Extended Abstract Acta Rheumatologica 2019
Vol.6 No.2

Comparative analysis of virtual reality versus progressive resistive exercises in improving arm function of patients with hemiplegic in Bacoor, Cavite Er D

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Virtual reality (gaming console) and Progressive Resistive Exercises (PREs) have emerged as recent treatment approaches in stroke rehabilitation. In particular, the game console is used to aid in portraying and calculating body positioning, visual perception, balance and gross motor skills while PREs is a strengthening technique that basically employed by the physiotherapist in treating impairments particularly muscle weakness. PRE's can be administered via different forms; the study utilized PNF D1 Flexion, Extension patterns through resistive bands. The principle states that to improve muscle performance and functionality, it should exceed the metabolic capacity of the muscle and challenged to perform at a level greater than to which it is accustomed. Aim of this study is to improve the arm function of patients with hemiplegic by using new dimensional approach. Quasi experimental group pre and post-test design is used in the study. Retrospectively, all the post-stroke patients who are at the age range of 40-70 years old were reviewed with selection criteria and been oriented with informed consent. 15 participants were randomly array into three variable groups; the two groups were distributed to the experimental group that represents the Nintendo Wii and the PREs group.

The remaining group represents the control group which undergoes stretching technique and Range of Motion exercises (ROM) in the upper extremity. They were subjected into 15 treatment sessions and assessed twice by using the modified Fugl-Meyer Assessment of Physical Performance for the functional mobility of the affected upper extremity of the post-stroke patients. Assessment was imposed before starting our first the treatment session and after the final session. The modified Fugl-Meyer Assessment of Physical Performance demonstrates that virtual reality has the highest mean scores among all the interventions done with a M=55.80, SD=2.168 followed by the PRE's (M=48.20, SD=6.340), and lastly the control group which is the lowest post-test mean score (M=40, SD=1.581). There is a significant difference on the post-test scores of the PRE's as compared to virtual gaming console. With the computed significant value of p=0.035 suggests to accept the null hypothesis. This shows evidence that gaming console may be a much more effective treatment than PREs for post-stroke patients in improving the mobility of the affected upper extremity.

Keywords: Stroke, Rehabilitation, computer game , Virtual environment, Gait, Walking, Mobility, Balance, Upper extremity, Arm, Hand, Robotics, Haptics, Immersive, Semi-immersive

Introduction-

The introduction of computer game (VR) augmented sensorimotor rehabilitation was heralded as a therapy that promised ecologically valid, intensive task specific training. It was purported to provide multi-sensory training that would transfer from the virtual world to the real world Additionally, it was suggested that VR could deliver training intensity (repetitions and duration) associated with neuroplasticity and positive behavioural adaptations because it was particularly well suited to very high training doses . Early reviews of the field have shown that promise to be partially met, Virtual reality technology and its application to motor rehabilitation have been described elsewhere ,and will not be the focus of this paper.

Method-

A Medline search using the terms "virtual reality" and "stroke" for the amount of March 2010 to this was performed. This time period was selected to incorporate articles that were newer than those examined in stroke and computer game Cochrane review. Both authors independently reviewed the citations and selected articles that met the following criteria: were RCTs that compared standard of care to virtual reality, or compared different delivery methods in VR. The inclusion criteria of the latter, distinguishes this paper from the recent Cochrane review. Studies were excluded if they did not meet the CEBM level of evidence three or higher had a mechanistic or validations of technology focus or used off-the-shelf video games. Video games are often grouped with virtual reality studies, but for purposes of this paper they were excluded. Agreement between independent reviews was determined by consensus.

Discussion-

In the Cochrane review there have been eight studies on the UL and three on gait and mobility. The main finding of that review was the evidence to support the utilization of VR over standard of look after UL but not gait rehabilitation post-stroke. In this paper we look at comparative efficacy as well, but also at important aspects of technology delivery. It is noteworthy that the Cochrane review covered a period of six years and this paper represents only two-and-a-half-year period. The quantity of the clinical trials in VR research on comparative efficacy and technology delivery continues to progress with a disproportionately larger number of studies on the UL. To provide a perspective on the field, we discuss and comment on each of the elements in the results tables.

Conclusion-

While the number of RCT's examining VR for stroke rehabilitation is growing, there remain unresolved questions on

the technology, clinical characteristics, and practical concerns which will affect translation of VR rehabilitation into practice. We summarize them here in an attempt to border relevant questions for the sector .

Unresolved questions related to the technology:

• Is it necessary to utilize haptic interfaces to provide tactile feedback and interactive forces, or we can achieve similar transfer of training by using mixed reality systems?

• Are semi-immersive 2D systems as efficacious as immersive systems in reducing impairments and promoting activity? Does the use of non-immersive systems promote compensations?

• Do software-controlled algorithms provide greater speed and fidelity of exercise progression? Are they superior to expert clinical decision-making? Can they be combined with clinician-decision making?

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