

Keele Critically Appraised Topic (CAT Form)



Clinical question

In adults following a traumatic brain injury (TBI) does the addition of a tilt-table increase ankle joint range of movement (dorsiflexion) in addition to usual care?

Clinical bottom line

There is limited evidence to either support or refute the use of a tilt-table to improve ankle dorsiflexion after traumatic brain injury, but small potential effects have been reported. It is suggested that clinical judgement on a case-by-case basis is used to decide the appropriateness of tilt-table use. Further research is required.

An audit of tilt-table use locally will be undertaken, and a survey is planned to better understand the national picture regarding use of tilt-tables in this patient group.

Plain Language Summary

When a patient has experienced a brain injury the control in their lower limbs is often affected. One of the aims of the therapy team is to make sure that no movement is lost in the ankles, knees and hips. This is essential if the patient is going to stand upright and walk again in the future. The therapy team have many ways of helping to keep these joints moving, so they do not become very stiff and lose range of movement. One of these treatment options involves using a tilt-table. This is a mechanical table that the patient lies on, and, with the aid of straps, can be gradually lifted from lying to an upright standing position. This position stretches the back of the calves and may help prevent stiff ankles. However, there are several possible issues relating to using a tilt-table. These include owning a tilt-table in the department and having enough therapists to carry out the treatment session. This critically appraised topic aimed to find out if there is high-quality research to support the use of a tilt-table for maintaining ankle movement for people after a brain injury.

Why is this important?

Patients having rehabilitation following a traumatic brain injury (TBI), require input from therapists to maintain range of movement in the ankle joint. This is important to enable patients to be able to achieve at least a neutral position at the ankle, to allow upright standing and walking in the future.

Patients can be treated by a therapist to complete passive stretches of the ankle joint or can use splints or blocks to help position the ankle joints maintaining length in the calf muscles to keep the range of movement. In addition to these methods a mechanical tilt table can be used. Use of a tilt-table requires two or more members of the team to transfer the patient onto the tilt-table, gradually adjust to an upright position, ensuring good weightbearing through the patient's feet with the ankles in alignment. Standing is a more functional position and uses the patient's weight to passively prolong the stretch on the muscle and joints for a sustained period.

The patient is supervised during the session to monitor any difficulties; the amount of time tolerated, will vary depending upon the patient. This opportunity to stand in a tilt-table is often affected by staffing levels in the team and the availability of a tilt-table.

It takes a significant amount of time to gradually move the patient into an upright stance and to increase their tolerance to being in an upright position. The cost of both staffing and equipment (at a price of £4,250) need to be taken into consideration.

The question explored in this critically appraised topic (CAT) is “does the addition of a tilt-table provide improved range of ankle movement compared to usual care for patients following a TBI”.

Search timeframe

1990 - 2025

Search criteria

Population Intervention Comparison Outcomes (PICO) themes	Description	Search terms
Population and Setting E.g. adults with OA, primary care	Adults Traumatic Brain Injury,	"Traumatic brain injury" or "TBI"
Intervention or Exposure (i.e. what is being tested) e.g. manual therapy	Tilt table, Electric vertical standing table.	"Tilt table*" or "electric vertical standing table" or "supported standing devices" or "supported standing"
Comparison, if any e.g. usual care, leaflet	Passive dorsi flexion stretches, Passive ankle stretches. Usual care	"Passive dorsi flexion stretches" or "Passive ankle stretches" or passive adj4 stretch* Usual care
Outcomes of interest e.g. Visual analogue scale, Range of motion	Ankle range of movement dorsi flexion, Neutral ankle position.	"Ankle range of movement dorsi flexion" or "Neutral ankle position" or "range of movement"
Types of studies e.g. Randomised Controlled Trials, Systematic reviews	RCT's Systematic reviews	

Databases searched

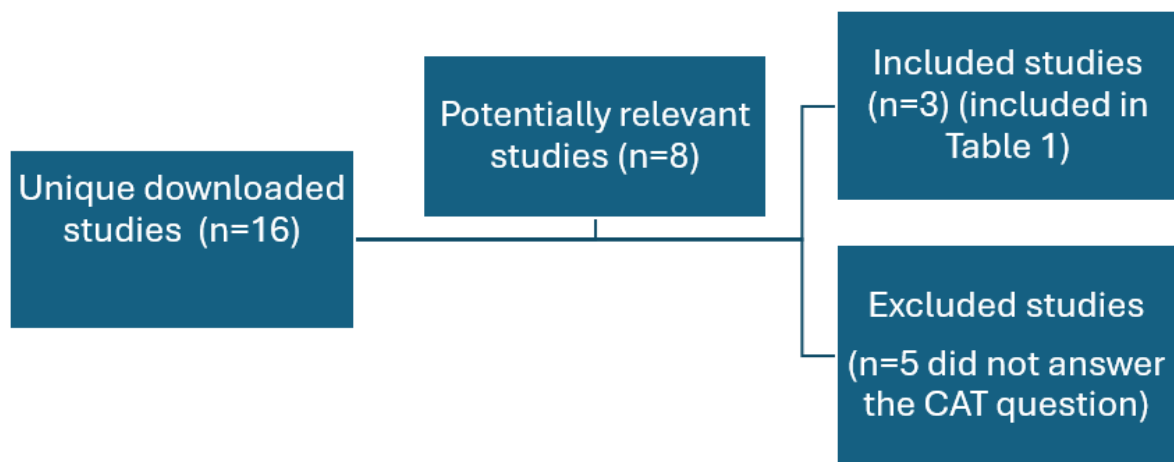
Physiotherapy Evidence Database (PEDro), Translation of Research into Practice (TRIP) Database, Cochrane Systematic Reviews, Cochrane (Trials), Cinahl, Embase & Emcare,

Joanna Briggs Institute, Web of Science, AMED, Google Scholar, OrthoEvidence, OT Seeker, Carrot2 and Pub Med

Date of search

30/5/25 and a further search September 2025.

Results of the search:



There were 16 unique downloaded studies. There were eight relevant studies, one was determined to be a duplication (poster presentation of Leung 2014). The three studies partially answering the CAT question are included in Table 1: one Cochrane review and two systematic reviews. The five excluded studies didn't answer the question and were of low quality.

Table 1- Details of included studies

First author, year and type of study	Population and setting	Intervention or exposure tested	Study results	Assessment of quality and comments
Bohannon & Green (1) 2021. Systematic Review	From 482 articles, 20 studies were included: originating from 11 countries. Patients included had either a stroke, brain injury, spinal cord or other neurologic conditions.	Patients were exposed to periods of standing with use of a tilt-table for support at various angles from upright to 70°, some included standing wedges or incline plates.	There was limited support for tilt-table standing as an intervention. Some patients with neurological conditions may respond positively to tilt-table standing; particularly those with decreased ankle range of motion, positive neurologic signs in the lower limbs and decreased level of consciousness.	The Systematic review acknowledged that the studies varied widely in the populations studied, procedures used, and responses reported. Of the 20 studies only three included TBI patients, totalling 28 patients. The strongest evidence for tilt-table standing appears to be associated with small increases in ankle dorsiflexion range following one or multiple sessions. The review summarises that due to the findings and quality of the studies an unqualified endorsement of tilt-table standing does not seem warranted. A trial of the tilt-table specifically for patients with specific problems may provide further help.

Synnot (2) 2017 Cochrane Library	Only Studies with at least 50% of the participants with a traumatic brain injury were selected. Nine studies with 134 patients were included; 105 with TBI.	Pharmacological (Baclofen & Botulinum toxin A) Non-pharmacological (casting, physiotherapy, splints, tilt-table standing and electrical stimulation) Often combinations of these. Only one of the studies used tilt-table as part of the intervention. (Leung 2014).	Only five studies with 105 patients produced some usable results. The remaining four were funded by drug manufacturers and mechanical technology companies indicating a potential conflict of interest. The authors felt it would be misleading to provide evidence of the study results given the quality of evidence was very low for all measurements.	Poor reporting, small study size. Low quality and limited amount of evidence leave the authors uncertain about the effectiveness or harms of these interventions. ‘Meta-analysis was not feasible due to the paucity of data heterogeneity of interventions and comparator groups.
Newman (3) 2013 Systematic Review	17 articles were selected involving 540 patients. Adults with upper motor neurone disorders: stroke, multiple sclerosis, traumatic brain injury and spinal cord injury.	The intervention of interest was supported standing. All doses and settings were accepted. All methods to achieve passive standing were eligible, including tilt-table, standing frame and prone stander. Only seven patients	There was a variety in range of time since diagnosis within all the studies and the setting varied between home and with or without therapist present. Standing interventions varied considerably between the trials and only 15 TBI patients were evaluated using a tilt-table. (Five	Quality generally was low with only two high-quality trials. These two looked at stroke (n=30) & spinal injury (n=20) patients. In both, standing had a small effect on preventing loss of ankle dorsiflexion. The authors discussed that few firm conclusions could not be drawn from the existing evidence due to lack

	Looking at the effect of standing on muscle length in the lower limb, spasticity and mineral bone density.	achieved standing with a tilt-table.	patients in one study and 10 in another).	of high-quality studies of sufficient size. Future trials adequately powered are needed and immediate and long-term effects should be considered.
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Summary

The more recent systematic review (1) scoped the use of the tilt-table across a broad spectrum of patient groups to determine if there was any evidence in support of its use. The earlier systematic review (2) evaluated supported standing in adults with upper motor neurone disorders, in a variety of methods and measured outcomes. The Cochrane Review (3) looked at a variety of pharmacological and non-pharmacological methods of managing muscle spasticity in traumatic brain injury, the tilt-table only formed a small section within this review, involving just one study (Leung et al., 2014, with 36 participants). In this study the tilt-table was used for both groups, but the frequency of tilt-table uses in each group, differed. In the intervention group the participants received tilt-table treatment for 30 minutes five times each week in addition to electrical stimulation to the ankle dorsiflexors and 12 hours each day splinting. However, the control group just received 30 minutes of tilt-table treatment three times each week. This makes comparison between the groups and understanding the potential effects of tilt-table use not possible.

Both Bohannon (1) and Newman and Barker (3) found that tilt-table standing is associated with small increases ankle range of movement and has a small effect on preventing loss of ankle dorsiflexion. This opinion is endorsed by clinicians; however, further work looking specifically at certain patient groups is recommended for definitive decisions to be made.

Implications for practice

The literature discusses the theoretical reasoning behind the use of tilt-tables to achieve prolonged weightbearing stretches in a functional position, maintaining good ankle positioning and a small effect that loss of dorsi flexion can be prevented. However, larger studies demonstrating significant results for people following a TBI is lacking. The consideration of dosage: time spent in standing, frequency each week and for how many months is very variable within the evidence found.

Further research is clearly warranted to help clinicians demonstrate effective use of their valuable time and fully understand the benefits of using tilt-tables for people after TBI.

A local audit and scoping of practice in other acute Trusts will be useful to evaluate potential benefits for people post TBI until further literature is published.

What would you post on X (previously Twitter)?

High-quality research is needed to demonstrate clearly any benefits in using a tilt-table to help preserve ankle dorsiflexion in patients following traumatic brain injuries.

References

1. [Neurologic and musculoskeletal effects of tilt-table standing on adults: a systematic review - PubMed](#)
2. [Interventions for managing skeletal muscle spasticity following traumatic brain injury - PubMed](#)
3. [The effect of supported standing in adults with upper motor neurone disorders: a systematic review - PubMed](#)
4. [Standing with electrical stimulation and splinting is no better than standing alone for management of ankle plantarflexion contractures in people with traumatic brain injury: a randomised trial - PubMed](#)

Please tick the box that best reflects your clinical bottom line and include the picture on page 1

CAT image	Evidence quality	Checkbox
	Good quality evidence to support use....	☐
	Insufficient or poor quality evidence OR substantial harms suggest intervention used with caution after discussion with patient...	☒
	No good quality evidence.	☐

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