

# Which interventions are useful for managing muscle spasticity in individuals who sustained traumatic brain injury? – A Cochrane Review summary with commentary

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## Abstract.

**BACKGROUND:** Spasticity is a frequent symptom after traumatic brain injury.

**OBJECTIVE:** To assess the effects of different interventions used for muscle spasticity after TBI.

**METHODS:** To summarize a rehabilitation perspective “Cochrane Review” conducted by Synnot et al.

**RESULTS:** Nine studies were involved for the Cochrane review. Poor report on the results of the studies that tested the effectiveness of interventions in spasticity are responsible for the low quality of the evidence. Most of the studies reported results in terms of decreasing spasticity and limiting effects in terms of how the decrease spasticity and no reports on the beneficial effects in terms of improving activities and participation.

**CONCLUSIONS:** High quality adequately powered trials in patients with TBI should be encouraged.

Keywords: TBI, spasticity, brain injury, muscle

The aim of this commentary is to summarize from a rehabilitation perspective the published Cochrane Review “Interventions for managing skeletal muscle spasticity following traumatic brain injury” by Synnot, Chau, Pitt, O’Connor, Gruen, Wasiak, Clavisi, Pattuwage, & Phillips, 2017<sup>1</sup> under the direct super-

vision of Cochrane Injuries. This Cochrane Corner is produced by Cochrane Rehabilitation.

## 1. Background

Spasticity is frequent after suffering from Traumatic Brain Injury (TBI) and subsequently increases

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<sup>1</sup>The abstract/plain language summary of this Cochrane Review is taken from a Cochrane Review previously published in the Cochrane Database of Systematic Reviews 2017, Issue 11,

doi: 10.1002/14651858.CD008929.pub2. (see [www.cochranelibrary.com](http://www.cochranelibrary.com) for information). Cochrane Reviews are regularly updated as new evidence emerges and in response to feedback, and Cochrane Database of Systematic Reviews should be consulted for the most recent version of the review.

the loss of function and limits activities and participation leading not only a clinical problem but also reduces patient's quality of life.

There are different approaches to treat spasticity such as pharmacological and non-pharmacological interventions as well as surgical ones.

### **Interventions for managing skeletal muscle spasticity following traumatic brain injury**

(Synnot, Chau, Pitt, O'Connor, Gruen, Wasiak, Clavisi, Pattuwage, & Phillips, 2017).

#### **2. What is the aim of the Cochrane Review?**

The aim of this Cochrane Review was to assess the effects of different interventions used for the management of skeletal muscle spasticity in after TBI.

#### **3. What was studied in the Cochrane Review?**

The population addressed in this review were people who suffered from TBI regardless the age (children and adults were included). The interventions studied were pharmacological (botulinum toxin or baclofen) and non-pharmacological interventions (splinting, casting). The interventions were compared among each other or with placebo. The primary review outcomes included spasticity as measured using the Tardieu or Modified Tardieu Scale, the Ashworth Scale or Modified Ashworth Scale as well as adverse events.

As secondary outcomes different domains of the International Classification of Functioning, Disability and Health (ICF) (Laxe et al., 2013) were included such as Sensory functions and pain, Neuromusculoskeletal and movement-related functions, general task and demands, mobility, self-care, domestic life, major life areas and community, social and civic life.

#### **4. Search methodology and up-to-dateness of the Cochrane Review**

The search for relevant studies was done using the Cochrane Injuries Group Specialised Register, the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE (Ovid), Embase (Ovid), clinical trials registries and others as well as the

reference lists of included studies, the information being current to June 2017.

#### **5. What are the main results of the Cochrane Review?**

The review included nine studies which involved 134 TBI participants. Four studies did not report between group differences yielding only five studies and 105 patients with TBI. The main results of the review include the following:

- The effect of baclofen on spasticity was greater than placebo at six-hour post-treatment based on one study (to be interpreted with caution). The quality of the evidence on the effect was very low due to the risk of bias limitations. Therefore, there is uncertainty about the effect of baclofen compared to placebo in terms of benefits on spasticity or on neuromusculoskeletal and movement-related functions (as measured by spasm and deep tendon reflexes).
- The effect of botulinum toxin A on upper limb spasticity was greater than placebo at four weeks based on one study and this greater effect disappeared when combined with casting in comparison with casting alone based on another study. The quality of the evidence on the effect was very low due to the risk of bias concerns. Therefore, there is uncertainty about the effect on botulinum toxin A on spasticity or neuromusculoskeletal and movement-related functions (as measured by ankle dorsiflexion) after TBI.
- There is uncertainty about the effect of pseudoelastic splints compared with traditional splints either on spasticity or on range of movement. The quality of the evidence on the effect was very low due to the risk of bias limitations.
- There are no different effects on spasticity after being treated with physiotherapy compared to casting or botulinum toxin A plus casting. The quality of the evidence was very low due to risk of bias related to insufficient information and blinding.
- There is uncertainty about the effects of tilt table standing, electrical stimulation and ankle splinting versus tilt table standing alone on spasticity. The quality of the evidence was very low due to concerns about indirectness, imprecision and likelihood of publication bias.

- The studies did not yield information regarding the secondary outcomes such as for instance the impact of spasticity reduction in pain, self-care, domestic life or other major life areas.
- Regarding adverse events, there is also uncertainty about the effect of baclofen or botulinum toxin A or with or without casting due to the lack of sufficient information in studies. Casting was associated with minor skin damage mostly with spontaneous resolvability.

## 6. What is the evidence about spasticity treatment for TBI?

The authors (Synnot et al., 2017) concluded that there is significant uncertainty about the effectiveness or harms of these interventions in the management of post-TBI spasticity due to the very low quality and limited amount of evidence of the studies. One of the main reasons of this low quality was the poor report of the results of the studies that tested the effectiveness of baclofen and tizanidine. Additionally, two studies were funded by pharmaceutical or medical technology companies. In general, most of the studies concluded that the intervention tested had beneficial effects on spasticity. In the case of casting and splinting, some secondary effects such as minor skin damage was seen.

## 7. What are the implications of the Cochrane evidence for practice in TBI neurorehabilitation?

Spasticity is one of the main complications in patients with TBI. Regaining functioning is the main objective in rehabilitation. Functioning according to the WHO International Classification of Functioning (ICF) is understood as the balance between body functions, activities and participation. Therefore, when treating spasticity it is presumed that pain, skin status, movement disorders will improve and activities and participation will be enhanced, decreasing disability due to spasticity. Unfortunately, most of the outcomes reported by the studies in this review were limiting the effect to the interventions to the decrease of spasticity (body function of the ICF) and there were no other outcomes reported in the domains of activity and participation (such as improving the

ability of doing the daily life activities, improving gait . . . ). The results of this review agree with the findings of other reviews which also conclude that there is a lack of high quality evidence for many modalities of treatment of spasticity (Khan, Amatya, Bensmail, & Yelnik, 2017).

Apart from the fact that this review could not conclude a benefit, antispasticity interventions are extensively used since there is a variety of evidence of their use in other conditions with spasticity i.e stroke. It is assumed that if it is effective in stroke that they will also be effective in post-TBI spasticity but this review showed that the evidence for existing interventions of managing spasticity in TBI patients is limited. Therefore there is an urgent need to develop high quality adequately powered trials in patients with TBI that include comprehensive collection and reporting of adverse event data, as well as information about activities of daily living and return to work.

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## Conflict of interest

The author declares no conflicts of interest.

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