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New technology in CNS rehabilitation (hyperbaric oxygen therapy + tele-rehabilitation)

Central Nervous System (CNS) dysfunctions with cognitive decline are considered as worldwide major problems. The etiology of brain impairment is various, e.g. traumatic brain injury, tumors, stroke, neurodegeneration, hypoxia, neurodevelopmental diseases, metabolic syndromes, psychiatric illnesses, and many others. The clinical manifestations of cognitive dysfunctions are related to the brain region, the specificity of lesions, abnormalities of neural synchronization, neurotransmitters, and also cognitive reserve and genes associated with cognitive abilities. Despite advances in medicine and rehabilitation, there is still no effective treatment to improve neural and functional recovery, however recent studies suggest that strategies focused on increase the effectiveness of neuroprotection may be considered as a most promising method in CNS therapy. Complex, more effective treatment of patients with brain dysfunctions should involve three levels of action: neuronal, functional and psychosocial. On neuronal level novel therapies are focused on elimination or minimize of brain damaging agents like hypoxia, oxidative stress factors, inflammatory processes, edema (e.g., operative methods, novel pro-cognitive pharmacotherapy, hyperbaric oxygen therapy - HBOT), improvement of neuronal synchronization (e.g. transcranial brain stimulation). On functional level systematic neurorehabilitation involving movement, speech and neuropsychological rehabilitation taking into account the patient's neuropsychological and disability profile should be implemented. Improvement of psychosocial functioning may be obtain due to patients, family and society education, elimination of geographic barriers of availability to treatment, stimulate the patients social and work activity. Such expectations meets telemedicine rehabilitation, which is more effective, as it provides higher compliance: 20% hospitalized patients do not perform the recommended exercises and with tele-rehabilitation the percentage is reduced to 1%. Recently there is increased interest with IT solutions in neuropsychological rehabilitation, especially using task based on computed games rules, which increase patient motivation to the exercise. Telemedic solution will help patients perform prescribed exercises at home (at the time and place convenient for them). There will be also added effect of the exam situation that causes reduction of the patient's reluctance to rehabilitation and non-cooperation. Promising for patients with CNS dysfunctions is complex treatment with "NEUROBARY" system, which is a combination of oxygen hyperbaric therapy and telemedic neurorehabilitation. COGTEL platform is also used to data recording, report generation, tele-visits, and educational panels. Patients, who were examined by us, after TBI and stroke received 30 HBOT sessions and telemedicine neurorehabilitation with monitoring of the effects and access to selected therapy methods from mobile equipment. Patients treated with this system showed significant improvement on cognition and social skills and revealed greater motivation to rehabilitation.

Biography

Alina Borkowska is Head and Chair of Clinical Neuropsychology Department in Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun. Her research concerns on neurobiology and genetics of cognitive dysfunctions in psychiatric and neurological diseases, somatic illnesses and in patients after cardio-surgery and neurosurgery operations. She is a Head of numerous universities and national grants. She was awarded with national and international scientific awards. She is a member of Polish Psychiatric Association, European Psychiatrist Association and member of scientific board in numerous scientific journals. She is also Advisory Board Member of Polish Brain Committee. She was invited as a speaker on international conferences. She has published more than 400 papers in reputed journals with total IF=112.

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