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Appraisal

Critically Appraised Papers

Higher-dose, higher-repetition upper limb motor rehabilitation program after stroke is not superior to dose-matched or usual-dose customary occupational therapy

Synopsis

Summary of: Winstein CJ, Wolf SL, Dromerick AW, Lane CJ, Nelson MA, Lewthwaite R, et al, for the Interdisciplinary Comprehensive Arm Rehabilitation Evaluation (ICARE) Investigative Team. Effect of a task-oriented rehabilitation program on upper extremity recovery following motor stroke. The ICARE randomized clinical trial. *JAMA*. 2016;315:571-581.

Question: Does intensive, high-repetition, task-oriented training during outpatient rehabilitation improve upper extremity motor function after stroke compared to dose-equivalent usual occupational therapy or conventional (low-dose) occupational therapy. ***Design:*** Phase 3, parallel 3-group, assessor-blinded, randomised, controlled trial with stratification by motor severity and time from stroke onset. ***Setting:*** Seven sites (predominantly inpatient rehabilitation). ***Participants:*** Individuals who were an average of 46 days post stroke (SD 22) with moderate upper limb motor impairment. Key exclusion criteria were severe cognitive and sensory impairments. Randomisation of 361 patients allocated 119 to the Accelerated Skill Acquisition Program, 120 to receive dose-equivalent usual and customary occupational therapy care, and 122 to receive observation only (low-dose) customary occupational therapy. ***Interventions:*** The Accelerated Skill Acquisition Program, which was delivered three times per week for 1 hour per session for 10 weeks, was an intensive, task-specific intervention in which purposeful movement was emphasised; constraint of the less affected hand was optional. Dose-equivalent usual and customary occupational therapy care received usual and customary care at the same dose as the Accelerated Skill Acquisition Program intervention. The observation only (low-dose) customary occupational therapy was a usual-care group, where the dose was not manipulated. ***Outcome measures:*** The primary outcome measure was change in log-transformed Wolf Motor Function Test time score at 12 months. Secondary outcome measures were change in Wolf Motor Function Test time (minimal clinically important difference: 19 seconds) and the proportion of participants who increased by at least 25 points on the hand subscale of the Stroke Impact Scale. ***Results:*** Eighty-four percent of patients (n = 306) completed the study with no significant difference in attrition between groups. The mean between-group differences in the log-transformed Wolf Motor Function Test time score at 12 months were not statistically significant: the Accelerated Skill Acquisition Program versus dose-equivalent usual and customary occupational therapy care was 0.14 log-transformed seconds (95% CI −0.05 to 0.33); the Accelerated Skill Acquisition Program versus observation only (low-dose) customary occupational therapy was −0.01 (95% CI −0.22 to 0.21); the dose-equivalent usual and customary occupational therapy care versus Accelerated Skill Acquisition Program was −0.14 (95% CI −0.32 to 0.05). These between-group mean differences corresponded to small changes in absolute values, ranging from 0.5 to 2.0 seconds. Across all participants, the mean improvement in Wolf Motor Function Test time over 12 months was 6.8 seconds (95% CI 5.3 to 8.3). The proportion of patients in each group with hand function scale improvement ($\geq$ 25 points) was 73%, 72% and 69%, respectively, with no between-group differences. ***Conclusion:*** Providing a structured and intensive (27 hours) upper limb motor rehabilitation program was not superior to usual occupational therapy (either dose-equivalent or low dose, 11 hours). Moreover, mean improvements did not exceed clinically meaningful thresholds in upper limb motor function.

Provenance: Invited. Not peer reviewed.

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Commentary

The ICARE trial investigated an Accelerated Skill Acquisition Program (ASAP), which was a structured, task-oriented rehabilitation program that focused on eight key principles of motor training after stroke. Importantly, the ASAP was compared to usual and customary care that was of an equivalent dose or a usual dose. These comparison groups enabled content and dose of rehabilitation on upper limb motor recovery to be disentangled.

While the majority of participants in the ICARE trial demonstrated an improvement in upper limb function at the primary end-point (12 months), there was no beneficial effect in favour of ASAP over and above the comparison groups. Thus, it would appear that the time-dependent component of motor recovery was unchangeable by content or dose of rehabilitation performed. It is possible that an individual's underlying neurobiology played a role in their recovery trajectory. However, there was no report of a biomarker of stroke recovery,[1] which would have enabled investigation of whether rehabilitation can only get you so far if you have reduced connection between the brain and upper limb.

The outcomes of this trial are consistent with a growing body of evidence that demonstrates a lack of superiority of higher intensity, task-oriented rehabilitation over and above usual care for people with upper limb impairment after stroke.[2,3] This suggests that we are yet to identify what the critical active ingredients of upper limb rehabilitation are from the inactive ingredients.[4] Key questions that remain about possible active ingredients as a result of this trial centre on: 1) *Dose and frequency:* was a 1-hour session, three times per week for 10 weeks sufficient to shift an individual's long-term recovery trajectory? 2) *Active time:* was there sufficient time spent during a session actively engaging compared to rest? 3) *Challenge:* was an optimal challenge point sustained for the entire duration of a therapy session? 4) *Real-world use:* was there sufficient use of the upper limb in environments outside the clinic? As a profession, we can all work together to refine our understanding of these possible active ingredients by collectively pooling data and collaborating across research and clinical settings.

Provenance: Invited. Not peer reviewed.

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