Editorial

Long COVID: Impact and Comprehensive Management. A Never Ending Story?

Cuando una congestión pulmonar lo estaba arrasando
Y la inventive fiebre le falseó la cara del día,
Congregó los ardientes documentos de su memoria
para frugar su sueño

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The SARS-CoronaVirus-2 disease 19 (COVID-19) pandemic has having dramatic effects throughout the world, with million casualties (yes, casualties: like in war..., with first lines, trenches, heroes, cowards and traitors: the reader knows who/what is who/what) and economic troubles.[1] As in war, the disease requires appropriate strategies and tactics for prevention and management of the acute phase, as well of the post-war period.[2] Unfortunately, as the war survivors may suffer from several long- term consequences such as the Post Traumatic Stress Disorder, likewise for COVID-19 survivors, the war may be not over after coming home from the Intensive Care Unit (ICU) or the hospital, a warning also for individuals who have suffered from mild symptoms.

There has been recent interest in the "long COVID-19" (named also "Postacute sequelae of COVID-19: PASC"): "the persistence or the development of symptoms beyond four weeks from the onset of the disease, when the test for replication-competent SARS-CoV-2 has been negative for at least one week".[3] Studies report 30%–90% six month incidences, according to methods, timing and structure of follow-up programmes, evaluation of comorbidities, previous length of hospital stay, need of ICU admission.[4]

In addition to the consequences on lung function, showing a greater prevalence of lung diffusion (DLCO) compromission,[5] a high prevalence of impairment in physical performance is reported in survivors. These individuals may suffer from fatigue and/or muscle weakness, exercise-induced dyspnoea, sleep difficulties, anxiety and/or depression up to six months after the acute infection.[6,7] Reduction in exercise performance has been reported also in asymptomatic professional athletes such as soccer players after return to negativity at COVID-19.[8]

An additional role in reported different incidences of long- term effects is played by the wide range of measures used to evaluate long COVID-19. Studies evaluating only symptoms may suffer from recall bias and subjective rating, therefore the need for validated measures is of utmost importance, if necessary using safe equipments and procedures.[9] Among the reported measures, the Barthel Index, the Barthel index Dyspnoea, the Six-Minute Walking Distance Test, the Short Physical Performance Battery and the 1-Minute Sit-to-Stand are the most used.[10] With the use of these or other tools, a wide range of prevalences of impairment in physical performance (e.g. from 11% to 77% of predicted values for Barthel Index) have been reported.[10] Furthermore the standardisation of a battery of measures would allow making comparisons among studies and follow-up time-points.

So far we have agreement on definition, incidence, and clinical presentation, but we are only at the first steps on the way of long COVID knowledge: what future perspectives in research and strategies of management?

- The pathophysiology of long COVID-19 is still unclear. Potential pathophysiological mechanisms have been suggested such as virus-specific pathophysiological changes, immunological and inflammatory damages in response to the acute infection and expected sequelae of post-critical illness.[4]
- The reported clinical problems in the long-term highlight the need of well structured and personalised programmes of rehabilitation for these individuals.[11] However the present health organisations may be not enough to face the increasing number of individuals requiring follow-up and rehabilitation post COVID.
- The available technologies may help. Robotics, artificial intelligence, big data analytics, mobile apps and tele-medicine can be effective resources also in fighting the long- term effects of pandemics.[12] At present we have the technology to monitor and manage at distance the impairment in physical performance with appropriate programmes of tele-rehabilitation.[13,14] In the next future robotics might monitor patients' beds, performing progressively more complex nursing tasks under at distance human control. This might result in less caregivers' physical burden and even less potential risks of infection transmission.[12] There is promising evidence that virtual reality, augmented reality, domotics, will relieve from professionals the burden of many tasks of health care with more benefits and safety for more fragile individuals like those suffering from long-term sequelae of COVID-19.[15] Furthermore, despite the usefulness of artificial intelligence during the acute phase of pandemic has been questioned, it might be also helpful for the late sequelae.[16]
- Despite the fake news storm, we must also listen to the patient voices, especially while planning programmes of vaccination, management and rehabilitation. An analysis of 1.38 million posts on social media mentioning long-term symptoms of COVID-19 concluded that four main areas need attention: (a) the timeframes assigned to COVID-19; (b) the range of symptoms which

affects testing/diagnoses; (c) the emotional/intellectual impact; (d) the lack of resources and information.[17]

With the support of our beloved, although imperfect, evidence based medicine, we scientists, researchers and caregivers must fight our battle against the worldwide tsunami of stupidity supported by the fake news in the social media. So far the misinformation supported both by long-standing anti-vaccine movements and by political interference,[18] has been opposed by reporting statistics on acute mortality and ICU admissions. The warning on long COVID associated pathologies should be added to the weapons for the (unfortunately to be lost) war on worldwide stupidity.

Another final point should be considered. Excluding articles still online ahead of print and rejected submissions, in 2021 the articles on COVID-19, including original and review articles, research letters or correspondences, published in *Pulmonology* have been 35.2% of total, as compared to 19.4% of 2020. There has been a further increase also in the number of studies and research on long Covid and we are increasingly improving the care of these individuals. Acute phase and now long COVID deserve special attention by the scientific community, however we must not forget that several other diseases might be neglected, which can also compromise the health worldwide and bring as many deaths as the COVID-19.[19]

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