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A Step in the Right Direction

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The importance of acknowledging limited control over dosing and intensity in the rehabilitation treatment of patients with stroke has been known for many years.[1] While treatments, such as constraint induced movement therapy for upper extremity hemiplegia following stroke provide indications of optimal dosing using the original mode of delivery,[2,3] there appears to be no relationship between titrated dosing and outcome in modified forms of this treatment.[4] This finding may be attributed in part to the concentrated effort in treating one limb whose magnitude of impairment may vary considerably across patients.

However, improved ambulation requires precise restoration of interlimb coordination for which intersegmental activation within and between limbs is essential. The Locomotor Experience Applied Post-Stroke (LEAPS) randomized controlled trial demonstrated improvement in treadmill gait training at one-year post-insult (primary outcome measure) among participants enrolled 2 months post-stroke. However, profound improvement in gait speed occurred among participants given an alternative strength and balance exercise program delivered for 36 sessions, each approximately 90 minutes, over 12–16 weeks.[5] Moreover, maximal exercise benefit was achieved by 24 sessions.[6] These findings were important because they heralded one of the first demonstrations of precision dosing and outcomes in sub-acute stroke survivors using a specified exercise program while identifying time for maximal improved gait speed. More recently, favorable outcomes using robot assisted gait training following stroke appear to be associated with numbers of training sessions and relative chronicity of stroke.[7]

Guidelines reported this year to improve gait following chronic stroke and other cortical or spinal cord injuries have emphasized the importance of controlling for intensity, frequency, duration and relative chronicity in establishing reproducible treatment protocols.[8] These same concerns are appropriate for formal studies as well. The absence of standardization

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of one or more of these factors inevitably contributes to the diversity of findings in stroke rehabilitation and often the inability to replicate studies. With these realities in mind, the paper by Klassen et al[9] gives pause for reflection and potential modeling of future ambulation studies in rehabilitation of patients with acute stroke. Considerable care was taken to document cardiovascular parameters (heart rate) upon which to pace increases in exercise within two dosing regimens (delineated in intensity by one versus two hours) compared to a well-documented usual treatment group. The six-minute walk test (6MWT) served as a primary endpoint, and other quality of life measures were assessed as well. Performance audits were undertaken weekly and intervention protocol fidelity was overseen with meticulous care. Step counters were also employed for monitoring and motivational purposes. Importantly, six rehabilitation units covering three Canadian provinces participated. At post-treatment, individuals in both dose treatment groups showed greater walking endurance than the control group and the more intense dose group demonstrated greater gait speed (5-meter walk) than the less intense control group. The improvements seen in the 6MWT for each dose group were retained at one year.

The detailed care demonstrated in the execution of this project is most impressive. Scheduling exercise programs that sought to achieve a cardiovascular parameter of a defined aerobic training zone (greater than 40% of heart rate reserve) provides precision to optimize participant compliance and potential benefit. Quantification of exercise time is also valuable in defining true dosing.

Moreover, monitoring procedural consistency across six participating sites is not trivial. In short, the controls imposed upon this study are important and demonstrate oversight which is admirable. Delineation of group assignment that acknowledges dosing, cardiovascular equipoise, and consistency in implementation serves as a valuable model which future efforts in rehabilitation studies should emulate. However, this very precision raises questions that have plagued neurorehabilitation studies for some time.

Undoubtedly provision of stroke rehabilitative services varies across countries and the financial structures that underwrite them. One must ask to what extent the number of treatment sessions in this Canadian study is replicable in other healthcare systems. Are audits governing compliance easily obtained elsewhere and what impediments exist in fostering consistency across institutions attempting to adhere to protocols that require inclusion criteria such as seen in the Klassen et al study? Might comparable findings be seen in more chronic or impaired stroke cohorts? Specifically, do the participants in this study demonstrate comparable attributes to those seen in other stroke gait studies. The participants in this study appear considerably younger and managed to improve walking speeds comparable to their able-bodied counterparts. Even with these concerns, this study highlights research discipline that future studies should emulate. In this regard, this study does represent “a step in the right direction”.

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