Critical review of passive muscle stretch: implications for the treatment of children in vegetative and minimally conscious states

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Authors' objectives
To review the efficacy of passive muscle stretch in the treatment of children in vegetative and minimally conscious states.

Searching
MEDLINE and CINAHL were searched from 1966 to the 'present'. The search terms included 'range of motion', 'persistent vegetative state', 'minimally conscious state', 'brain injury', 'spasticity', 'cerebral palsy' and 'muscle stretch and contractures'. The reference lists of identified articles were also examined for additional studies.

Study selection
Study designs of evaluations included in the review
All designs of studies were eligible for inclusion in the review, except for single case reports which were excluded.

Specific interventions included in the review
Passive range of motion (PROM) and prolonged muscle stretch (PMS) (including serial casting) as treatment modalities.

Participants included in the review
Studies of children or adults in a vegetative or minimally conscious state, or with acquired brain injury, cerebral palsy or cerebrovascular accident, were eligible for inclusion in the review. The studies included in the review were of adults with cerebrovascular accident, adults with upper motor neuron lesions, children with cerebral palsy, children who were 'severely motorically and cognitively involved', patients with head trauma (traumatic brain injury), and boys with spastic diplegia.

Outcomes assessed in the review
The outcomes to be considered in the review were not specified in the methods for the review process. The following outcomes were extracted from the included studies: measure of muscle spasticity using various tests, which were reported in the review; goniometer measurement of PROM or ROM; torque-controlled measurement of ankle dorsiflexion; torque and angular position of ankle; potentiometric recording of joint ankle; clinical grading of deep tendon reflexes; and rating of gait or standing.

How were decisions on the relevance of primary studies made?
The review had a single author. No suggestion of any independent checking of the study selection process was made in the review.

Assessment of study quality
The quality of each study was assessed on the basis of criteria developed by Guyatt et al. (see Other Publications of Related Interest no.1), with additional criteria pertinent to the outcome measures used and the data analysis. The list of criteria was given in the review. In addition, a level of evidence (see Other Publications of Related Interest no.2) was assigned to each study. The review had a single author who presumably applied the quality criteria with no independent verification.

Data extraction
The review had a single author who presumably performed the data extraction with no independent verification. The
categories of data extracted were: bibliographic details, study design, participants, intervention, dependant variable, outcome measure, results and factors pertaining to study quality.

Methods of synthesis
How were the studies combined?
The studies were combined narratively. Recommendations regarding treatment were classified as A, B, C or D based on the levels of evidence assigned following the quality assessment, and extrapolations of the study results were discussed.

How were differences between studies investigated?
There was no formal assessment of diversity. The studies were discussed by intervention and the nature of the injury or disability.

Results of the review
Seventeen studies (n=704) were included in the review: 2 retrospective studies and 15 of some form of experimental design. Of the latter 15, 6 had no control group, 7 were randomised or quasi-randomised, and 2 were cohort studies with control groups.

Only two studies included children who could be considered to be in a vegetative or minimally conscious state. The quality of the studies and level of evidence varied considerably. There were 4 studies of PROM/PMS, 3 of PMS programmes and 10 of serial casting. The following recommendations were made in the review.

Repeated flexion-extension movements of the elbow may reduce spasticity (grade D).

A prolonged muscle stretch of 10 to 30 minutes’ duration is effective in reducing spasticity immediately and for up to 35 minutes following the stretch (grade C).

Manual passive stretching exercises held for 20 to 60 seconds per repetition for five repetitions are as effective when provided twice weekly as when provided five times per week (grade B).

Passive stretching exercises held for 60 seconds per repetition for five repetitions three times weekly may be effective in reducing knee flexion contractures (grade C).

Prolonged stretching of the hip adductor muscles for 5 to 7 hours per day may prevent hip adductor muscle contracture (grade D).

Serial casting is effective in increasing joint range of motion (grade C).

Serial casting might be effective in reducing spasticity (grade D).

Authors’ conclusions
There was limited evidence to support the efficacy of passive muscle stretch to improve range of motion and reduce spasticity in children in a vegetative or minimally conscious state. Caution must be used when interpreting these recommendations because of the limited number of studies available, and the extrapolation of study results from a different population.

CRD commentary
This review addressed an appropriate question. However, the inclusion criteria for studies that would be eligible for the review were not well defined. In particular, even though the review was of treatments for children in a vegetative or minimally conscious state, the review included adults and children and a range of indications because no studies conducted in the required patient population were found.
One flaw in this review was that it had only a single author. Thus, the review processes were presumably not checked for errors, leaving it susceptible to the author's bias. The literature search was fair, incorporating two main electronic databases. However, it was not complemented with handsearching and no attempts to acquire unpublished data were made, therefore some studies may have been missed. Publication bias was not assessed.

A good level of detail was provided for each of the individual studies. A thorough assessment of the quality of the studies, and the level of evidence they provided, comprised the main focus of the review and was the basis of the data synthesis.

The author's conclusions and recommendations are supported by the findings of the review. However, the reader should remember that the recommendations for the treatment of children in a vegetative or minimally conscious state were based on extrapolating data from different populations.

Implications of the review for practice and research
Practice: The author did not state any implications for practice.

Research: The author states 'Further research is needed to strengthen these recommendations and establish the efficacy of passive muscle stretch treatment of children in a vegetative or minimally conscious state'.

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Other publications of related interest

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract
contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.