

SMALL GAINS MATTER!

ADDING INTERACTIVE METRONOME® CAN GIVE YOU THAT EXTRA BOOST.



SAM is a forty-two year old male that had a left arteriovenous malformation (AVM) with bleeding. Sam had many complications following his initial bleed and underwent a ventriculostomy and subsequently developed meningitis. Approximately a month and a half after his admission to the hospital he underwent surgery for the resection of the AVM. A few days later, there was some bleeding and further craniotomy was required. He was then found to have hydrocephalus, therefore drainage for an infected wound on his head was required. A shunt was inserted approximately two months after his initial admission to the hospital. Once he was stable, he was transferred to an inpatient rehabilitation program for about one month. After this, he was admitted to the HealthSouth Outpatient Center and The Bridge for their comprehensive brain injury program. Through cognitive assessments he was found to have severe deficits in the following areas: initiation, immediate and delayed memory for both written and verbal, insight, safety awareness, problem solving and generating options, attention and concentration with internal and external distraction, attention to visual details, planning, organizing and sequencing skills, processing speed, and math skills. He often externally blamed and confabulated. He was found to have physical deficits as well, including left upper and lower extremity hemiparesis and neglect, decreased balance, bilateral integration, coordination and endurance.

to the brain injury program in the first place, which allowed both Sam and his therapy team to create a training plan including Interactive Metronome® (IM). IM is the only training program that improves timing in the brain in an organized, systematic, flexible and engaging format. Research shows that combining movement and cognitive tasks leads to better overall outcomes and improvements in language and cognition, stronger motor control and coordination, and enhanced balance and gait. IM is a patented and unique training tool that challenges thinking and movement simultaneously, providing real-time millisecond feedback to help synchronize the body's internal clock. The focus of Sam's goals for the first month's treatment included increasing safety awareness, attention and concentration, the use of strategies and the functional use of his left upper extremity. Immediate recall of information was addressed on a continual basis, although this was not an established goal. cognition, stronger motor control and coordination, and enhanced balance and gait. IM is a patented and unique training tool that challenges thinking and movement simultaneously, providing real-time millisecond feedback to help synchronize the body's internal clock. The focus of Sam's goals for the first month's treatment included increasing safety awareness, attention and concentration, the use of strategies and the functional use of his left upper extremity. Immediate recall of information was addressed on a continual basis, although this was not an established goal.

Test	Measures	Sam's Score	Meaning
The Benton Controlled Oral Word Association Test	Verbal organization skills	2nd percentile	Seriously deficient
Boston Naming Test	Confrontational naming	65%	Below norms by both age and education
Championship Season Test	Written organization skills	0%	Severely deficient
The Babcock Story Recall Test	Immediate recall of verbal information	29%	Severe impairment
The Babcock Story Recall Test	Delayed recall	10%	Severe impairment

Through the numerous evaluations, it was found that Sam still had many of the same deficits that brought him

An initial IM Pre Long Form Assessment (LFA) was administered, which consists of 14 unique tasks to help his therapists assess Sam's coordination of both upper and lower extremities in addition to bilateral integration skills. Sam was able to complete all the tasks, however modifications needed to be made in order for him to maintain his balance. Sam required maximum cuing for each tasks due to his impaired memory, planning, bilateral integration, coordination, and sequencing skills not only to keep him focused at the task at hand as well as tactile cuing to the left upper extremity due to his left side neglect during

hand tasks. He was unable to remember the guide sounds during task fourteen. The results of Sam's assessment fell in the "Extreme Deficiency" range of the IM indicator chart with a millisecond score of 224.6 and a Super-Right-On (SRO) of 7.4%.

Age	6	7 - 8	9 - 10	11 - 12	13 - 15	16+
Extreme Deficiency	280+	270+	260+	240+	215+	200+
Severe Deficiency	175-279	170-269	160-259	155-239	150-214	147-199
Below Average	120-174	90-169	80-159	75-154	72-149	70-146
Average	90-119	65-89	55-79	45-74	43-71	41-69
Above Average	56-89	45-64	38-54	36-44	33-42	30-40
Exceptional	40-55	32-44	28-37	26-35	23-32	22-29
Superior	Below 40	Below 32	Below 28	Below 26	Below 23	Below 22

After Sam's IM Pre-LFA was completed, his therapy team developed an IM training plan based on Sam's individual needs, test results, and team's observations. The Provider was aware that Sam would need to relate the IM program as to helping more on a physical level to motivate him due to his decreased insight and awareness of his cognitive deficits. The plan was to begin IM training with the tasks that Sam was more successful on and then increase the task duration for each session to increase his attention and concentration and endurance. During the first session Sam completed exercises 1 through 6, 12, and 13 for a total of 940 repetitions. After five sessions, Sam was able to tolerate up to 1200 repetitions with several rest breaks. He required moderate/maximum assistance with remembering the guide sounds and he was beginning to demonstrate a slight increase in attention and concentration. At this point, he only required moderate cuing to perform the exercises correctly and was still using a chair to help balance himself for foot tasks.

Halfway through Sam's training, the Provider was immediately aware that it would take more than the recommended 13-15 sessions to see improvements in Sam's performance. After approximately eleven sessions an Interim LFA was completed. This time around, Sam showed improvements in overall millisecond timing and SRO percentage with a millisecond score of 157.1 and an SRO of 8.9%.

At this point, Sam was no longer requiring tactile cues for his left upper extremity movement and was beginning to demonstrate an increase with bilateral integration and no longer needed to use a chair to keep his balance during foot tasks. He only required minimal/moderate assistance to remember the guide sounds and appeared to no longer get distracted by external factors.

Despite Sam's progress in other areas, it was still difficult to advance the number of repetitions that he was able to complete in a session due to his decreased endurance and the amount of cuing he still required. After about the 16th session, Sam was able to tolerate up to 1400 repetitions. He had a both hands score of 109 ms with a SRO of 14% for 400 repetitions.

Once Sam completed his IM training, a Post LFA was administered, and his final millisecond score was 111.7 with an SRO of 13.2%, nearly double what he scored during his first LFA.

The Benton Controlled Oral Word Association Test was re-administered and his score improved from the 2nd percentile to the 4.5 percentile. He scored a 73% on the Boston Naming Test for confrontational naming which was an improvement from 65%. The Championship Season for written organization increased from 0% to 10% and his ability to answer simple yes/no questions accurately increased from 83% to 92%.

Sam felt that IM training helped him with his balance and with the coordination of his left upper extremity. He also reported that he felt he was not as easily distracted. He stated that he was grateful that this facility had given him a chance with the training and was willing to adapt IM to meet his needs because other facilities were not as accommodating in the past, therefore preventing him from this level of success.

Given the severity of Sam's cognitive deficits from the AVM and bleeding, he was able to make good cognitive and physical gains through the comprehensive rehabilitation program, which included IM training. The Provider used clinical knowledge to create a personalized IM training plan to meet Sam's individual needs and to make it challenging enough, but not so challenging that prevented Sam from feeling successful and positive with his outcomes.

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