Individuals in Coma or Vegetative State
Document #: MED.00011
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Description/Scope

This document addresses sensory stimulation for brain-injured individuals in a coma or vegetative state. Sensory stimulation is intended to enhance the rehabilitative potential of brain-injured individuals. Protocols may involve stimulation of any or all of the following senses: visual, auditory, olfactory, gustatory, cutaneous and kinesthetic.

Position Statement

Investigational and Not Medically Necessary:

Sensory stimulation (also known as: coma stimulation sessions, coma arousal therapy, multisensory stimulation programs and coma care) for brain injured individuals in a coma or vegetative state is considered **investigational and not medically necessary.**

Rationale

It has been proposed that comatose individuals treated with intense and repeated stimulation following very precise protocols could awaken earlier from coma and return to a higher level of functioning. The majority of studies identified were limited to case series or descriptive technical studies of coma stimulation techniques (Davis, 1995; Hall, 1992; Heine, 2017; Wood, 1992). In 1991, Wood and colleagues published a critique of coma stimulation that pointed out that the incomplete knowledge regarding information processing in the brain-injured state does not permit a scientific or theoretical basis of coma stimulation (Wood, 1991). For example, Wood points out that the brain-injured individual is constantly exposed to sensory stimulation (skin care, range of motion exercises, bowel and bladder procedures, and ambient noise in an intensive care unit) aside from any specific program of sensory stimulation. In 2002, a review from the Cochrane Database reported that there was no reliable evidence to support, or rule out, the effectiveness of multisensory programs in subjects in coma or vegetative states (Lombardi, 2002).

Meyer and colleagues (2010) conducted a review of the literature from the years 1980-2008 regarding various techniques (dopamine targeting agents, sensory stimulation, music therapy and median nerve electrical stimulation) used to promote arousal from coma following an acquired brain injury. Regarding sensory stimulation, the authors reported that stimulation strategies may vary from single stimulation of a single sense (unimodal stimulation) to stimulation of all senses using various stimuli (multimodal stimulation). However, there is some concern around the potential to over-stimulate unresponsive individuals which may result in a reduced awareness of certain stimuli. Some of the studies included in the literature review demonstrated a trend towards greater improvements in a variety of measures following multimodal sensory stimulation (Hall, 1992; Mitchell, 1990; Wood, 1992), while other studies reported no change in similar parameters (Davis, 2003; Pierce, 1990). Therefore, the authors concluded that there is conflicting evidence regarding the benefit of sensory stimulation in arousing individuals from a coma.

According to the American Occupational Therapy Association (AOTA) 2009 guideline for adults with traumatic brain injuries, a recommendation for or against sensory stimulation programs could not be made because, “evidence that the intervention is effective is lacking, of poor quality, or conflicting, and the balance of benefits and harm cannot be determined.” More studies are needed with a randomized control design, sufficient sample size, long-term follow-up and a more broadly generalizable population sample.

Megha (2013) conducted a randomized controlled trial (RCT) to evaluate the effectiveness of multimodal coma stimulation in comatose individuals with traumatic brain injury (n=30). Study participants were randomly assigned to one of three groups (group A received 20-minute multimodal coma stimulation sessions, 5 times a day, n=10; group B received 50-minute stimulation twice a day, n=10; group C acted as the control group and received conventional physiotherapy twice a day). Duration of treatment was 2 weeks in all three groups. Prior to coma stimulation, participants’ levels of consciousness were assessed using the Western Neuro Sensory Stimulation profile (WNSSP) and the Glasgow Coma Scale (GCS). Final results showed significant improvement in measures of consciousness levels in the respective treatment groups, A and B, when each was compared with the control group C. Specifically, there was a statistically significant difference observed between group A and C in favor of group A for GCS (p=0.000). Similarly, there was a statistically significant difference observed between groups B and C in favor of group B for WNSSP (p=0.002). Despite these early positive findings, the study was characterized by several limitations, including its small size, lack of blinded assessments and lack of follow-up. Without an adequate follow-up period, it is not clear if the improvements in consciousness levels were durable beyond the 2-week treatment duration. Despite the statistically significant findings between groups, the study was also limited by the lack of generalizability and clinical heterogeneity in the baseline characteristics of study participants.

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

In 2020, Li and colleagues conducted a systematic review of the efficacy of sensory stimulation to improve arousal in comatose individuals after sustaining a traumatic brain injury. A total of 10 eligible studies were included for analysis. The authors noted that there was significant heterogeneity in the studies with respect to duration of observation and the type of sensory stimulation. The studies dated back to 1990 and had sample sizes ranging from 12 to 90 participants distributed amongst 1 to 3 study arms. The review concluded that although there appears to be some evidence that sensory stimulation may increase arousal in comatose individuals, “high-quality clinical trials are needed to establish standard SS [sensory stimulation] protocols.”

Background/Overview

Coma stimulation may include a variety of stimulation techniques designed to awaken the comatose individual. Techniques may include visual activities (i.e. presenting the comatose individual with objects to look at), auditory (i.e. playing music or speaking), tactile (i.e. touching the individual), taste and smell (i.e. offering things for the individual to taste or smell) stimulation. Mobility stimulation may also be included in stable individuals. A stimulus is considered successful if the individual grimaces or moves. Therapists, nurses, physicians, or family members can perform these services in the hospital, the individual's home, or in a nursing home.

The intensity of multisensory stimulation programs varies. Programs range from one or two cycles of stimulation daily (approximately 1 hour each), to hourly stimulation cycles, lasting approximately 15-20 minutes, for 12-14 hours per day, 6 days a week. Due to the intensity of the program, family members are frequently trained in stimulation techniques.

Definitions

Coma: A state of unconsciousness occurring as a result of illness or injury.

Structured sensory stimulation: Stimulation in a systematic fashion that includes one or all of the following senses: sight, hearing, smell, taste and touch.

Vegetative state: A disorder of consciousness in which individuals with severe brain damage are in a state of partial arousal rather than true awareness.

Coding

The following codes for treatments and procedures applicable to this document are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement policy. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

When services are Investigational and Not Medically Necessary:
For the following procedure codes for all indications, or when the code describes a procedure indicated in the Position Statement section as investigational and not medically necessary.

CPT

97139	Unlisted therapeutic procedure [when specified as sensory stimulation or coma stimulation therapy]
97799	Unlisted physical medicine/rehabilitation service or procedure [when specified as sensory stimulation or coma stimulation therapy]

HCPCS

S9056	Coma stimulation, per diem

ICD-10 Diagnosis

	All diagnoses

References

Peer Reviewed Publications:

1. Davis AE, Gimenez A. Cognitive-behavioral recovery in comatose patients following auditory sensory stimulation. J Neurosci Nurs. 2003; 35(4):202-209, 214.
2. Davis AE, White JJ. Innovative sensory input for the comatose brain-injured patients. Crit Care Nurs Clin North Am. 1995; 7(2):351-361.
3. Hall ME, MacDonald S, Young GC. The effectiveness of directed multisensory stimulation versus non-directed stimulation in comatose CHI patients: pilot study of a single subject design. Brain Inj. 1992; 6(5):435-445.
4. Heine L, Tillmann B, Hauet M, et al. Effects of preference and sensory modality on behavioural reaction in patients with disorders of consciousness. Brain Inj. 2017; 31(10):1307-1311.
5. Li J, Cheng Q, Liu FK, et al. Sensory stimulation to improve arousal in comatose patients after traumatic brain injury: a systematic review of the literature. Neurol Sci. 2020; 41(9):2367-2376.
6. Lombardi F, Taricco M, De Tanti A, et al. Sensory stimulation for brain injured individuals in coma or vegetative state. Cochrane Database Syst Rev. 2002;(2):CD001427.
7. Megha M, Harpreet S, Nayeem Z. Effect of frequency of multimodal coma stimulation on the consciousness levels of traumatic brain injury comatose patients. Brain Inj. 2013; 27(5):570-577.
8. Meyer MJ, Megyesi J, Meythaler J, et al. Acute management of acquired brain injury Part III: an evidence-based review of interventions used to promote arousal from coma. Brain Inj. 2010; b24(5):722-729.
9. Mitchell S, Bradley VA, Welch JL, Britton PG. Coma arousal procedure: a therapeutic intervention in the treatment of head injury. Brain Inj. 1990; 4(3):273-279.
10. Padilla R, Domina A. Effectiveness of sensory stimulation to improve arousal and alertness of people in a coma or persistent vegetative state after traumatic brain injury: a systematic review. Am J Occup Ther. 2016; 70(3):1-8.
11. Pierce JP, Lyle DM, Quine S, et al. The effectiveness of coma arousal intervention. Brain Inj. 1990; 4(2):191-197.
12. Salmani, Mohammadi, Rezvani, Kazemnezhad. The effects of family-centered affective stimulation on brain-injured comatose patients' level of consciousness: a randomized controlled trial. Int J Nurs Stud. 2017; 74:44-52.
13. Wood RL. Critical analysis of the concept of sensory stimulation for patients in vegetative states. Brain Inj. 1991; 5(4):401-409.
14. Wood RL, Winkowski TB, Miller JL, et al. Evaluating sensory regulation as a method to improve awareness in patients with altered states of consciousness: a pilot study. Brain Inj. 1992; 6(5):411-418.

Websites for Additional Information

1. Brain Injury Association of the United States. Available at:http://www.biausa.org/. Accessed on December 09, 2023.
2. Centers for Disease Control and Prevention (CDC): Traumatic Brain Injury in the United States Fact Sheet. Last updated April 20, 2023. Available at http://www.cdc.gov/traumaticbraininjury/get_the_facts.html. Accessed on December 09, 2023.
3. National Institute of Neurological Disorders and Stroke (NINDS). Coma Information Page. Available at: https://www.ninds.nih.gov/disorders/all-disorders/coma-information-page. Accessed on December 09, 2023.

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Document History

Status	Date	Action
Reviewed	02/15/2024	Medical Policy & Technology Assessment Committee (MPTAC) review. Updated Description/Scope and References sections.
Reviewed	02/16/2023	MPTAC review. Updated Rationale and References section.
Reviewed	02/17/2022	MPTAC review. Updated References section.
Reviewed	02/11/2021	MPTAC review. Updated Rationale and References section. Updated Coding section to add NOC codes 97139, 97799.
Reviewed	02/20/2020	MPTAC review. Updated Rationale and References section.
Reviewed	03/21/2019	MPTAC review. Updated References section.
Reviewed	03/22/2018	MPTAC review. Updated header language from “Current Effective Date” to “Publish Date.” Updated Rationale and References sections.
Reviewed	05/04/2017	MPTAC review. Updated Rationale and References sections.
Reviewed	05/05/2016	MPTAC review. Updated Background/Overview and Reference sections. Removed ICD-9 codes from Coding section.
Reviewed	05/07/2015	MPTAC review. Updated Description/Scope, Rationale, Background/Overview and Reference sections.
Reviewed	05/15/2014	MPTAC review. Updated Rationale and Reference sections.
Reviewed	05/09/2013	MPTAC review. Updated review date, and Reference sections.
Reviewed	05/10/2012	MPTAC review. Updated review date, and Reference sections.
Reviewed	05/19/2011	MPTAC review. Updated review date, Definitions, and Reference sections.
Reviewed	05/13/2010	MPTAC review. In the title, replaced the word “patient” with the word “individual”. Updated review date, Background/Overview, and Reference sections.
Reviewed	05/21/2009	MPTAC review. Updated Description, Rationale, Background/Overview, and Reference sections.
Reviewed	05/15/2008	MPTAC review. Updated review date and references.
	02/21/2008	The phrase "investigational/not medically necessary" was clarified to read "investigational and not medically necessary." This change was approved at the November 29, 2007 MPTAC meeting.
Reviewed	05/17/2007	MPTAC review. Updated index and references in Rationale and References sections.
Reviewed	06/08/2006	MPTAC review. Typographical error corrected in Coding section. References updated to include current relevant web site links.
Revised	07/14/2005	MPTAC review. Revision based on Pre-merger Anthem and Pre-merger WellPoint Harmonization.

Pre-Merger Organizations	Last Review Date	Document Number	Title
Anthem, Inc.	10/28/2004	MED.00011	Sensory Stimulation for Coma Patients
WellPoint Health Networks, Inc.	06/24/2004	2.10.17	Sensory Stimulation for Brain-Injured Patients in Coma or Vegetative State

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Applicable to Commercial HMO members in California: When a medical policy states a procedure or treatment is investigational, PMGs should not approve or deny the request. Instead, please fax the request to Anthem Blue Cross Grievance and Appeals at fax # 818-234-2767 or 818-234-3824. For questions, call G&A at 1-800-365-0609 and ask to speak with the Investigational Review Nurse.

Federal and State law, as well as contract language, including definitions and specific contract provisions/exclusions, take precedence over Medical Policy and must be considered first in determining eligibility for coverage. The member’s contract benefits in effect on the date that services are rendered must be used. Medical Policy, which addresses medical efficacy, should be considered before utilizing medical opinion in adjudication. Medical technology is constantly evolving, and we reserve the right to review and update Medical Policy periodically.