Learning from contracture management in Stroke - recent review & views of therapists in DOC

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Cochrane Library

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Assistive technology, including orthotic devices, for the management of contractures in adult stroke patients (Protocol)

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Assistive Technology

For the purpose of this review an assistive technology is defined as a mechanical, electrical or electromechanical device used to stretch or lengthen a muscle statically, dynamically or cyclically.

YES - Equipment used to **position** limb segments to maintain **stretch** (e.g. tilt table, stand- ing frames) neuromuscular electrical stimulation (NMES), continuous passive motion, tilt table, standing frame, splints (dynamic and static), serial casts, virtual reality, robotic arms, biofeedback, Lycra garments etc

NO - pillows, foam and sandbags, cycling (active), treadmill, hydrotherapy, Botulinum toxin, mitt used for constraint-induced movement therapy, dressing and taping, etc.

Criteria

- Single blind **RCT** or First part of **cross over studies**
- **Objective** is to manage contractures, acceptable if looking at treatment effectiveness and **PROM** or **stiffness** is primary OM
- **Adult Stroke**, can be mixed population if Stroke data is separable
- **Baseline similarity** – PROM or stiffness values at baseline / week 0 and demographically similar
- **PROM** measured using goniometer or using standard force or **Stiffness**

Study Flow

3010

From database search – by Cochrane Library

211

Initial list from Title and abstract

66

Full texts shared between three authors

22

Based on Relevance to our objective (Contracture Specific)

7 RCTs

1 Author failed to respond
With raw data
1 RCT – randomisation was unsatisfactory

5 RCTs

Study ID	AT used	Control Rx	Dosage	Outcome measure	Duration and Follow up	Sample	Authors Conclusion
Lannin et al 2007	Wrist and fingers splinted at 45^{o} and at neutral	No Splint Finger / wrist ext exs, 10 minutes, no stretching	9-12 hours, 5 days a week, splints wore at night	Stiffness – PROM using standardised torque	4 weeks, follow up at 6th week	Adult stroke N= 21 in each group	No benefit of using a splint to manage contractures
Leung et al 2012	ES to wrist and finger extensors + Splinting + routine therapy	Splinting 12 hrs / day + routine therapy	1 hr ES, 5 days a week	Stiffness – PROM using standardised torque (3 Nm/s and 2 Nm /s)	4 weeks, Follow up at 6th week	Adult stroke + TBI, raw data provided N= 29	Not clear if ES+ Splinting is superior to Splinting alone
Malhotra Et al 2013	ES to wrist and fingers + 45 minutes routine therapy	Routine treatment involving stretching, strengthening, functional task etc	2-3 sessions 30 minutes each for 5 days a week	PROM and Stiffness	6 weeks, Follow up at 12, 24 and 36 weeks	Adults stroke N= 90	ES might prevent deterioration in contracture, prevented development of pain

Study ID	AT used	Control Rx	Dosage	Outcome measure	Duration and Follow up	Sample	Authors Conclusion
Robinson et al 2008	Splinting the knee with ankle at plantargrade	Standing on Tilt table with foot dorsiflexed using a wedge	30 minutes on TT Vs 7 nights per week applied for 4 weeks	PROM against 12 Kg torque and photographs of ankle	4 weeks, follow up at 10th week	Adult stroke – non walkers N=30	No control group, both treatments equally effective for preventing contracture
Turton and Britton 2006	Hinged Board (Bexhill arm support)	Standard arm care, not involving sustained stretches	Positioning using hinged board	Stiffness – PROM measured using standardised torque (0.5 Kg of force)	12 weeks, no follow up	Adult stroke patients N=25	Not well tolerated over 12 weeks, small sample size, Not recommended as treatment to prevent contractures

Stiffness

Name & Year	No of Controls	No Exp Tx	Mean Diff in Control	Mean Diff in Rx	SD Control	SD Rx	Diff Mean	Effect size
Leung et al (wk 4- wk 0)	13	16	-10	-3	12.06	11.24	7	0.60285
Wk 6 – wk 0	13	14	-7	-10	14.63	13.15	-3	-0.21614
Lannin 2007 (wk 4 – wk 0)	21	21	-9	-11	16.9	15.4	-2.4	-0.14845
Lannin 2007 (wk 6- wk 0)	21	21	-17	-14	17.8	14.9	3	0.18277
Malhotra et al 2013 Wk 6 - wk 0	42	39	0.03	0.01	0.065	0.124	-0.02	-0.20424
Wk 12 – wk 0	41	38	-0.01	0.06	0.12	0.3	0.07	0.31080
Turton and Britton 2005 wk 12 – wk 0	11	12	-9.9	-15.5	18.9	13.8	-5.6	-0.34090

PROM

Name & Year	No of Controls	No Exp Tx	Mean Diff in Control	Mean Diff in Tx	SD Control	SD Tx	Diff Mean	Effect size
Robinson et al 2008	14	16	-0.9	0.1	12.6	9	1	0.09241
Wk 10 – wk 0	11	13	-6.1	-1.1	11.5	9	5	0.48960
Malhotra et al 2013 (wk 6 – wk 0)	42	39	-15.8	-8.5	26.65	23.56	7.3	0.28956
Wk 12 – wk 0)	41	38	-18.2	-19.8	22.41	23.42	-1.6	-0.06987

CCD findings

- E Stim (cyclical stretching to wrist & fingers flexors)
- Splint (stretch wrist and finger flexors)
- Tilt Table (+ wedges to stretch TA)
- Positioning devices (hinged board for wrist and fingers flexor stretching)
- Slowing down, preventing contracture or maintaining ROM could be seen as treatment effectiveness in long term rehab
- Preliminary findings: No single treatment is superior, evidence is weak. Treatment plan should be guided by theoretical understanding, experience and client presentation

Informal Q&A

- What do you think are treatment options for managing **contractures** in a Vegetative state / minimally conscious state - post brain injury client?
- ES, FES, Splinting, Casting, Botox, Tilt table, tenotomy in late stages
- Have you observed / treated these clients – if so what modalities were used and in what setting? (acute / rehab / Long Term setting)
- More long term, some acute
- Would you consider one treatment to be superior to the other?
- No, Botox and splinting, tenotomy in later stages, Positioning

Informal Q&A

- Have you considered the cost of using / applying this treatment i.e., no of staff required (qualified / support staff), time, raw materials
- Divided, staff training - attrition

- What outcome measure you use, how frequently do you check your outcomes to inform continuing / treatment?
- PROM – visual, photographs, annual reviews

- Family / carer involvement in the treatment selected – do you involve them and confident of teaching them the use…?
- Yes – stretching, exercises, No – complex treatments, not satisfied with handing over splinting