Author's response to reviews

Title: Usability of DBS therapy controllers in elderly patients

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Author's response to reviews: see over
Dear Prof. Korczyn and Mr. Bongcayao,

thank you very much for sending us the comments of the reviewers so quickly.

We appreciate that Dr. Limousin recognizes the scientific value of our work, as she is one of the worldwide leading experts in the field of deep brain stimulation. We incorporated her constructive suggestions in the new version of the manuscript.

We intended to clarify the rationale of our study to Dr. Balash, as he found our article to be of insufficient interest. Dr. Balash stated that usability problems in elderly patients are unknown to him, as DBS nurses usually solve them. Unfortunately, DBS nurses are not standard in many countries like in Austria or Germany. By contrast, Dr. Limousin who is working in a field that includes DBS nurses is aware of the issue described in our article. In our opinion, even if DBS nurses may filter usability problems, it is worth analyzing the sources of error and to consider them in the training process of patients.

Please find enclosed all of our responses to you and the reviewers as well as the revised manuscript. We hope that these changes make a substantial contribution to improving our manuscript.

Kind regards,

Iris Kaiser (on behalf of the group)
Responses to the Editors

1) As suggested, the abbreviation DBS has been defined in the title as: „Usability of therapy controllers in elderly patients with deep brain stimulation”

2) The e-mail addresses of the authors have been included in the title page.

3) Keywords have been removed from the abstract.

4) Our files have been formatted according to the journal style.

Responses to Dr. Limousin

Changes are marked in blue in the manuscript

Minor suggestions

1) Since the age cut off is 55, calling the group “elderly DBS patients” is a little strong; they could be referred as over 55 DBS patients.

The reviewer is correct in noting that an age of 55 may not be recognized as old. We changed our phrasing according to the reviewer’s suggestion on page 5. In the lifespan literature definitions concerning age cut offs between younger and older adults differ from each other and as we know for example from the MOBILATE study, it is also common to chose a context-bound lower limit at 55 years. For these reasons we defined
an age of 55 as cut off in our study. However, the average age of the patients in our study was around 65 years.

2) The abstract states that patients had been using the controller for more than 6 years, but the method section is mentioning 6 months, there must be an error.

One of the inclusion criteria in our study was using the controller at least six months so that they have had. The wording probably was misleading because we intended to express that prior to the study the mean duration of using the controller was already more than six years in our patients (see also next point).

3) The abstract could be slightly more clear in particular focussing the method and aim of the study on the impact of the training with video

We emphasized to give the abstract more structure by partly rewording it.

4) Method: it would be useful to clarify how patients were assigned to a particular group. I assume that the rater was not blinded of the group the patient was in, this should be mentioned in the method and possibly added to discussion, since a blinded assessor could be considered for future studies.
To avoid biases, the groups were matched according to age and score of the KUT questionnaire (control orientation with respect to technology use). As suggested, we included this information in the method section on page 5 and 6.

It is correct that the rater was not blinded of the group the patient was in. Certainly, a blinded rater would have been desirable. However, due to the given comparability of groups (also in other variables) and the objective criteria at the nine practical assignments, the results could in our opinion be recognized as robust. We have added a description in the discussion section focusing on this point (see page 16).

5) **It would be interesting to know what is the routine information given to the patient in relation to how to use the device as well was the advice given to the patient in relation to how often to use it and what to use it for.**

This is again a very valuable reviewer comment. We now discuss this point on page 13.

6) **Result section, use of therapy controller: some of this section would fit better in the method.**

As suggested, parts of this section have been moved to the method section (see page 8).
Discretionary revisions:

1) Introduction: there could be indication that depression and OCD are not established indication but under investigation

We have included a description on page 3, as suggested.

2) I am not sure table 3 is really necessary

We would like to leave it up to the editor whether table 3 should be removed. We would suggest keeping it in order to emphasize the comparability of groups.

3) It would have been interesting to know if there a difference between PD and essential tremor patients, nevertheless I understand that the groups are probably too small for that.

As noted by the reviewer, the groups are indeed too small. Moreover, two out of the four lost patients had essential tremor.

4) Result page 11 first sentence I would remove “obviously”

We have removed the phrase as suggested.
Responses to Dr. Balash

*Changes are marked in green in the manuscript*

1) The subject of the study is not seems to be actual. Our group had no any complaints or difficulties in handling with controller within five years at elders. Patient training with a DBS nurse has solved all problems to date. On my opinion, the existing controller is simple and conforms to its purpose. It does not require modification.

In the following we would like to discuss why we consider this original study to be of valuable interest to the scientific community:

The reviewer has worked in a clinical setting that includes specialized Parkinson’s nurses, or even DBS nurses and was therefore unaffected by usability problems of patients up to the present. However, the availability of DBS nurses is by far not standard in many other countries. Unfortunately, like in many other areas, we do not have this very useful help. Training is typically done by physicians and not always in a systematic way (we elaborate on this on page 13 and 14). For that reason it is even more important to investigate alternative solutions to support or train patients in using technical devices. The initial idea of this scientific work was to optimize this workflow and to improve the didactics of learning how to operate therapy controllers.
Even if DBS nurses are available at the clinic, appropriate video training material may be a useful asset. Patients may watch the video anytime at home in case they feel insecure. Thus, patients may receive valuable support in their daily life.

Our work also aims at giving new impulses to the manufacturers to add effective educational material to their written manuals and to have end-users in mind when it comes to re-designing patient controllers.

The reviewer states that the controller is simple with respect to its functions. However, even simple devices can cause difficulties for individuals who are not very familiar with technology use [see “Designing for older adults: principles and creative human factors approaches (human factors & aging) by Fisk et al (2009)].

Our results show that elderly patients still have difficulties in operating this relatively simple controller even after several years of use. There are many reports that older adults have problems in correctly using allegedly simple technical devices like e.g. ticket vending machines or blood glucose meters (see e.g. Mykityshyn et al 2002, or manuscript page 4).

Previous studies showed that user-friendly design and appropriate training methods could effectively improve the performance of elderly users (Struve & Wandke, 2009; page 4).

This is in line with our results: we found that despite this in theory may be a simple technical device, patients in practice make quite a lot of errors when they use the controller (see result section) and that patients who also watched the video training made less mistakes both immediately after the training as well as after six months.
2) The authors check and prove an a priori obvious point that the video-training is better, than the reading of instructions in older people. However, that training had only the short-term effect and after 6 months both groups had appeared similarly use controller, and insignificantly differ in terms of mistakes.

The reviewer states that there was no difference between groups in the course of time. This was not the case, as we show in the results section. The beneficial effects of the video-based training still existed after six months (see results of ANOVA on page 10). Patients of the video group were significantly less error-prone compared to the control group at both points in time. These are our primary study findings that we also charted on figure 2 and 3. Both patient groups performed faster than at baseline. Moreover, after six months, patients used the controller more regularly compared to baseline (two thirds compared to half of the patients at baseline). It is correct that this result was not significant, probably due to the small series of patients and in the future larger patient groups should be investigated and also across a longer time span. We added this in the discussion section (page 16).

It is not an a priori obvious point that video training has generally beneficial effects. In the study we showed that our age-specific training material was effective in this patient group, which is not a matter of course but the empirical evidence of our study. To our knowledge, this was the first study demonstrating the efficacy of a systematic and age-specific training in elderly DBS patients aiming at raising the awareness to provide
appropriate training material and to include the end-users in the design of technical products in medical care.