Does virtual professional support improve the effectiveness of home pulmonary rehabilitation?

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When reading the article by Şahın et al.[1] (Effects of a home-based pulmonary rehabilitation program with and without telecoaching on health-related outcomes in COVID-19 survivors: a randomized controlled clinical study) published in this issue of the *Jornal Brasileiro de Pneumologia*, we identified elements that could have explored the results better with great clinical implications.

Starting from the central question of the research, the results in Table 3[1] showed that there were no major effects on the investigated outcomes between the groups. However, there was an exclusive effect of time, in which case it would be applied to the two groups indifferently, or there would be an effect of time-group interaction, in which case one of the groups would have a different behavior over time.

Let's exemplify: The FVC reveals only the major effect of time, when both groups increased their indicator, but in a large magnitude (Cohen's d > 0.8), which was not highlighted by the researchers. The same occurs with the six-minute walk distance outcome; the study group has a d = 2.30 and the control group has a d = 2.07. This shows the great clinical effect of pulmonary rehabilitation on FVC in these individuals.

The modified Medical Research Council scale outcome has a time-group interaction that needs to be analyzed first. It was observed that the study group evolved better over time than did the control group, with a magnitude of d = 4.51 in the intragroup analysis and d = 2.10 in the intergroup analysis, that is, telecoaching clinically enhanced this outcome. This also occurred with the social aspects when comparing the study and the control groups (d = 5.88 vs. d = 2.14), a clinical effect almost two times greater (d = 1.83). The isolated interpretation of the partial eta only allows measuring the explanatory power of the built model and not the specific effects of the factors that Cohen's d allows for balanced groups.[1]

These interesting findings reveal inconsistencies identified in the measures of the standard deviations of the groups presented in Table 3 and the distribution of the groups in Figure 2 in the study by Şahın et al.[1] Table 3[1] shows that the standard deviations of the study and control groups were the same both before and after the intervention for almost all outcomes.

This is minimally odd for interventions when individual variability follows distinct progressions. In figure 2,[1] on the other hand, the outcomes six-minute walk distance, modified Medical Research Council scale score, and perceived dyspnea and fatigue reveal distinct variability, which may lead to the invalidation of the application of factorial ANOVA.[2] It is suggested that the authors make explicit the real variability of the outcomes in order to obtain accurate values for the measures of clinical effect.

Finally, we recommend a data analysis using a generalizable mixed model in order to minimize independence biases of residues of repeated measures and the heterogeneity of variance that are apparent in the published results.[3]

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Authors' Reply

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We thank the authors for their interest in our study comparing the effects of a home-based pulmonary rehabilitation program with and without telecoaching on health-related outcomes in COVID-19 survivors.[1] We are grateful for the valuable comments on our manuscript and are happy to respond to their comments as follows.

Firstly, since our assumptions meet the general linear models, we used two-way ANOVA for repeated measures from general linear models in our study. While building the model, we set it up in factorial design. Therefore, we tried to reduce the heterogeneity for the variances as much as possible.[2]

Then, we would like to underline that the values in Table 3[1] in our study are presented as the standard error of mean, not standard deviation. This misunderstanding can cause the effect size values calculated by the authors to be confusing for the readers. Considering that the standard error of mean is calculated with the formula (standard deviation/√n), they have been specified as too large. Therefore, we calculated the Cohen's effect size values of our main results with the formula d = (X1 − X2)/standard deviation for both groups (ds = d_{study}; dc = $d_{control}$).[3] We interpreted our results with the effect size values to summarize their clinical significance.

After the rehabilitation program, the effect size of the change in FVC was moderate in the study group but higher than in the control group (ds = 0.56; dc = 0.48). As we mentioned in our study, the most important clinical gain in the study group was in the daily life dyspnea score (ds = 1.30; dc = 0.43). Large effect size was obtained in the six-minute walk distance in both groups, being relatively higher in the study group (ds = 0.90; dc = 0.82). Exertional dyspnea and fatigue scores improved only in the study group, and their effect sizes were found to be d = 0.70 and d = 0.64, respectively. While the effect size calculated for our results regarding the gains in muscle strength was d > 0.5 for deltoid and quadriceps femoris muscles in the study group, the effect size obtained for biceps muscle strength in the control group was higher than in the study group (d > 0.5).

The effect size of the change in the Saint George's Respiratory Questionnaire activity score was higher in the study group (ds = 0.62; dc = 0.56), and the effect size of the change in the impact (ds = 0.73; dc = 0.88), and of the total score (ds = 0.84; dc = 0.90) was higher in the control group. The highest effect size in the Medical Outcomes Study 36-item Short-Form Health Survey in the study group was in the social functioning domain (ds = 1.28; dc = 0.46). Although there was a small decrease in anxiety and depression scores in both groups, it was concluded that the effect size for these values was d < 0.50.

As a result, as emphasized in our study, although there were different gains on different variables in both groups, improvements in daily life dyspnea and social functioning were higher and had a larger effect size in the study group than in the control group.

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