

Higher Session Frequency of Prism Adaptation Treatment for Spatial Neglect Leads to Greater Rehabilitation Efficiency

Nicole Diaz-Segarra, MD^{1,2}; Emma Kaplan, BS³; Maria Mawhinney, MA³; Grace Wells, BS³; Cristen McKenna, MD, PhD^{1,2}; Peii Chen, PhD^{1,3}

¹ Rutgers New Jersey Medical School, Department of Physical Medicine and Rehabilitation, Newark, N.J.

² Kessler Institute for Rehabilitation, West Orange, N.J. ³ Kessler Foundation, Center for Stroke Rehabilitation Research.

Background

- **Spatial neglect** is a debilitating neurocognitive disorder characterized by failure or slowness to respond or initiate action to the space contralateral to the injured hemisphere. It has a reported prevalence of 30% after stroke and traumatic brain injury, and is associated with greater disability, increased fall risk, and decreased likelihood of community reintegration.
- **Prism adaptation treatment (PAT)** is a promising intervention for spatial neglect, currently recommended to be delivered at ten sessions over fourteen days. However, there is no direct evidence supporting this dosage frequency's impact on rehabilitation outcomes.

Objective

To examine the hypothesis that PAT administered at or above the recommended frequency during inpatient rehabilitation leads to higher rehabilitation efficiency, in comparison to PAT administered below the recommended frequency.

Methods

- A retrospective chart review was conducted on patients identified with spatial neglect who completed 8-12 PAT sessions.
- Based on the recommended PAT frequency (0.714; i.e., ten sessions over fourteen days), we stratified patients into:
 - Group A: received recommended or higher PAT frequency
 - Group B: received less than recommended PAT frequency
- To examine the a priori hypothesis, a non-parametric group comparison was performed between group A and Group B, using a Mann Whitney U-test on each outcome measure.
- The outcome measures were three indicators of rehabilitation efficiency, defined as FIM ® change from admission to discharge divided by the length of stay measured in days, including Total FIM efficiency, Motor FIM (mFIM) efficiency, and Cognitive FIM (cFIM) efficiency. Medians and interquartile ranges (IQR) were reported.

Results

- A total of 215 patients were included in the analysis.
 - The median age was 68 years (IQR 58-77).
 - 109 patients (50.7%) were female.
 - The median duration between brain injury onset and admission was 8 days (IQR 5-13).
 - 194 patients (90.2%) had sustained a stroke, and the remaining had another type of brain injury.
- 89 patients (41.4%) received PAT at the recommended frequency or higher (Group A), and 126 (58.6%) had PAT less than the recommended frequency (Group B).
 - There was no group difference in age, sex, onset-to-admission duration, or etiology.
- As shown in the Table below, **Group A had higher Total FIM efficiency, Motor FIM efficiency and Cognitive FIM efficiency, compared to Group B.**
- All the group comparisons resulted in small effect sizes (indicated by r based on the U test result). The comparisons in Total FIM efficiency and Motor FIM efficiency reached statistical significance, while the comparison in Cognitive FIM efficiency did not reach significance.

Group	FIM efficiency	Motor FIM efficiency	Cognitive FIM efficiency
A: ≥ Recommended frequency (n = 89)	1.70 (0.95 – 2.42)	1.11 (0.67 – 1.44)	0.25 (0.13 - 0.37)
B: < Recommended frequency (n = 126)	1.19 (0.74 – 1.76)	0.76 (.5 – 1.2)	0.18 (0.11 - 0.28)
Effect size of group difference	r = 0.19, p = 0.004*	r = 0.21, p = .002*	r = 0.16, p = 0.019

* Denotes significance at the alpha of 0.017 to minimize Type-I error

Conclusions

- ✓ Patients who received at or above the recommended frequency of 8-12 PAT sessions demonstrated better rehabilitation efficiency, compared to those who received lower than the recommended frequency with a small effect size.
- ✓ This was found in two of the three outcome measures based on FIM, Total FIM efficiency and Motor FIM efficiency.
- ✓ Additional studies, including large-scale prospective randomized trials, are needed to replicate these findings and evaluate the extent to which PAT at the recommended frequency leads to other improved rehabilitation outcomes.



References

1. Esposito, E., Shekhtman, G., & Chen, P. (2020). Prevalence of spatial neglect post stroke: A systematic review. *Annals of Physical and Rehabilitation Medicine*. doi:10.1016/j.rehab.2020.10.010
2. Corbetta, M., & Shulman, G. L. (2011). Spatial neglect and attention networks. *Annual Review of Neuroscience*, 34, 569-599. doi:10.1146/annurev-neuro-061010-113731
3. Chen, P., Hreha, K., Kong, Y., & Barrett, A. M. (2015). Impact of spatial neglect in stroke rehabilitation: Evidence from the setting of an inpatient rehabilitation facility. *Archives of Physical Medicine and Rehabilitation*, 96(8), 1458-1466. doi:10.1016/j.apmr.2015.03.019
4. Mizuno, K., Tsuji, T., Takebayashi, T., Fujiwara, T., Hase, K., & Liu, M. (2011). Prism adaptation therapy enhances rehabilitation of stroke patients with unilateral spatial neglect: a randomized, controlled trial. *Neurorehabilitation and Neural Repair*, 25(8), 711-720. doi:10.1177/1545968311407516
5. Chen, P., & Hreha, K. (2020). *Kessler Foundation Prism Adaptation Treatment 2020 Manual*. Wood Dale, IL: Stoelting.
6. Goedert, K. M., Zhang, J. Y., & Barrett, A. M. (2015). Prism adaptation and spatial neglect: The need for dose-finding studies. *Frontiers in Human Neuroscience*, 9, 243. doi:10.3389/fnhum.2015.00243