

PICO question: For people  $\leq$  1-year s/p CVA, is therapeutic exercise more effective than no exercise regimen at all in reducing impairments and functional limitations associated with stroke?

### ***Summary points from the literature***

From this review, it is clear that therapeutic exercise is effective in reducing impairments and functional limitations associated with stroke. It can be concluded that therapeutic exercise is helpful in improving strength<sup>5,6</sup>, balance<sup>2,5-9</sup>, aerobic capacity<sup>2,6,8-11</sup>, gait<sup>2,6,8-11</sup>, ADLs and IADLs<sup>2,5,6,8</sup>, and health-related QOL.<sup>7,11</sup> These results suggest that impairments and functional limitations are modifiable after stroke and that exercise is effective in reducing the impact of compromised fitness after stroke. Further study is required to address several gaps that are present in the literature.

First, there is a need for additional research regarding the frequency, intensity, and duration of the referenced interventions.<sup>2</sup> Many of the referenced studies provide a general description of the proposed intervention, but lack information on how the frequency, intensity, and duration of the intervention was established and progressed. This information would make the interventions easier to replicate and would make the results more generalizable across populations.

Second, future studies need to address the effect of aquatic therapy in improving balance in stroke survivors.<sup>5</sup> Noh et al. analyzed the effect of aquatic therapy on postural balance and muscle strength in stroke survivors and found that the aquatic intervention resulted in significant improvements in mean Berg Balance Scale score, weight-bearing ability when rising from a chair, and forward/backward shifting to the affected side. In response to these findings, more intensive therapeutic and specific balance-challenging exercises need to be added to aquatic therapy programs and their effectiveness needs to be confirmed.

Lastly, exploration needs to be done to discover additional seated exercise models that address aerobic training and encourage paretic limb use.<sup>11</sup> Tang et al. evaluated the feasibility of adding aerobic cycle ergometer training to conventional rehabilitation early after stroke. Researchers found that aerobic training on a semi-recumbent cycle ergometer resulted in improvements in preferred walking speed, fast-paced walking speed, peak VO<sub>2</sub>, work rate, and Stroke Impact Scale score.<sup>11</sup> Of those who are capable of independent ambulation after stroke, a significant proportion is unable to walk a speed or distance necessary to achieve aerobic benefits.<sup>11</sup> Therefore, a seated ergometry paradigm might serve as an effective alternative to walking programs.<sup>11</sup>

### ***Applications to clinical practice***

As a result of this review, many applications can be made to clinical practice regarding the implementation of therapeutic exercise in persons with stroke. First, this review addresses the need for rehabilitation options that provide well-rounded care for chronic stroke survivors and emphasize the physical therapist's role in developing and implementing programs that would meet this need.<sup>2,10</sup> Second, this review suggests that exercise programs for chronic stroke survivors should include task-specific, dynamic balance training, with an emphasis on multisensory and agility tasks.<sup>7</sup> Third, this review indicates that aquatic therapy combined with land-based activities may be more effective in enhancing balance and reducing falls than either intervention alone.<sup>5</sup> Fourth, this review implies that short-term aerobic ergometry training may improve lower limb dyscoordination during walking in individuals with already compromised motor control.<sup>11</sup> Lastly, this review emphasizes that structured, intensive rehabilitation should continue after hospital discharge and that both self-initiated and therapist-directed exercise should be incorporated into such rehabilitation programs.<sup>6,8</sup>

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