An approach with serious exergames for assessment and stimulation of patients with neurocognitive disorders

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G. Sacco, M. Thonnat, G. Ben Sadoun, P. Robert. *An approach with serious exergames for assessment and stimulation of patients with neurocognitive disorders. Gerontechnology 2018;17(Suppl.):<page>.* **Purpose** We present a clinical and therapeutic approach aiming to create new care for patients with neurocognitive disorders (NCD). Enriched environment including physical and cognitive stimulation improves cognitive functions[1]. The aim of this paper is to describe a method for non-pharmacological management of NCD using serious exergames (SEG). SEG are serious video games integrating physical activity. We propose to use SEG as a tool to provide enriched environment associating physical activity and cognitive stimulation. **Method** We used X-Torp[2], a SEG specially designed for patient with NCD. The patient is physically stimulated when controlling the game with both upper and lower body parts. Cognitive stimulation is realized with mini games close to classical Trail Making Test (TMT). Those mini games could also be used to assess the cognitive functions of the patient. For the stimulation, a usability-training experiment[3] was conducted on 18 patients, for 10 hours over a month. To test the relevance of the assessment, we also conducted an independent experiment to compare two versions of the TMT: a standard one with paper versus a game with X-torp. 75 subjects were enrolled: 27 healthy (HC), 27 with minor NCD, 21 with major NCD (DSM 5). **Results and Discussion** For the usability experiment, all patients were able to finish the game but of course with a progression speed depending on their neurocognitive disorder. Indeed, the results have showed that X-Torp was usable for patient with NCD. For the TMT experiment, the results have showed that the two versions are able to discriminate similarly HC, minor and major NCD. However, this SEG needs to be improved to generate different physical intensity during the game w.r.t. to the patient capabilities. These experiments were performed in a clinical environment during a limited time. In order to validate the benefits of this approach in the long term more experiments need to be conducted. Another important perspective is to assess the use of these serious exergames at home without any therapist. In particular, these games may improve self-esteem of the patient and could be used for a long duration if they are well adapted to the interest and physical capabilities of the patient.

References

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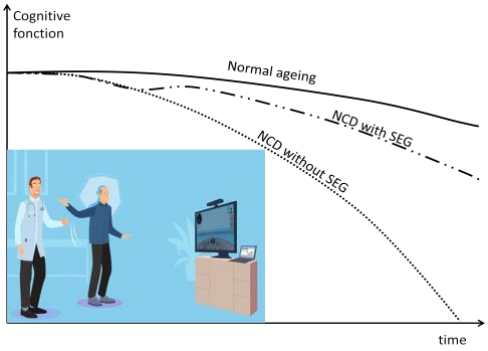

Figure 1; patient using X-Torp game and possible evolutions of disease with or without exergames