

# [Are strokes really impossible to foresee and is full recovery possible?](https://assignbuster.com/are-strokes-really-impossible-to-foresee-and-is-full-recovery-possible/)

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Stroke is the leading cause of disability in adults in the United States and the third leading cause of death. Strokes are caused by a lack of blood and/or oxygen to the brain. This lack of oxygen causes brain cells to die and impairs everyday function. With 730, 000 people per year affected by a stroke and 530, 000 people per year left disabled after having a stroke, the annual cost of stroke in the United States is extremely high reaching up to 54 billion dollars. About 60 to 80% of people that have a stroke survive and of those that survive 75-88% have resulting hemiplegia.

Strokes can occur as one of two different types. Ischemic strokes are the most common, accounting for 83% of all strokes. Ischemic strokes occur from a blockage of a blood vessel. This blockage usually occurs gradually as plaque builds up around the walls of the vessels resulting in a cerebral thrombosis. However, the blockage can also occur suddenly when a clot is formed. Blood clots can travel from other parts of the body and result in a cerebral embolism when they travel to the brain.

The other 17% of strokes are categorized as hemorrhagic strokes which result from a brain bleed due to a blood vessel rupturing. While hemorrhagic strokes are much less common than ischemic strokes, they are much more deadly. However, if a person survives, they are more likely to recover most of their function. Like ischemic strokes, hemorrhagic strokes can also present themselves in two different ways. The first, called a subarachnoid hemorrhage, results from a surface blood vessel leaking causing bleeding into the space between the brain and the skull. Subarachnoid hemorrhages account for 90% of all hemorrhagic strokes. The other 10% are termed cerebral hemorrhages. Cerebral hemorrhages are caused by a burst of a defective artery in the brain. This can be caused by a variety of different things including a head injury or an aneurysm.

The level and region of impairment following a stroke depends upon where in the brain that the stroke occurred. Right brain damage causes problems with the left hemisphere of the body while left brain damage creates problems with the right hemisphere of the body. Left side damage can cause difficulty moving the right side of the body, difficulty communicating wants and needs, visual impairments, behavioral changes, sensory changes, and cognitive changes. Right side damage may result in difficulty moving the left side of the body, difficulty knowing where things are in space, difficulty attending and seeing things on the left side, visual changes, and difficulty determining what has changed since the stroke. Strokes that occur in the brainstem will normally cause more physical deficits that cognitive. These symptoms include swallowing difficulty, also known as dysphagia, difficulty breathing, problems with balance and coordination, reduced speech intelligibility, dizziness, nausea, and decreased level of arousal. Lastly, strokes that involve the cerebellum can cause ataxia, trouble walking, and dizziness or vertigo.

Recovery of a stroke not only depends upon the type and location of stroke that occurred, but also a variety of other factors. Recovery also depends upon time passed before medical intervention, the size of the affected area, age, the patient’s fitness level before the stroke, and the patient’s cognition level before the stroke. Rehabilitation of a stoke includes muscle strengthening, range of motion exercises, mobility training, and gait training. If the patient has at least limited function, constraint induced movement therapy can be implemented in all of these aspects of rehabilitation in order to speed up the recovery process.

Constraint induced movement therapy, CIMT, can be described as restraining the movement of unaffected side, forcing the patient to use the affected limb. Constraint induced movement therapy consists of three key components. These components are repetitive, task-oriented training, adherence-enhancing behavioral strategies, and constraining the use of the less-affected arm. CIMT can also be modified by using only one of the above components or using a combination of two (Thrane et al., 2015). After having a stroke many people develop a learned non-use of the upper extremity that was affected by the stroke possibly because it hurts or they get frustrated that they cannot use the limb as they once could. Constraint induced movement therapy decreases the patient’s risk of the learned non-use of the impaired extremity allowing for a better recovery. By forcing the patient to use the affected upper extremity, the patient may gain use of the affected arm quicker than normal therapy. The purpose of this review is to explore research conducted on the effectiveness of using constraint induced movement therapy in various situations as a supplement to regular rehabilitation.

### Methods

I used multiple search engines to find research articles pertaining to different ways to rehabilitate a patient after a stroke. My first searches were done using pubmed. gov using the key words constraint, induced, movement, therapy, stroke. I found two articles entitled “ Similar Effects of Two Modified Constraint-Induced Therapy Protocols on Motor Impairment, Motor Function and Quality of Life in Patients with Chronic Stroke” and “ Modified constraint-induced movement therapy for clients with chronic stroke: interrupted time series (ITS) design” I then went to google scholar and searched “ constraint induced movement therapy stroke upper extremity” in order to narrow my results to the upper extremities. I found an article from The Journal of the American Medical Association online entitled “ Effect of Constraint-Induced Movement Therapy on Upper Extremity Function 3 to 9 Months After Stroke.” Also with this search I found an article entitled “ Effects of Constraint-Induced Movement Therapy on Patients With Chronic Motor Deficits After Stroke.” After searching google scholar, I went back to PubMed and used the same key words to find another article entitled “ Efficacy of Constraint-Induced Movement Therapy in Early Stroke Rehabilitation: A Randomized Controlled Multisite Trial.” I then used sciencedirect. com to find three more articles using the same key words. These articles are “ Effect of small group treatment of the modified constraint induced movement therapy for clients with chronic stroke in a community setting,” and “ Modified Constraint-Induced Movement Therapy Versus Traditional Rehabilitation in Patients With Upper-Extremity Dysfunction After Stroke: A Systematic Review and Meta-Analysis” and “ A Randomized Controlled Trial of Modified Constraint Induced Movement Therapy for Elderly Stroke Survivors: Changes in Motor Impairment, Daily Functioning, and Quality of Life.” I used a UK medical journal site called thelancelet. com to find an article entitled “ Home-based constraint-induced movement therapy for patients with upper limb dysfunction after stroke (HOMECIMT): a cluster-randomised, controlled trial.” I then realized that I wanted to have an article that explored the long term effectiveness of constraint induced movement therapy. I used sciencedirect. com again and used the key words CIMT, stroke, long term. With this search I found “ A one-year follow-up after modified constraint-induced movement therapy for chronic stroke patients with paretic arm: a prospective case series study.” After finding this last article I concluded that I had enough information to begin the process of breaking down each article and beginning my literary review. However, in order to make my paper flow, I grouped the articles together pertaining to the content. I grouped “ Effects of Constraint-Induced Movement Therapy on Patient With Chronic Motor Deficits After Stroke” with “ Efficacy of Constraint-Induced Movement Therapy in Early Stroke Rehabilitation: A Randomized Controlled Multisite Trial” because each of these studies required their participants to wear the restraint on their uninvolved arm for 90% of their waking hours. I also grouped “ Effect of small group treatment of the modified constraint induced movement therapy for clients with chronic stroke in a community setting” with “ Similar Effects of Two Modified Constraint-Induced Therapy Protocols on Motor Impairment, Motor Function and Quality of Life in Patients with Chronic Stroke” because both studies relied on ten, three hour sessions of CIMT therapy. “ A Randomized Controlled Trial of Modified Constraint-Induced Movement Therapy for Elderly Stroke Survivors: Changes in Motor Impairment, Daily Functioning, and Quality of Life” is grouped with “ Home-based constraint-induced movement therapy for patients with upper limb dysfunction after stroke (HOMECIMT): a cluster-randomised, controlled trial” because each study compares constraint induced movement therapy to traditional therapy. All other studies were analyzed one by one because they did not pair well with any of the other ones.

### Results

In the article entitled “ Effects of Constraint-Induced Movement Therapy in Early Stroke Rehabilitation: A Randomized Controlled Multisite Trial,” W. Miltner et al. (1998) found that by placing the participants affected upper extremity in a sling for 90% of their waking hours contributed to a very large degree of improvement from before to after CIMT. Miltner et al. (1998) tested each patient with a variety of neuropsychological tests, the Wolf Motor Function Test (WMFT), the Arm Motor Ability Test, and the Motor Activity Log (MAL). The Wolf Motor Function Test mean score increased from less than 3. 0 to approximately 3. 8 over the course of the treatment, and the time it took to complete the test decreased significantly from sixteen seconds to about 9 seconds. The table included below that was taken from the article shows the mean baseline, pretest, posttest, and follow up scores. Similarly, G. Thrane et al. (2015) found that after ten days of restraining the affected limb for 90% of daily waking hours, motor function, as well as post-treatment dexterity was vastly improved. Thrane et al. (2015) also used the Wolf Motor Function Test to understand the impact that constraint induced movement therapy has on stroke patients with limited upper extremity function. Thrane et al. (2015) found that the Wolf Motor Function Test decreased the time of completion by 2. 9 seconds. Miltner et al. (1998) found that after six months of no therapy, there were no significant decreases in performance of the original tests; The score of the Motor Activity Log actually increased slightly to 4. 0. Thrane et al. (2015) also determined that after six months of no therapy there was no significant decrease or increase in performance of the tests.

The study done by Souza and Conforto and Orsini and Stern and Andre (2015) compares CIMT done with an in clinic one-and-a-half-hour session to a three-hour session. The group that had the one and a half hour in clinic session was then asked to complete a one-and-a-half-hour session at home with a family member who was previously trained for one hour by a therapist (Souza et al., 2015). The three-hour group did their entire therapy in the clinic and was not asked to do anything at home (Souza et al., 2015). The primary test used to compare data was the Motor Activity Log (Souza et al., 2015). The results show that both groups improved from pre test to the final outcome, but neither one substantially more than the other (Souza et al., 2015). Compared to the other study done with a ten day, three-hour therapy component, completed by Leung and Ng and Fong (2009), Souza et al. (2015) had similar results. Leung et al. (2009) also found that CIMT improved the MAL scores.

The next two studies were conducted to compare CIMT to traditional therapy used after a stroke. Barzel et al. (2015) used MAL to compare home based CIMT to traditional therapy and found that the patients using CIMT improved much more than the patients using traditional therapy. A second study was done and also found significantly greater improvements in the patients that were using CIMT (Wu, Chen, Tsai, Lin & Chou, 2007).

My sixth article, “ Modified constraint-induced movement therapy for clients with chronic stroke: interrupted time series (ITS) design,” was conducted by Park and Lee and Cho and Yang (2015). Park et al. (2015) used the box and block test (BBT) along with two others to understand the significance of CIMT. The participants in this study were analyzed five times over a three-week period before CIMT as well as five times over a three-week span after completing CIMT therapy (Park et al., 2015). The CIMT therapy was conducted five times a week for two weeks (Park et al. 2015). During this two-week span, the two patients were asked wear a splint for six hours a day during their everyday activities including the two hours that they were receiving therapy (Park et al., 2015). The BBT showed the greatest amount of improvement jumping from a mean score of 13. 0 to 19. 0 for the first patient and from 12. 6 to 15. 2 for participant two (Park et al., 2015). The only instance in all tests in which there was no improvement was patient two who showed no increase in the modified Barthel index (MBI) (Park et al., 2015).

The included table was taken from the article and shows all results from each test and further exemplifies how CIMT can be used for rehabilitation of stroke patients (Park et al., 2015).

Shi and Tian and Yang and Zhao (2011) analyzed thirteen studies that used CIMT to come to the conclusion that “ Modified CIMT is a feasible alternative intervention for patients with upper-extremity dysfunction after stroke because the current study revealed that compared with TR, modified CIMT could reduce the level of disability, improve the ability to use the paretic upper extremity, and increase the use of the paretic upper limb in daily living.” Of the thirteen studies that Shi et al. (2011) examined, only two of them concluded “ that there was no statistical significance…between the groups” establishing a success rate of 85%. The table below was taken from the article and further explains the results of the study (Shi et al., 2011).

The next study was by far the largest consisting of two hundred twenty-two individuals and was conducted by Wolf et al. (2006). The participants of this study were encouraged to wear a mitt on their uninvolved upper extremity for 90% of their waking hours (Wolf et al., 2006). Wolf et al. (2006) used the Wolf Motor Function Test (WMFT) and the Motor Activity Log (MAL) to analyze the effectiveness of CIMT. Patients increased their WMFT scores and decreased their time by . 73 seconds by the twelve month follow up (Wolf et al., 2006). The MAL test showed that the patients’ baseline scores changed by over . 90 in both aspects of the test (Wolf et al., 2006). Table two below is taken from “ Effect of Constraint-Induced Movement Therapy on Upper Extremity Function 3 to 9 Months After Stroke” includes more results further emphasizing the positive effect of CIMT.

The last study done by Takebayashi et al. (2015), focuses primarily on the long-term effects of CIMT. Fourteen participants were included in this long-term study, and a variety of tests were performed including the Fugl-Meyer Assessment and the Motor Activity Log (Takebayashi et al., 2015). The patients, even after a year of no additional training, “ showed consistent functional improvement and increased arm use in activities of daily living” (Takebayashi et al., 2015). The following tables taken from the article show the comparison of the pre test, post test, and one year retest of the Fugl-Meyer Assessment as well as the Motor Activity Log (Takebayashi et al., 2015).

## Discussion

All of the previously mentioned studies concluded that constraint-induced movement therapy is an effective treatment option for stroke patients who have hemiparesis in one of their upper extremities. In each study, a baseline was established and then compared to a variety of different things to understand the effect that constraint induced movement therapy has on various types of patients. Every study had a variety of different types of strokes. Some were predominantly ischemic while others were predominantly hemorrhagic. Some studies included a variety of ages as well as both genders. The studies, however, did not include the races of the participants. Race could play a factor in the effectiveness of constraint induced movement therapy. Therefore, I think there should be a study done that includes as many races as possible in order to generalize the results. Thrane et al. (2015) had participants in which their stroke occurred seventeen years before the constraint induced movement therapy was introduced. Miltner et al. (1998) had participants that were between five and twenty-six days post stroke. Both studies were successful and concluded that CIMT is an effective tool in stroke rehabilitation. This suggests that constraint-induced movement therapy can be effective for patients who have just had a stroke as well as patients who are several years post stroke.

Shi et al. (2011) included two studies in their assessment that had differing results from the rest of the studies. However, these two studies were not blinded and only included two weeks of therapy. These two reasons are possibly why the results differed so much from the other studies. The rest of the studies proved the effectiveness of constraint-induced movement therapy.

Due to these studies, I believe constraint induced movement therapy should be included in all rehabilitation programs of stroke patients with upper extremity paresis.