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CORRESPONDENCE

Health resort medicine can be a suitable setting to recover disabilities in patients tested negative for COVID-19 discharged from hospital? A challenge for the future

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Since March 2020, the world is facing COVID-19 pandemic. So far, to treat patients needing life support has been the main concern. After the recovery from COVID-19, the infection and the long hospitalization period can lead to medium- or long-term outcomes, such as muscle strength and cardiorespiratory performance reduction, neuropathy, and other possible post-infectious neurological syndromes as Guillain-Barrè syndrome (Baig et al. 2020; Sedaghat and Karimi 2020), residual immune imbalance (Wang et al. 2020), anxiety, depression, post-traumatic stress, or cognitive disorders (Talan 2020), all requiring appropriate therapeutic intervention also after the discharge from hospital. Considering the high number of patients who develops a severe form of the infection (Jin et al. 2020), many subjects require a rehabilitative intervention after the discharge, practicable after patients tested negative for COVID-19. Unfortunately, there are no specific structures offering a comprehensive treatment to these subjects, even if it is important to start a multidisciplinary rehabilitation program as soon as possible (Grabowski and Joynt Maddox 2020), in order to contain the infection outcomes and the residual disabilities, in particular in subjects having multiple comorbidities such as advanced age, chronic diseases, and obesity. To face the novelty of this health emergency, it is necessary to propose to the healthcare systems innovative, suitable, and accessible models of therapy. Hence, our proposal for an innovative post-hospitalization rehabilitative treatment, taking advantage of health resort medicine as suitable setting to take care of discharged subjects tested negative for COVID-19. Core elements of interventions in health resorts are balneotherapy, hydrotherapy, and climatotherapy in combination with other rehabilitation strategies (Gutenbrunner et al. 2010). Rehabilitation strategies in health resort medicine may include therapeutic massage, water massage, physical modalities, numerous forms of exercise such as water exercise, breathing, balance, and muscle-strengthening exercises, health education, psychological interventions, and treatments complementary to balneotherapy (Masiero et al. 2019b). These procedures can represent a therapeutic opportunity to treat neuro-musculoskeletal and cardiorespiratory outcomes as well as to recover mental health and psychosocial disabilities in post COVID-19 subjects. The main goals of the rehabilitation treatment in post COVID-19 subjects discharged from hospital should be indeed individually tailored to the recovery from muscular disorders and neurological deficits, the cardiorespiratory reconditioning, the improvement in cognitive symptoms, and the education to a healthy lifestyle. In addition, it may be necessary to treat any associated comorbidities (e.g., obesity and osteoarthritis).

For example, focusing on exercise in thermal water, it combines the specific chemical effects of mineral-rich water and the physical effects of immersion (mainly due to temperature, buoyancy, viscosity, and hydrostatic pressure) with the benefit of exercising (Fioravanti et al. 2011). Thanks to the higher density and the viscous resistance, aerobic exercising and strength training in mineral-rich water allow the patient to strengthen muscles weakened by the prolonged hospitalization period with minimal discomfort (Nasermoaddeli and Kagamimori 2005). Minimizing the risk of joint injury and making easier muscular strength recovery, exercise in thermal water seems to offer the safest and more effective environment to rehabilitate obese subjects

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(Masiero et al. 2018), frequently involved in severe forms of COVID-19 (Finer et al. 2020). Thanks to the buoyancy force and the unloading effect, thermal setting can also early recover walking ability and balance (Masiero et al. 2019a), frequently reduced after prolonged bedrest, through techniques such as Ai Chi, Yogalates (a hybrid aquatic yoga/Pilates program), and balance workouts (Becker 2009).

Furthermore, immersion in thermal water may be used to strengthen weakened inspiratory muscles, through the combination of respiratory exercise and aerobic training (Becker 2009), leading to develop a specific respiratory rehabilitation service for post COVID-19 patients.

Bathing in mineral-rich water can also relieve anxiety and mental stress and improve stress resilience probably through an increase in cortisol levels, thanks to a rise in ACTH production (Antonelli and Donelli 2018). The positive social atmosphere of health resort medicine may also play a therapeutic role on the immune system, often damaged by a prolonged mental stress through immunity suppression (Vitlic et al. 2014).

Finally, also climatotherapy, which involves the use of climatic conditions in the treatment of chronic diseases, may be exploited in order to recover pulmonary function and quality of life. This was demonstrated, for example, in patients with chronic obstructive pulmonary disease and chronic bronchitis attending mountain environment (Kubincová et al. 2018). Considering that even after the virus eradication in patients who have recovered from COVID-19, a progressive, fibrotic irreversible interstitial lung disease could develop and in older post COVID-19 subjects with pre-existing pulmonary conditions a chronic non-progressive fibrosis could occur (Spagnolo et al. 2020), COVID-19 respiratory outcomes may find benefit with climatotherapy intervention.

In order to carry out this innovative strategy, it is necessary to share international recommendations, combining the therapeutic requires with measures to prevent the spread of the infection. In particular, a prolonged interaction between the patients and the staff and the possible need of involving family members in the delivery of care must be considered (Boldrini et al. 2020). Internationally, it seems that the access of patients, family members, and staff should be considered safe, respecting hygienic procedures, such as limiting close contact, using personal protective equipment, and encouraging to wash hands often. It is also recommended to train staff and patients to health education and preventive measures. Concerning the water, there is no evidence that COVID-19 can spread to people through the water used in pools, hot tubs, and spas and a proper disinfection should kill the virus (Centers for Disease Control and Prevention 2020b). The access to Health resort medicine should be guaranteed to post-COVID 19 subjects after two negative rRT-PCR results, improvement in signs and symptoms, and fever resolution (Centers for Disease Control and Prevention 2020a).

Considering the high number of health resorts in the world, they should be the ideal setting to perform an innovative and effective therapeutic paradigm that can address the COVID-19 infection outcomes, with particular attention to those linked to comorbidities. Once this rehabilitative strategy will be implemented, the benefits, which can be already hypothesized, could be assessed, also in terms of cost-effectiveness.

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