**Brief Report**
Volume 11:05, 2024

International Journal of Neurorehabilitation

ISSN: 2376-0281 Open Access

# A Scoping Review of AI Applications in Adult Stroke Recovery and Rehabilitation

**Adikari Dobkin***

*Department of Data Analytics and Cognition, La Trobe University, Melbourne, VIC 3086, Australia*

## Introduction

Stroke is a leading cause of disability worldwide profoundly impacting the lives of millions of individuals and their families. The recovery process can be long and arduous often requiring extensive rehabilitation to regain lost functions and improve quality of life. Recent advances in technology have introduced innovative approaches to enhance stroke recovery particularly through the application of Artificial Intelligence (AI). This scoping review explores the current landscape of AI applications in adult stroke recovery and rehabilitation examining their potential benefits, challenges and implications for clinical practice. Stroke rehabilitation typically involves a multidisciplinary approach including physical, occupational and speech therapy. The primary goals are to restore independence and functionality while minimizing the impact of residual disabilities. However traditional rehabilitation methods can be resource-intensive, often constrained by factors such as limited access to skilled therapist's variability in treatment protocols and differences in patient responsiveness. AI offers a promising avenue to address these challenges by enabling personalized data-driven rehabilitation strategies that can adapt to individual needs and progress [1].

## Description

One of the most significant contributions of AI in stroke rehabilitation is the development of smart rehabilitation devices. These devices utilize machine learning algorithms to track patient performance in real time providing feedback and adjusting difficulty levels based on the individual's capabilities. For instance robotic exoskeletons and smart prosthetics can assist in movement training enabling patients to practice tasks that mimic daily activities. By analyzing movement patterns these AI systems can identify specific areas of weakness and suggest targeted exercises to enhance recovery. Such personalized interventions may lead to improved outcomes as they are tailored to each patient's unique deficits and recovery trajectory. Additionally Virtual Reality (VR) platforms integrated with AI technology are gaining traction in stroke rehabilitation. VR environments create immersive experiences that can engage patients in meaningful activities while facilitating motor learning and cognitive rehabilitation. AI algorithms can enhance VR systems by analyzing user interactions adjusting scenarios based on real-time performance and ensuring that therapy remains challenging yet achievable. Studies have shown that VR combined with AI not only improves motivation and engagement but also enhances motor recovery and cognitive function among stroke survivors [2,3].

***Address for Correspondence:** Adikari Dobkin, Department of Data Analytics and Cognition, La Trobe University, Melbourne, VIC 3086, Australia; E-mail: d.adikari78@gmail.com*



**Received:** 01 October, 2024, Manuscript No. ijn-24-152355; **Editor Assigned:** 04 October, 2024, PreQC No. P-152355; **Reviewed:** 18 October, 2024, QC No. Q-152355; **Revised:** 23 October, 2024, Manuscript No. R-152355; **Published:** 30 October, 2024, DOI: 10.37421/2376-0281.2024.11.591

By leveraging large datasets from electronic health records and rehabilitation outcomes, AI algorithms can identify patterns and predict recovery trajectories for individual patients. These predictive models can inform treatment planning helping clinicians determine the most effective interventions and set realistic goals. For instance early identification of patients at risk for complications or delayed recovery can prompt timely modifications in therapy, ultimately improving outcomes and resource allocation. By supporting clinical decision-making AI-driven predictive analytics can enhance the overall quality of stroke rehabilitation [4].

Despite the promise of AI applications in stroke recovery and rehabilitation several challenges must be addressed to ensure their successful implementation. One major concern is the integration of AI systems into existing clinical workflows. Healthcare professionals may require additional training to effectively utilize AI tools and the technology must align with established rehabilitation protocols. Furthermore the reliance on data-driven decision-making raises ethical considerations regarding patient privacy and data security. Ensuring compliance with regulations such as the Health Insurance Portability and Accountability Act (HIPAA) in the United States is essential to protect sensitive patient information. Moreover the variability in the quality and accessibility of AI technologies can pose barriers to widespread adoption. While some AI applications are backed by rigorous research and clinical validation others may lack sufficient evidence of efficacy or safety. Establishing standardized guidelines and protocols for the development and implementation of AI systems in stroke rehabilitation is critical to promote consistency and reliability. Collaborations between researchers, clinicians and technology developers can facilitate the creation of evidence-based AI tools that meet the needs of both patients and providers. Another challenge lies in the diverse needs of stroke survivors. Stroke can affect individuals differently depending on factors such as the type of stroke the area of the brain affected and pre-existing health conditions. AI applications must be designed with this variability in mind ensuring that they are adaptable and capable of addressing a wide range of rehabilitation needs. Personalized approaches are crucial as they can enhance engagement and motivation which are key drivers of successful recovery [5].

## Conclusion

In conclusion, the integration of AI applications in adult stroke recovery and rehabilitation holds great potential to transform the landscape of post-stroke care. By leveraging machine learning predictive analytics and smart rehabilitation technologies AI can enhance the personalization accessibility and effectiveness of rehabilitation strategies. However, the successful implementation of these technologies requires careful consideration of clinical workflows, ethical concerns and the diverse needs of stroke survivors. As research continues to advance the collaboration between healthcare professionals, researchers and technology developers will be essential in harnessing the full potential of AI in improving outcomes for individuals recovering from stroke. Ultimately the goal is to empower patients enhance their quality of life and facilitate their journey toward recovery through innovative and effective rehabilitation approaches. Furthermore, the incorporation of patient-reported outcomes and preferences into AI systems can enhance their relevance and effectiveness. Engaging patients in the development and refinement of AI applications ensures that their voices are heard and that the technology aligns with their rehabilitation goals. Collaborative approaches

that prioritize patient-centred care will ultimately lead to more effective and meaningful interventions.

## Acknowledgement

None.

## Conflict of Interest

None.

## References

1. Dobkin, Bruce H. "Rehabilitation after stroke." *N Engl J Med* 352 (2005): 1677-1684.
2. Barry, Daniel T. "Adaptation, artificial intelligence and physical medicine and rehabilitation." *PMR* 10 (2018): S131-S143.
3. Kim, Jeoung Kun, Yoo Jin Choo and Min Cheol Chang. "Prediction of motor function in stroke patients using machine learning algorithm: Development of practical models." *J Stroke Cerebrovasc Dis* 30 (2021): 105856.
4. Derungs, Adrian, Corina Schuster-Amft and Oliver Amft. "Longitudinal walking analysis in hemiparetic patients using wearable motion sensors: Is there convergence between body sides?" *Front Bioeng Biotechnol* 6 (2018): 57.
5. Lau, Hong-yin, Kai-yu Tong and Hailong Zhu. "Support vector machine for classification of walking conditions of persons after stroke with dropped foot." *Hum Mov Sci* 28 (2009): 504-514.

**How to cite this article:** Dobkin, Adikari. “A Scoping Review of AI Applications in Adult Stroke Recovery and Rehabilitation.” *Int J Neurorehabilitation Eng* 11 (2024): 591.