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Does occupational therapy improve activities of daily living and/or cognitive abilities in stroke patients with cognitive impairment? A Cochrane Review summary with commentary[1]

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Abstract.
BACKGROUND: Cognitive Impairment (CI) after stroke is frequent and often persistent, and is associated with poor functional outcome. Occupational therapy (OT) is aimed at restoring functioning also by addressing CI.
OBJECTIVE: Commentary on the review by Gibson et al. (2022) updating a previous Cochrane Review (Hoffmann et al., 2010) to investigate the effectiveness of OT on CI after stroke.
METHODS: This review included randomised and quasi-randomised controlled trials evaluating OT for adults with clinically defined stroke and confirmed CI. Outcomes included basic activities of daily living (BADL) (primary), instrumental ADL (IADL), community integration and participation, global cognitive function and specific cognitive abilities.
RESULTS: Overall, 24 trials from 11 countries including 1142 participants. For BADL, a small effect below the minimal clinically important difference (MCID) was found immediately after intervention and at six months' follow-up (low certainty evidence), but not at three months follow-up (insufficient evidence). For IADL, the evidence was very uncertain about an effect, while for community integration, there was insufficient evidence of an effect. For global cognitive performance, there was an improvement of clinical importance after the intervention (low-certainty). There was some effect for attention overall, and for executive functional performance overall (very low-certainty). Of the cognitive subdomains, there was evidence of effect of possible clinical importance, immediately after intervention, only for sustained visual attention (moderate certainty), for working memory (low certainty), and thinking flexibly (low certainty), while there was only low or very low certainty or insufficient evidence of an effect for other cognitive domains/subdomains.

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CONCLUSION: The authors concluded that the body of evidence for the effectiveness of OT interventions has improved since their first review. However, although their findings provide some support for the potential benefits of OT (mostly based on low certainty evidence), OT effectiveness for stroke patients remains unclear.

Keywords: Occupational therapy, cognitive impairment, activities of daily living, stroke, rehabilitation, systematic review

The aim of this commentary is to discuss from a rehabilitation perspective the Cochrane Review "Occupational therapy for adults with problems in activities of daily living after stroke" (Gibson et al, 2022) by Elizabeth Gibson, Chia-Lin Koh, Sally Eames, Sally Bennett, Anna Mae Scott, Tammy C Hoffmann[1] , published by Cochrane Stroke Group. This Cochrane Corner is produced in agreement with NeuroRehabilitation by Cochrane Rehabilitation with views* of the review summary author in the "implications for practice" section.

1. Background

Despite the improvements in the acute care phase, stroke remains a leading cause of chronic disability worldwide. Cognitive Impairment (CI) is a frequent and persistent stroke sequela, with 40% of stroke survivors displaying CI (without dementia) within one year' poststroke, and 22% over a five-year period after their first stroke. CI after stroke typically affects complex cognitive functions across multiple cognitive domains, and it is associated with poorer short- and long-term functional outcome, greater mortality, depression, dependency, institutionalization, and restrictions in participation. Indeed, identifying the best ways to improve cognition following stroke has been rated first of the top 10 research priorities relating to life after stroke. The goal of OT is to maximise individuals' independence and participation in their life roles, habits, and routines at home, school, in the workplace, in the community, and other settings through a collaborative assessment and intervention process that includes a range of skilled services. OT is one of the recommended interventions aimed at providing interdisciplinary rehabilitation after stroke. A previous Cochrane review of OT for improving ADL in stroke survivors (Legg et al, 2017) found low-quality evidence that OT targeted towards ADL can improve ADL performance, and reduce the risk of functional deterioration over time. Any OT intervention for stroke patients includes the assessment of CI and, if present, the selection of therapeutic approaches aimed at improving the impact of CI on the person's performance of their valued occupations, particularly on basic ADL and IADL. To specifically examine the effectiveness of OT in improving the impact of CI after stroke on basic ADL, IADL, and cognitive abilities, a first Cochrane review was published in 2010 (Hoffmann et al, 2010), which identified only one trial (33 participants). No difference between groups was found for basic ADL and the only other outcome considered a cognitive skill (time judgement skill). Hence, the effectiveness of OT for post stroke CI and its functional impact remained unclear, and after more than a decade, it was important to update this review.

Occupational therapy for adults with problems in activities of daily living after stroke

(Elizabeth Gibson, Chia-Lin Koh, Sally Eames, Sally Bennett, Anna Mae Scott, Tammy C Hoffmann, 2022)

2. Objective

To assess the impact of OT therapy on either basic ADL and IADL, on global cognitive function, and specific cognitive abilities in persons with CI following a stroke.

3. What was studied and methods

The population addressed in this review included adults with clinically defined stroke and confirmed CI, excluding studies focusing on apraxia or perceptual impairments or virtual reality interventions. The included studies were randomized or

[1]This summary is based on a Cochrane Review previously published in the Cochrane Database of Systematic Reviews 2022, Issue 3. Art. No.: CD006430. DOI: 10.1002/14651858.CD006430.pub3 (see www.cochranelibrary.com for information). Cochrane Reviews are regularly updated as new evidence emerges and in response to feedback, and Cochrane Database of Systematic Reviews should be consulted for the most recent version of the review.

*The views expressed in the summary with commentary are those of the Cochrane Corner author (different than the original Cochrane Review authors) and do not represent the Cochrane Library or Wiley.

quasi-randomized controlled trials. OT, delivered or supervised by an OT, using cognitive remediation or compensatory adaptive or combined approaches was compared to usual rehabilitation or OT care. The primary outcome was basic activities of daily living (BADL). Secondary outcomes were instrumental ADL (IADL), community integration and participation, global cognitive function and specific cognitive abilities and their subdomains (including attention, memory, executive function, or a combination of these).

4. Results

Compared to the 2020 review, 23 new trials were included. Overall, 24 studies from 11 countries, including 1142 participants (two weeks to eight years since stroke onset) were analyzed. Duration of the interventions ranged from 10 days to 18 weeks. Twenty studies delivered interventions within a hospital ward, rehabilitation unit or center, or occupational therapy department. Interventions were predominantly provided individually, using face-to-face or computer-based training modes, or both. The main results are summarized as follows (for a detailed numerical account of all considered outcomes, see the original review Gibson et al, 2022):

- **BADL:** little to no clinical difference with a mean improvement of 2.2 points on the FIM immediately after the intervention (95% confidence interval (CI) 0.17 to 4.22; $P = 0.03$, $I^2 = 0\%$; 6 studies, 336 participants; low certainty evidence). There was insufficient evidence of an effect at three months (MD 10.00, 95% CI –0.54 to 20.55; $P = 0.06$, $I^2 = 53\%$; 2 studies, 73 participants; low-certainty evidence), but evidence of an effect at six months (MD 11.38, 95% CI 1.62 to 21.14, $I^2 = 12\%$; 2 studies, 73 participants; low-certainty evidence).
- **IADL** very uncertain evidence about an effect (standardised mean difference (SMD) 0.94, 95% CI 0.41 to 1.47; $P = 0.0005$, $I^2 = 98\%$; 2 studies, 88 participants).
- **Community integration:** insufficient evidence of an effect (SMD 0.09, 95% CI –0.35 to 0.54; $P = 0.68$, $I^2 = 0\%$; 2 studies, 78 participants).
- **Global cognitive function:** slight increase of global cognitive functional performance immediately after the intervention, exceeding the MCID of the Montreal Cognitive Assessment – MoCA (SMD 0.35, 95% CI 0.16 to 0.54; $P = 0.0004$, $I^2 = 0\%$; 9 studies, 432 participants; low-certainty evidence).
- **Orientation:** one study finding no significant differences for the treatment group and the control group (mean 4.14 (SD 0.63; insufficient evidence)
- **Attention overall:** some effect (SMD –0.31, 95% CI –0.47 to –0.15; $P = 0.0002$, $I^2 = 20\%$; 13 studies, 620 participants; low-certainty evidence), equating to a difference of 17.31 seconds (95% CI 8.38 to 26.24)
- **Executive functional performance overall:** (SMD 0.49, 95% CI 0.31 to 0.66; $P < 0.00001$, $I^2 = 74\%$; 11 studies, 550 participants; very low-certainty evidence), equating to 1.41 points on the Frontal Assessment Battery (range: 0–18).
- Of the cognitive subdomains of attention, executive function and **memory**, the authors found evidence of effect of possible clinical importance, immediately after intervention, only for **sustained visual attention** (moderate certainty) equating to 15.63 seconds, for **working memory** (low certainty) equating to 59.9 seconds, and **thinking flexibly** (low certainty), compared to control, while there was evidence of low or very low certainty or insufficient evidence for effect on other cognitive subdomains.
- Sub-analyses comparing the effects of different types of OT interventions (cognitive remediation vs compensatory and adaptive), found no differences for basic ADL. Evidence for global cognitive improvement was based on the cognitive remediation approach, and, for executive functional performance, there was a greater effect from the compensatory and adaptive approaches.

The certainty of the evidence for most outcomes was low or very low, with all outcomes having concerning risk of bias issues, many with some concern about imprecision due to insufficient sample sizes, and a few having issues with inconsistency due to substantial heterogeneity.

5. Conclusions

The authors concluded that the body of evidence for the effectiveness of OT interventions has improved since their first review, but the effectiveness remains unclear. Indeed, the potential benefits

of OT interventions on basic ADL performance and global cognitive function for stroke survivors with CI have some support based on the evidence, albeit of low certainty, from this review. On the other hand, only the effect on global cognitive function was a clinically important difference. There is also some support of moderate certainty for such interventions to slightly improve sustained visual attention after the intervention, although the clinical importance of such improvement and how to maintain it over time is not clear. While there is some evidence of low certainty that occupational therapy may slightly increase working memory and flexible thinking after intervention, this review suggests that there may be little to no difference on other cognitive domains and subdomains of attention, memory, and executive function and on IADL, community integration and participation. Most of the evidence in this review has low certainty, thus, more research is needed to further support or refute the effectiveness of occupational therapy for cognitive impairment after stroke and to discern which approaches are the most effective. Further, the minimal and optimum 'dose' of the intervention, and the indications for specific approaches, for example, depending on the individual profile of the person with stroke, need further investigation.

6. Implications for practice in neurorehabilitation

From a rehabilitation perspective, although the effectiveness of OT in assisting persons with CI post-stroke is still unclear, this review provides some support for the potential benefits of OT interventions on basic ADL performance and global cognitive function for stroke patients with CI. Indeed, for ADL, OT was found to result in a change of the total FIM score immediately and 6 months after intervention. Although this improvement was below the MCID, it has been shown that 1 point on the total FIM score for people with stroke was equivalent to an average of 2.19 minutes of help from another person per day; from this perspective, OT provided to these persons may equate to fewer minutes of help needed per day, thus reducing the caregiver burden. Focusing on cognition, low-certainty evidence based on nine studies shows that OT may slightly increase global cognitive functional performance immediately after the intervention with, on average, an improvement of 1.63 points on the MoCA (MICD 1.22), a clinically relevant improvement. Moderate certainty evidence for sustained visual attention after the intervention and low certainty evidence for selective visual attention and flexible thinking were also found.

There are still limits in translating this evidence into practice. For instance, the tested interventions were highly heterogeneous, in terms of approach, duration and time from stroke; further, no difference was found between the OT approaches for the improvement of ADL, while the reported improvement in global cognition was based on the cognitive remediation approach. Compensative adaptive approaches, on the other hand, showed greater effects for the improvement of sustained visual attention. To improve translation to clinical practice, both OT and control interventions need to be better described in future trials, and it is important to investigate combined cognitive remediation and compensatory adaptive interventions, as well as combined cognitive and physical interventions, since combined therapy is more often the preferred approach in clinical practice.

From a clinical and research perspective, further issues also deserve attention. First, the choice of ADL as the primary outcome, albeit consistent with the primary aim of any OT intervention, may raise some questions as to whether persons with physical, (perceptual) AND cognitive impairment are similarly likely to respond to OT interventions aimed at cognition, especially since stroke patients displaying motor or perceptual impairments were not a priori excluded from the search, nor from the selected studies. Indeed, ADL performance implies cognitive as well as motor and perceptual abilities, and most stroke survivors display a combination of impairments in these domains. Second, since the explored interventions were predominantly provided individually using face-to-face or computer-based training modes, what makes them (especially computer-based training) different from cognitive interventions, apart from the fact that the included activities had to be delivered or supervised by an occupational therapist, should be elaborated. Finally, as the Authors acknowledge, a great effort has been expended in little more than a decade to provide high quality evidence of the effects of OT on CI; however, the methodological issues that caused the downgrading of the evidence in this review are objectively difficult to overcome. Beside the common problem in rehabilitation studies of blinding patients to the received intervention, we must reflect on the nature of OT, that, by definition, needs to be highly patient-centered. One of the founders of OT, Sir Robert Jones, in

1918, spoke of "some occupation suitable for (his) disability and curative in character" (Jones, 1918). Even now, OT explicitly aims at targeting diversity, not only in disability patterns across different domains of functioning, but also in personal and socio-cultural values, to identify and propose, among the infinite set of activities/occupations, those that are more meaningful for a specific patient at each stage of recovery. While this extreme personalization has obvious advantages from a clinical perspective, how to design reproducible OT study protocols for future studies remains a top challenge for researchers in this area.

Conflict of interest

The author declares no conflicts of interest.

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