A systematic review of the efficacy of gait rehabilitation strategies for spinal cord injury


CRD summary
The authors concluded that rehabilitation strategies that facilitate repeated practice of gait offer the greatest benefit to functional ambulation in subacute or chronic spinal cord injury. The authors' conclusions reflect the evidence presented, however, due to lack of reporting on methodology and possible reviewer, publication and language biases, the reliability of the authors' conclusions is unclear.

Authors' objectives
To determine the effectiveness of different gait rehabilitation strategies on functional ambulation following spinal cord injury.

Searching
MEDLINE, CINAHL, EMBASE and PsycINFO were searched from 1980 to 2005. Search terms were reported. Reference lists of relevant meta-analyses, systematic reviews, clinical practice guidelines, reviews articles and studies were scanned for additional studies. The authors stated that only published studies in English were included in the review.

The authors stated neither how the papers were selected for the review nor how many reviewers performed the selection.

Study selection
Articles that described specific gait rehabilitation parameters, including duration and frequency of specific training tasks, were eligible for inclusion in the review. Studies that either did not measure functional ambulation outcomes or did not analyse pre- versus post-intervention outcomes were excluded. Studies that involved functional electrical stimulation (FES) or bracing interventions were exempt from the inclusion and exclusion criteria as the authors stated that information that related to these criteria were not usually provided for these two types of intervention. Study participants included those with acute/subacute incomplete spinal cord injury (<12 months post injury), chronic incomplete spinal cord injury (>1 year post injury) and complete paraplegia. Interventions included Body Weight Supported Treadmill Training (BWSTT), FES, lower extremity bracing (braces/orthoses), a combination of these strategies and gait training with pharmacological agents. Outcome measures included: walking speed; Walking Index for Spinal Cord Injury (WISCI); Lower Extremity Motor Score (LEMS); Functional Independence Measure-Locomotor (FIM-L); 6-Minute Walk Test (6-MWT); and 10-Minute Walk Test (10-MWT).

Assessment of study quality
The study quality of randomised controlled trials (RCTs) was assessed using the Physiotherapy Evidence Database (PEDro) tool (an 11-item scale with a maximum score of 10). All other types of study were assessed with a modified Downs and Black Tool (maximum score of 28). In both instances a higher score indicated higher methodological quality. Two reviewers independently performed the validity assessment; disagreements were resolved through discussion.

Data extraction
For each study data regarding research design, subject characteristics, nature of intervention, measurements and key results were extracted. The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
The studies were combined in a narrative synthesis.

Results of the review
Forty one studies were included in the review: three RCTs; 22 pre-post test studies; 12 post-test studies; one case
control study; and three case reports. Twelve studies were on BWSTT, seven on FES, 10 on lower-extremity bracing (braces/orthoses) and 12 included a combination of strategies. Study quality of included RCTs ranged from 6 to 8 using the PEDro tool. Study quality of the non-RCTs included in the review ranged from 6 to 19 using the modified Down and Blacks Tool.

One RCT (n=146) found no difference in FIM-L or walking speed between BWSTT and overground gait training in patients with acute/subacute spinal cord injury. However, patients with American Spinal Injury Association (ASIA) impairment scale C and D spinal cord injury in both groups showed improved functional ambulation.

One RCT (n=27) investigated manual BWSTT, robot-assisted BWSTT, BWSTT and FES and overground training and FES. Participants in the BWSTT and FES, and overground training and FES groups both showed significant improvements in walking speed, but those in the manual or robot assisted BWSTT did not.

One RCT (n=9) investigated gait training combined with the use of intravenous GM1 ganglioside. Gait training combined with GM1 ganglioside use resulted in increased motor skills, walking distance and walking velocity.

Other study designs showed that 61% of participants who received BWSTT showed improvement following treatment; patients who received FES showed increased walking speed or distance, some of which persisted after the stimulator was turned off; the use of orthoses/braces could facilitate patients with subacute or chronic complete paraplegia to stand independently and achieve some functional ambulation skills with the aid of assistive devices; and there was evidence that bracing and FES may have provided additional benefits to functional ambulation over either intervention alone.

**Authors' conclusions**

Rehabilitation strategies that facilitated repeated practice of gait offered the greatest benefit to functional ambulation in subacute or chronic spinal cord injury.

**CRD commentary**

The review addressed a clear research question and was supported by adequate inclusion criteria. The search used an adequate number of databases, but was restricted to published studies in English. This meant that there was a high risk of the review being subject to publication and language biases and relevant studies being missed from the review. Methods used to select studies and extract data were not reported, therefore, it was unknown what efforts were made to minimise reviewer bias and error. Assessment of study quality was assessed using appropriate tools and with efforts to minimise reviewer bias and error. Details of the primary studies were provided. Given the heterogeneous nature of the included studies, a narrative synthesis was appropriate.

The authors’ conclusions reflected the evidence presented. However, due to the reliance upon predominately pre- and post-test studies, the lack of reporting on methods of study selection and data extraction, and the high risk of publication and language biases, the reliability of the authors conclusions is unclear.

**Implications of the review for practice and research**

**Practice:** The authors stated that standardised and consistent outcome measures across rehabilitation centres needed to be used.

**Research:** The authors stated that further research was required to determine whether combination therapies offered significant advantages over any given approach alone.

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**Bibliographic details**

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.