Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Commentary

Long term consequences of COVID-19

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On March 11, 2020, the coronavirus disease-2019 (COVID-19) was declared a pandemic by World Health Organization (WHO). While mainly affecting the respiratory system to the point of causing severe acute respiratory syndrome (SARS), COVID-19 might also affect the cardiac, neurological, haematological and renal systems.

With estimates indicating a fatality rate under 0.20%[1], the focus of the disease is shifting toward patients with COVID-19 who experience persistent symptoms for longer than 3-4 weeks (long COVID can also be found as post-acute COVID-19, chronic post-COVID and long-haul COVID)[2]. However, with new symptoms being dynamically added to the condition, the name and definition are bound to change [3–5]. Long COVID can also affect most systems in the body, and thus requires a multifaceted approach to effectively manage the physical, cognitive, psychological and social components of this health condition. [6–8].

In the UK, the Royal College of General Practitioners anticipates a continuous influx of patients with long COVID [9]. The most recent studies show that after acute COVID-19 infection, one in five people has persistent symptoms after 5 weeks and one in ten has symptoms for 12 weeks or longer. A Italian study reported that after recovering from COVID-19, 13% of 143 people were completely free of any symptoms, while one or two, or three or more symptoms persisted in 32% and 55% patients, respectively [6]. Significantly, two fifths of patients reported a worsened quality of life [7]. A systematic review and meta-analysis published in this journal shows that post-covid symptoms, mainly fatigue and dyspnoea, are present in more than 60% of persons previously infected by SARS-CoV-2 [10].

Research in Long COVID regarding risk factors, pathophysiology, consequences and sequelae is increasing. Similarly, the number of guidelines written in collaboration with national institutions and patients' associations is growing [11]. These guidelines aim to be dynamic and comprehensive, periodically updating with results of new research. [11,12] [13]

The voice of patients who report excellent health and good quality of life pre-Long COVID conveys desperation at worsening symptoms. The list of persisting and new symptoms described by patients is extensive, including persistent cough, breathing difficulty, chest tightness, cognitive dysfunction and extreme fatigue. Some describe the cyclic nature of the condition, where some symptoms improve while others worsen [3]. Many can be considered neurological symptoms, namely: "brain's in fog"; "can't remember the name"; "can't concentrate"; "my head pounds". Other non-specific neurological symptoms, which often occur with fatigue and breathlessness, include headaches, dizziness and cognitive blunting[3]. The psychological and psychiatric symptoms experienced by patients with Long COVID such as depression, anxiety, post-traumatic symptoms and cognitive impairment could be attributed to psychological factors and neurobiological injury. Symptoms such as anosmia, ageusia, dizziness, headache and seizures may persist for a long time after the acute COVID-19 illness [14,15].

Living with the stress of Long COVID has also affected the mental health of many patients, who have most commonly experienced insomnia and anxiety[16]. In Spain, the most common symptoms have affected the ability to carry out activities of daily living: 75% find it

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difficult to spend time with friends, 72% working outside the home and 70% declare having difficulty attending family responsibilities. In Long COVID, mental Illness is strongly associated with the social determinants model, which underscores the negative impact of poverty, discrimination and social exclusion. Only a minority of patients have the opportunity of being referred to mental health services. It is thus crucial to strengthen mental health services, community resources and informal support groups. A recent report describes the importance of accessible care for patients with complex needs, mental health services and other social interventions such as financial advisers [9].

Patient organizations and patient participation are instrumental in defining and providing solutions to Long COVID. In Spain, these organizations have emphasized wellbeing, social connection, self-care, peer support and symptom control. Patient groups have also emerged in other countries such as Italy, France, England and the United States. Support groups have also been set up in the wider net to assist with physical, mental and social concerns (mostly legal and occupational-related, see https://www.wearebodypolitic.com/covid19). Currently, researchers use self-reported surveys internationally to collect data on this condition. There is an evidence to argue that Long COVID is the first illness to be described by patients on Twitter and other social media fora.

Data *from the patients' perspective* to better describe Long COVID syndrome are urgently needed [5]. Large, long-term cohort studies should elucidate disease trajectory, complications, and biological mechanisms that underlie the long-term consequences of COVID-19.

Declaration of Competing Interest

No conflict of interest has been declared by the author(s). We confirm that the manuscript has not been submitted or is not simultaneously being submitted elsewhere, and that no portion of the data has been published in proceedings or transactions of meetings or symposium volumes. The corresponding author has the right to grant on behalf of all authors and does grant on behalf of all authors.

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