

Virtual and Augmented Reality Training on Digital Mirror D-Wall. Case Study: Long Covid-19 Rehabilitation Protocol

ACRM

AMERICAN CONGRESS OF REHABILITATION MEDICINE

Improving lives through interdisciplinary rehabilitation research



M. Gidoni^{1,2}, R. Russo³, A. Pinto³, R. Pirani², C. Gatt², L. D'Ambrosio², M. Esposito²

¹Università degli Studi di Milano, Dipartimento di Scienze biomediche per la salute, Dottorato in Scienze dell'esercizio fisico e dello Sport, Milano, Italy,

²Tecnobody s.r.l, Dalmine (BG), Italy.

³Move Different, Aosta(AO), Italy

e-mail: marco.gidoni@unimi.it



UNIVERSITÀ DEGLI STUDI DI MILANO

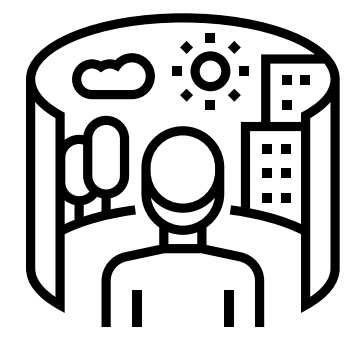


INTRODUCTION AND PURPOSE

The clinical and virological recovery from Covid-19 does not correspond to the defeat of the disease. Indeed, many people still carry indelible physical and psychological signs that affect their quality of life. Nowadays, many patients show cardiorespiratory and/or motor problems, such as asthenia and weakness, that interfere with the normal activities of daily life and work, regardless their admission to intensive care units (ICU). [1;2;3]

This study aims at highlighting:

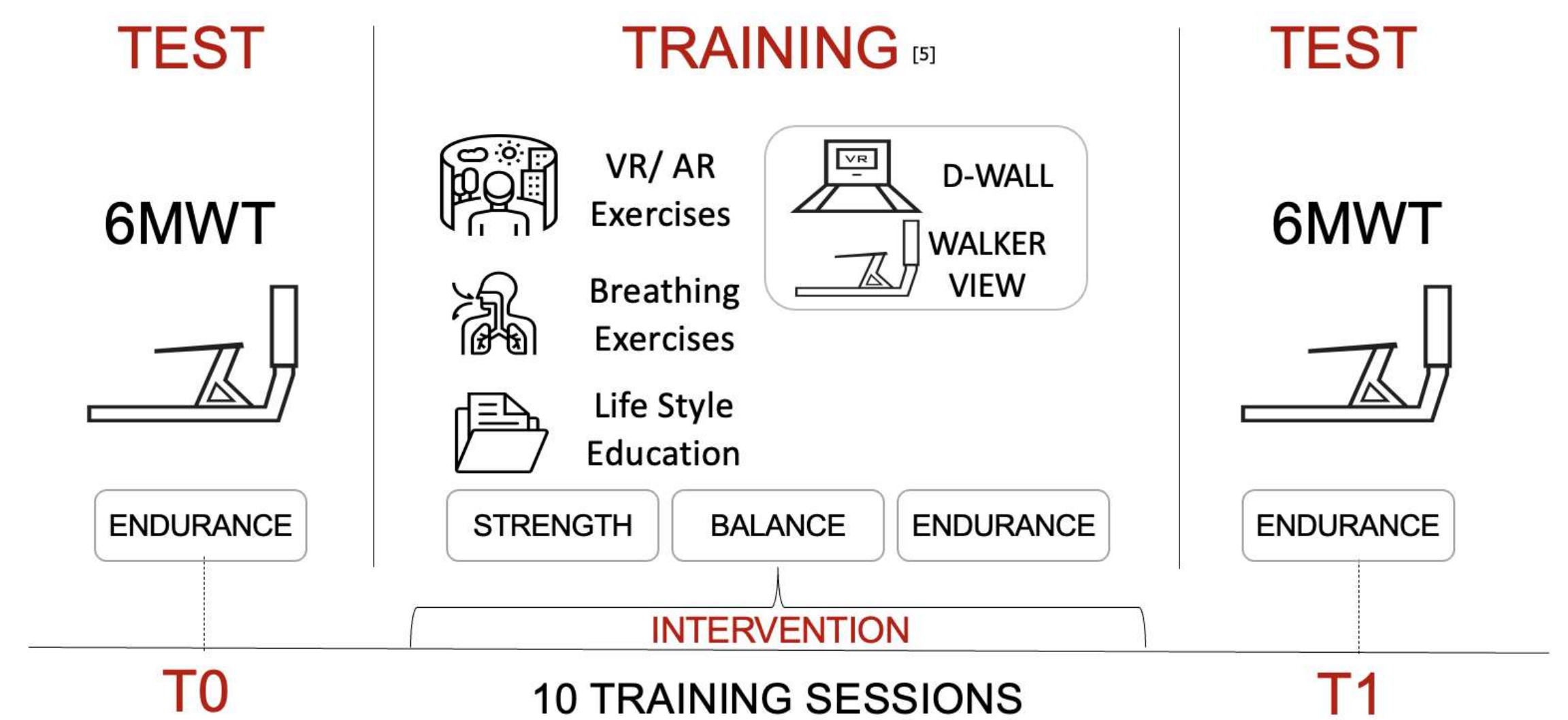
1. the **importance of objective instrumental assessment**, performing a 6 Minute Walking Test on a treadmill with an adaptive speed control (Walker View 3.0 SCX).
2. the **importance of Augmented and Virtual Reality (AR & VR) in rehabilitation**, using visual biofeedback that can be exploited to customize patient rehabilitation protocol [4] both in locomotion (Walker View 3.0 SCX) and free body movements (D-Wall).



MATERIALS AND METHODS

Tests have been carried out on a sample of 68 patients with Covid-19 symptoms, with a mean (SD) age of 62.4 (8) years, with symptom heterogeneity, from both ICU and GP referral.

According to symptomatology severity, patients were divided into two subgroups: severe group (35 subjects) and mild group (33 subjects) in order to adapt training intensity.



Statistical analysis was performed with non-parametric Wilcoxon signed rank test to compare pre (T0) and post (T1) outcomes of each group. Level of significance was set a priori at $p < .05$.

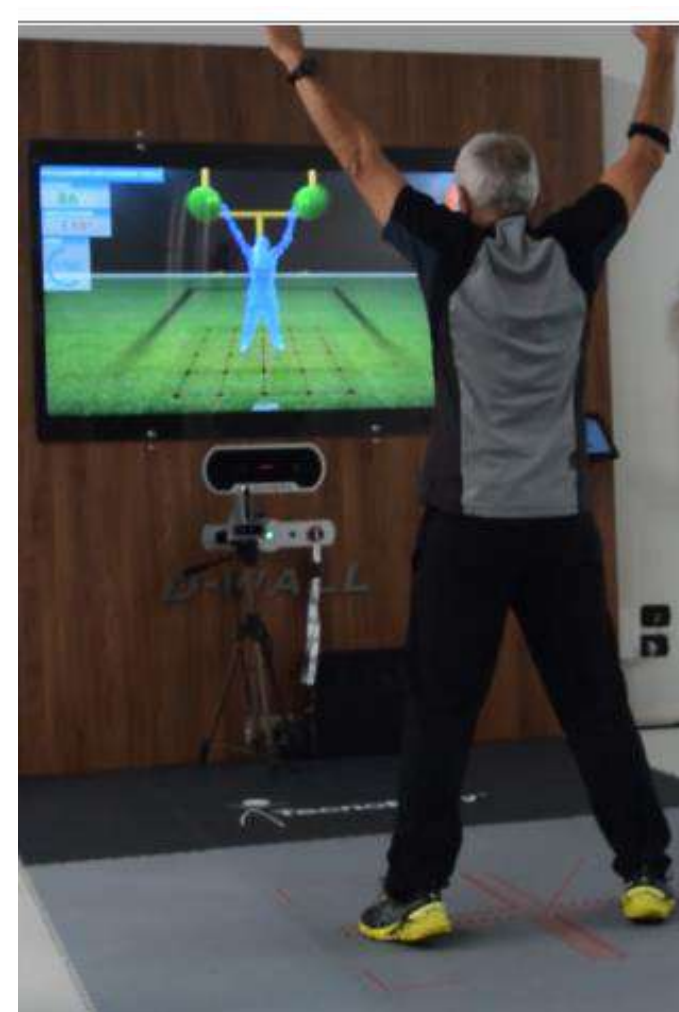
RESULTS

TRAINING

Virtual and Augmented Reality



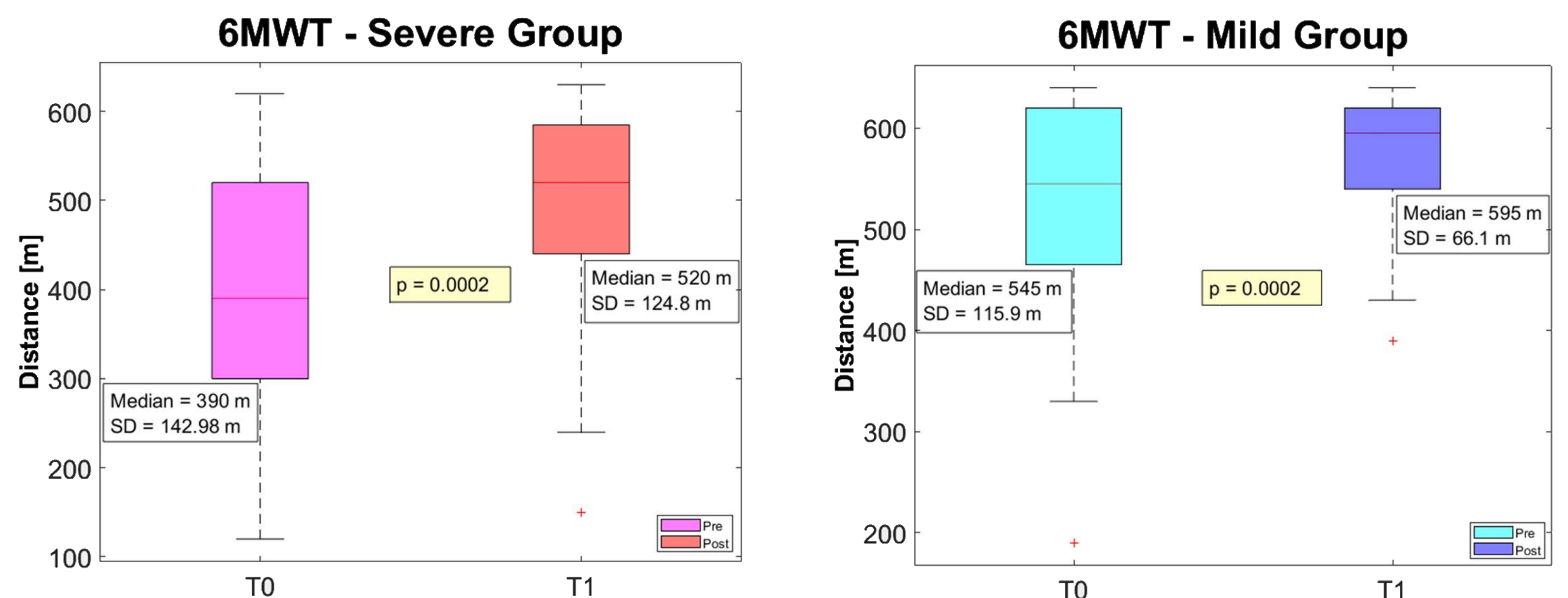
WALKER VIEW



D-WALL

TEST

6 Minute Walking Test (T0 and T1 comparison)



CONCLUSIONS

The obtained results demonstrate the efficacy for each group of a training protocol with the usage of AR and VR. The 6MWT on a treadmill with adaptive speed control system shows its effectiveness in the rehabilitation of Covid-19 patients. In fact, the 6MWT on Walker View 3.0 SCX points out, with quantitative values (i.e. covered distance), the improvements of the patients after the training protocol. As a matter of fact, the meters covered by the Severe Group after the training protocol are very close to the Mild Group ones. In addition, both groups at T1 tend to cover a distance almost comparable to the normotype reference distance. [6]

The results of this preliminary short-term study will need to be confirmed in a larger sample and considering evaluations at a greater distance from the intervention.

BIBLIOGRAFY

- [1] Carfi A, Bernabei R, Landi F; Gemelli Against COVID-19 Post-Acute Care Study Group. Persistent Symptoms in Patients After Acute COVID-19. *JAMA*. 2020;324(6):603-605.
- [2] Carvalho-Schneider C, Laurent E, Lemaigen A, et al. Follow-up of adults with noncritical COVID-19 two months after symptom onset. *Clin Microbiol Infect*. 2021;27(2):258-263. doi:10.1016/j.cmi.2020.09.052
- [3] Davis HE, Assaf GS, McCorkell L, et al. Characterizing long COVID in an international cohort: 7 months of symptoms and their impact. *EClinicalMedicine*. 2021;38:101019.

- [4] Wong AW, López-Romero S, Figueroa-Hurtado E, et al. Predictors of reduced 6-minute walk distance after COVID-19: a cohort study in Mexico. *Pulmonology*. 2021;27(6):563-565.
- [5] Udina C, Ars J, Morandi A, Vilaró J, Cáceres C, Inzitari M. Rehabilitation in adult post-COVID-19 patients in post-acute care with Therapeutic Exercise. *J Frailty Aging*. 2021;10(3):297-300.
- [6] Perera S, Mody SH, Woodman RC, Studenski SA. Meaningful change and responsiveness in common physical performance measures in older adults. *J Am Geriatr Soc*. 2006;54(5):743-749.