Reviewer’s report

Title: Evaluating the effect and mechanism of upper limb motor function recovery induced by immersive virtual reality-based rehabilitation for subacute stroke subjects: study protocol for a randomized controlled trial

Version: 0 Date: 28 Aug 2018

Reviewer: Maria Cochrane

Reviewer's report:

This is a very interesting article and generally well written, however, below please see some comments / suggestions:

Abstract - well written and concise, there are some spelling and language errors in the text.

Background - minor language editing needs to be done for clarification (for example in paragraph 1 - lines 33 - 36 needs restructuring to make the content easier to read)

I would also like to suggest that some of the information pertaining to non-immersive VR therapy is either omitted or more extensively compared to immersive VR therapy (or the lack of evidence for immersive VR therapy must come out clearly) - the depth of information on the non-immersive VR therapy creates the impression that the researchers intend to study it.

Aim - i suspect the aim has been altered to suit the article, but rephrase the aim for clarity (the aim is to test the efficacy of the intervention, not to compose an article / proposal for publication)...the aim in the discussion should be presented in this section.

Methodology - the flow chart is excellent and gives a very clear indication of the study procedure. However, the eligibility criteria is very broad - maybe a motivation for the wide age range (and the comparability of patients within this wide age range) should be provided. If the participants are randomly allocated and the one group has patients in the 65 - 85 age range and the other group has patients in the 30 - 50 age range (by chance), will the groups still be comparable?

The intervention period is very short (although a follow-up period is planned) - is this due to the information provided in the background that indicated that upper limb rehabilitation is usually a tedious and long process OR is there sufficient evidence in the literature to indicate that improvement can be observed after three weeks of intervention? The short intervention period may adversely affect the outcome of the study.

In the VR intervention procedure it is stated that participants can either sit in a 'regular' chair or a wheelchair - will the environment be altered to provide similar seating options for patients who chose either of these options - my concern is that patients in a 'regular' chair will not have arm
rests, as patients in wheelchairs would, that could potentially influence the extent to which they can move their arms while participating in the VR intervention.

I would also like to recommend that a second outcome measure to determine upper limb function is added - so that there is a clear differentiation between gross- and fine motor improvement (or not) after the intervention.

Although this is not an aim of the study, the researchers may like to consider adding an additional tool (such as the star cancellation test) to track hemispatial neglect - this influences upper limb recovery tremendously and could inadvertently improve due to the head movements that the participants will perform during the VR therapy.

Throughout the article, please ensure that the time frames indicated remains the same - the study will be 15 weeks in total and the follow-up will be 12 weeks after the 3 week intervention (if I understand the information correctly) - this is not clear throughout the study, at times it seems as if the follow-up will be after 15 weeks of the intervention.

Please move the sample size calculation to the sampling description (just after the eligibility criteria) - this will provide greater clarity on the information provided in the sampling section.

Discussion - well written and a good summary of the study.

Good luck with the study - looking forward to the results!

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