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Virtual Reality-Based Cognitive Intervention For The Prevention of Delirium & Cognitive Impairment In Geriatric Surgical Patients

Abstract

Delirium is an acute fluctuating syndrome of altered **attention**, awareness, and cognition. Delirium is highly prevalent, morbid, and costly in elderly critically ill surgical patients. It is also associated with functional and cognitive impairment. No specific pharmacological therapy or approach exists to target the specific cognitive domain involved in delirium. However, early cognitive and physical therapy has been shown to decrease the cognitive deficit, incidence, and duration of delirium. Clinical guidelines recommend multi-component, nonpharmacologic strategies focused on primary prevention (i.e., preventing delirium before it occurs) in patients at risk for delirium. These strategies include mobility/exercise, re-orientation, and cognitive stimulation exercises. Nevertheless, traditional cognitive therapy given to surgical intensive care unit (ICU) patients is non-specific, not customized, and not prioritized due to nursing staff-related issues, documentation burden, time constraints, and a lack of understanding or appreciation for the evidence supporting cognitive stimulation. Virtual Reality (VR) is an emerging technology with potential therapeutic including cognitive stimulation in critically ill patients. VR engages multiple learning systems, making it a more effective natural environment and targeting cognitive training to specific cognitive domains involved in delirium. We developed a novel, 3D simulated software platform prototype, "**ReCognition**" VR, to address these shortcomings to provide VR-based cognitive exercises to patients for testing in a pilot study. We propose that "ReCognition" VR -based cognitive intervention will prevent the development of delirium (before it occurs in patients at risk for delirium), short term & long-term cognitive impairment in critically ill, non-ventilated abdominal surgery patients of age > 60 years admitted to the ICU. Aim 1: To determine the feasibility, usability & acceptability of "ReCognition" VR-based cognitive stimulation exercises; Aim 2: To assess pilot outcomes measures (tolerability) for optimal implementation of "ReCognition" VR-based cognitive stimulation exercises; Aim 3: To evaluate pilot treatment effectiveness outcomes of "ReCognition" VR-based cognitive stimulation exercises in preventing delirium, short and long-term cognitive impairment. The GEMSSTAR -R03 award will support a current research project and provide a platform for me to continue focusing on geriatric-based clinical research and help me become a leader and an independent physician-scientist to perform clinical research on the delirium and post-delirium cognitive impairment in the elderly surgical population. This award will specifically provide me the support needed to develop expertise in 2 areas: (1) Modification of Recognition VR based cognitive exercise based on the result of the pilot study (2) Preliminary data on feasibility, acceptability, and tolerability for the application of VR- based cognitive exercise for the prevention of delirium and cognitive impairment in a subsequent larger clinical trial. This proposal, and the subsequent planned R01, will lay the foundation for future clinical trials addressing prevention strategies or therapy for delirium in elderly surgical patients.