Reviewer’s report

Title: Task-oriented training with computer gaming in people with rheumatoid arthritis (RA) or osteoarthritis (OA) of the hand: Study protocol of a randomized controlled pilot trial

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Reviewer: Marissa Lassere

Reviewer’s report:

1. Will the study design adequately test the hypothesis? The hypothesis is unclear. It could be clarified or discussed further in the manuscript. Please see comments.

2. Are sufficient details provided to allow replication of the work or comparison with related analyses. Unclear, see comments.

3. Is the planned statistical analysis appropriate? Unclear, see comments.

Even though this is pilot study of the intervention under investigation -- all comments are Major Compulsory Revisions as they impact issues of both internal and external validity.

Abstract:

1. Methods: change “double arm” to “parallel group”

2. “a mixed effect repeated measures analysis of variance” can the authors comment why they chose this statistical analysis rather than another parametric tests such as a two sample t-test that measures change across the intervention groups at the end of the trial. Most interventions in rheumatology of RA and OA trials whether pharmacologic or device would use a simple t-test.

3. Discussion: “initial estimation” - can the authors state that the results from this pilot be used to inform a ‘main trial’.

Background:

4. Second sentence: “The condition presents itself as acute symmetric polyarthritis developing over a few months or years especially in the small joints of hand, wrists or feet.”

This may not be the optimal description of RA. It may present as this but often does not. Most rheumatologists and RA cohort studies would find that rheumatoid arthritis has a subacute onset or insidious onset that develops over a period of weeks to months. The 1987 ACR classification criteria weight hand MCPJ, PIPJ and wrist involvement. Many patients with RA have other joint such as predominantly shoulder or knee involvement at disease onset. However, over time the majority of patients may develop hand and wrist involvement.

5. Joint damage is inferred whereas joint deformity is the clinical sign.
6. “Exercises play an integral part in the conservative management of the hand affected with arthritis.”

I do not understand what the authors mean by conservative. The management of OA differs considerably from that of RA. In RA rheumatologists use a variety of primarily pharmacologic treatments to limit patient pain, stiffness, swelling, and physical disability. Exercises do not play an integral role initially. Perhaps exercise treatment varies by geographical setting. Suppressing RA disease, inducing clinical remission and preventing irreversible joint deformity and limitation of range of motion is the long-term goal of treatment in RA. If this is successful then conservative management may not be needed unless there is evidence of ongoing RA disease activity despite DMARDs and biologic DMARDs or there is evidence of irreversible joint damage that is not amenable to DMARD treatment.

7. The authors have provided 6 citations for systematic reviews that show evidence of modest treatment effects. Therefore there is no need to describe in greater detail the three specific trials that showed positive results. Rather, could the authors briefly describe the results of the systematic reviews.

8. Specific training with manipulation of common objects should (this should be ‘could’) also be incorporated.

9. References to add. I think they have been added at the end of the sentence.

10. Grammatical error: provide ‘with’ interesting. ...

11. Hypotheses

“The task-oriented training will significantly improve performance based, self-reported hand function and reduce pain and stiffness levels.”

Is this RCT a pilot for a RCT that will attempt to show that task orientated training is superior to conventional therapy?

For example

1. In patients with RA and OA, task-oriented training will significantly improve performance based, self-reported hand function and reduce pain and stiffness levels compared to a control group of RA and OA patients randomised to treatment with conventional exercise therapy.

2. In patients with RA and OA, task-oriented training will be feasible in terms of compliance, treatment safety and completion rate compared to a control group of RA and OA patients randomised to treatment with conventional exercise therapy.

However, if change within the treatment arm is main outcome measure of interest rather comparing change across arms, why is a control group incorporated?

Initially it appears, from the abstract, that this pilot RCT is similar to a Phase IIb RCT in terms of evaluating safety, efficacy and feasibility. In many Phase IIb trials the interventions are directly compared. If it is not then could the manuscript state that a direct comparison will not be performed.

12. Inclusion criteria
The inclusion criteria are unusual for RA and OA RCTs and not typical of the RA and OA population of patients seen in clinical practice. For example in the manuscripts Raven et al 2008 (ref 36) the average age of respondents was 57.5 years (range 22.6–86.4) and the average DASH was 39 (SD 22). Therefore irrespective of the RCT result there will be poor generalisability of the results to usual RA and OA populations. Why were these specific criteria chosen? It will also effect the imputation of the pilot RCT results to design of the ‘main’ study. Please justify.

13. Exclusion criteria:
People will be excluded if they present with any of the following features:
1) Severely deformed finger joints
2) Neurological conditions of dominant side upper limb
3) Trauma in wrist or hand
4) Upper limb surgeries in previous six months
5) Co-existing hand conditions in the dominant hand
6) Problems with vision or hearing
7) Recent changes in drug regimen <3 months
8) Major diseases of heart or lungs or liver
9) DASH scores <25 or >50

Some of these are too vague. Impacts generalisability. Clinicians won’t know whether the results apply to their patients.

Re 1) How deformed? How will this be determined? Some RA and OA patients have considerable joint deformity with good functional ability.

Re 8) Why are major disease of heart and lung etc excluded. How is this determined?

RE 9) why not DASH scores above 50? The average DASH in Raven 2008 was 39 (SD 22).

What about measures of RA disease activity such as the Disease Activity Score (DAS) or ACR 20 which is generally collected in all RA RCTs? Are these patients in clinical remission? How would we know? It is difficult to interpret an intervention or RCT result in RA without a measure of disease activity at baseline. Xrays are another important baseline measure of disease damage. Please justify why measures of RA disease activity were not collected.

14. Sample size calculation:
“This pilot trial is being conducted to enable a sample size calculation for a larger study, as there is insufficient data available from the previous studies [22, 23]. Thirty participants will be recruited and allocated into two groups throughout the data collection period.”

This is a pilot for another ‘main’ trial. There is data regarding the effect size of the control group – here conventional exercise treatment in patients with RA and OA
(as per literature reviews). If there are 15 patients for the new treatment of task orientated training will 7 or so OA patients and 8 or so RA patients be enough to determine preliminary effect size estimates of this new intervention? RA patients can be very variable in the manifestations of their disease as reflected by joint activity and joint damage measures and these measures of disease activity and damage will impact the effect of most RA interventions such as the one examined in this pilot RCT.

15. A description of the intervention.

“Task-oriented training program
In a study by Guzelkucuk et al, 2007[14] on …”

These three pages should be in the introduction.

16. Primary outcome measure

“The primary outcome measure will be the Arthritis Hand Function Test (AHFT), an 11 item performance based test that measures grip and pinch strength, dexterity, applied strength and dexterity in people with arthritis [34, 35].”

Unfortunately I have not been able to access more than the abstracts of these two papers, nor papers/books that evaluated instruments of wrist/hand function (of which I note there are many). Can the authors provide the reliability of the instrument for patients with RA and OA respectively?

17. Secondary Outomes

The DASH has been extensively validated. However, the computer based hand functional assessment tool has not. In Hammond 2009 it was evaluated in 20 healthy participants. The reliability metrics used a mean difference rather than standard (ICC and Bland/Altman) metrics of reliability. Has it been evaluated in patients with RA and OA? Is the computer based hand functional assessment tool influenced by visual processing ability as well as hand dexterity? There are three pages of the manuscript describing the outcome measure without providing objective metrics. Unless there is data regarding to its metric properties in RA and OA should the tool be designated an ‘exploratory’ outcome and not a secondary outcome to optimally differentiate treatment from measurement failure? Please comment.

How long will all the assessments take to perform?

19. No formal measure of RA or OA disease activity is included as a covariate. The authors should comment as to why it was not included and the impact on the internal validity and generalisability of the results of the intervention by their omission.

20. “The independent assessor who will perform the randomization and evaluate the study outcomes will be blinded to the group allocations.”

This sentence is unclear.

21. “Both groups will be provided with software for use on their home computer to record and store pain and stiffness levels using separate 0-10 numerical verbal rating scales, before and after each exercise session.”
This indicates that the participants must be reasonably computer literate. Is there a reason why it has to be computerized? It will also limit generalizability.

22. Can "HP" be changes to home program throughout (Hewlett Packard first comes to mind on every read).

22. “If symptoms continue … the intervention will be discontinued…”

How are these dropouts handled in the analysis? Are they treatment failures? How is this incorporated into the primary and secondary outcome measures? Is it treatment efficacy failure or an adverse event?

23. Statistical analysis plan

“mixed effect repeated measures analysis of variance pre to post treatment will be used to test the significant differences in each of the outcome measures”

Can the authors comment why they chose this statistical analysis rather than another parametric tests such as a two sample t-test that measures change across the intervention groups at the end of the trial. Most interventions in rheumatology of RA and OA trials whether pharmacologic or device would use a simple t-test.

How are dropouts analyzed? (see 23)