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AI-based telemedicine rehabilitation model for victims with upper extremity injuries as part of brain injuries

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Introduction: In recent years, there has been an increase in the prevalence and absolute number of cases of polytraumatic injuries in Ukraine and worldwide. This trend is driven by factors such as the growing number of vehicles, the deterioration of road infrastructure in certain regions, and insufficient road safety measures. Patients with upper limb injuries as part of brain injuries require intensive treatment and rehabilitation. Machine learning and artificial intelligence are significant areas of interest in contemporary science and society. They represent some of the most advanced technologies applicable across various industries, including healthcare.

Objective: To investigate the effectiveness of an AI-based telemedicine model for the rehabilitation of patients after upper limb injuries as part of brain injuries.

Materials and Methods. The study analyzed the medical records of patients in the retrospective group (186 cases of upper limb injuries as a component of brain injuries) and 62 patients in the main group who additionally underwent rehabilitation using the AI telemedicine model. To measure the effectiveness and universality of the AI model, we compared it with the traditional rehabilitation group.

Results: The retrospective group consisted of 135 men (72.58%) and 51 women (27.42%), while the main group comprised 44 men (70.97%) and 18 women (29.03%). Rehabilitation in the retrospective group included early functional mobilization, edema treatment, and physiotherapy for three weeks. The main group additionally used an AI-based telemedicine model with a portable device for real-time monitoring and exercise management. Results showed statistically significant improvements in the daily duration of physical exercises and a reduction in visits to medical facilities in the main group, with higher scores for functional recovery. The AI-based telemedicine model, allowing real-time monitoring, led to better functional recovery and reduced use of medical services compared to traditional methods. Analysis of the results conducted on various datasets indicates a significant advantage of the AI telemedicine optimization algorithm. This innovative approach supports improved patient interaction and motivation, leading to significant improvements in rehabilitation efficiency.

Conclusion: The use of AI-based telemedicine technologies can help a larger number of patients by providing opportunities for telerehabilitation in remote areas, improving the quality of life for those affected. Experiments on various datasets showed that the AI telemedicine algorithm is capable of achieving good results across a wide range of machine learning tasks in healthcare.

Keywords: AI; brain injuries; upper limb; telemedicine rehabilitation.

Biography

Andriy Hospodarskyy is a distinguished academic and medical professional at Ternopil National Medical University in Ukraine. With a profound dedication to the field of medicine, Andriy has contributed significantly to medical research and education. His work at Ternopil National Medical University exemplifies his commitment to advancing healthcare through innovative research and the training of future medical professionals. Andriy Hospodarskyy is highly respected for his expertise, dedication, and contributions to the medical community, both in Ukraine and internationally.