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Entretien

## Clinical condition, resuscitation and medical-psychological care of severe COVID-19 patients (part 1)

### État clinique, réanimation et prise en charge médicopsychologique de malades COVID-19 sévères (1<sup>re</sup> partie)

Zeev Maoz<sup>a,b</sup>, Isabelle Huet<sup>a</sup>, Jean-Luc Sudres<sup>b</sup>, Jean-Pierre Bouchard<sup>c,d,e,\*</sup>

<sup>a</sup> Clinique cardiovasculaire et pulmonaire de Saint-Orens, 12, avenue de Revel, 31650 Saint-Orens-de-Gameville, France

<sup>b</sup> Centre d'Étude et de Recherche en Psychopathologie et Psychologie de la Santé (CERPPS, EA 7411), Université Toulouse 2 Jean-Jaurès, Maison de la recherche, 5, allées Antonio-Machado, 31058 Toulouse cedex 9, France

<sup>c</sup> Institut psycho-judiciaire et de psychopathologie (IPJP), Institute of Forensic Psychology and Psychopathology, centre hospitalier de Cadillac, 10, avenue Joseph-Caussil, 33410 Cadillac, France

<sup>d</sup> Unité pour malades difficiles (UMD), pôle de psychiatrie médico-légale (PPML), centre hospitalier de Cadillac, 10, avenue Joseph-Caussil, 33410 Cadillac, France

<sup>e</sup> Department of Statistics and Population Studies, University of the Western Cape, Robert-Sobukwe road, Bellville, 7535 Cape-Town, South Africa

#### ARTICLE INFO

Article history:  
Available online xxx

Keywords:  
COVID-19 (Corona Virus Disease)  
Downward spiral  
Epidemic  
Pandemic  
Post-Severe COVID-19 patient  
Post-Traumatic Stress Disorder (PTSD)  
Psychological Care  
Pulmonary Rehabilitation  
SARS COV-2

#### ABSTRACT

This interview covers the clinical and psychological condition of patients afflicted with severe COVID-19 and their pulmonary rehabilitation process. For these patients, symptoms are medically urgent and life-threatening. The sequelae of this viral attack and immune response to it are significant, and often persist for months after discharge from intensive care. To understand the medical and psychological state of these patients, a description is given of the organs affected, the oxygen cycle in the body and the medical care procedures that are used to help patients with dysfunctional respiratory systems. The link between physical and psychological progress is described. Physical weakness results from pulmonary sequelae and deconditioning, and is often experienced by patients as mental fatigue similar to psychological depression. This may draw the patient into a downward spiral, with multiple health aspects deteriorating, independently of the resolution of initial problems. Conversely, a positive physical or psychological evolution may lead to the evolution of the other. Thus, reversing the negative trend for just one system component can delay, completely arrest the spiralling down, or transform it into an upward spiral, improving the patient's condition. In addition, for people undergoing severe COVID-19, the return to normal life could be destabilizing and memories that arise from their crisis state may trigger Post-Traumatic Stress Disorder (PTSD). Health and psychosocial professionals hold an important role both in post-hospital care and in secondary prevention, i.e. prevention of relapse and re-hospitalization. Physical rehabilitation work must take these psychological factors into account, in the same way that any psychological follow-up is supposed to consider physiological factors.

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\* Corresponding author at: Institut psycho-judiciaire et de psychopathologie (IPJP), Institute of Forensic Psychology and Psychopathology, centre hospitalier de Cadillac, 89 rue Cazeaux Cazalet, 33410 Cadillac, France.

E-mail address: [jean\\_pierre\\_bouchard@yahoo.fr](mailto:jean_pierre_bouchard@yahoo.fr) (J.-P. Bouchard).

<https://doi.org/10.1016/j.amp.2021.12.014>

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R É S U M É

**Mots clés :**  
COVID-19  
Épidémie  
Patients post-COVID sévère  
Pandémie  
Prise en Charge Psychologique  
Réadaptation respiratoire  
Réhabilitation pulmonaire  
SARS-CoV-2  
Spirale descendante  
Trouble Stress Post-Traumatique (TSPT)

Cet entretien porte sur l'état clinique médicopsychologique des patients atteints de COVID-19 sévère et sur leur réadaptation respiratoire. Pour ces patients, les séquelles de l'attaque virale et de la réaction immunitaire sont importantes et apparentes dans les tests fonctionnels et les imageries médicales. Elles persistent souvent quelques mois après la sortie des soins intensifs. Le virus SARS-CoV-2 provoque des atteintes des muqueuses bronchiques et alvéolaires. Le circuit de l'oxygène dans le corps peut être découpé en trois maillons imbriqués: l'ensemble de l'appareil respiratoire, le système cardiovasculaire, les muscles et le métabolisme énergétique. Ces systèmes fonctionnent en interdépendance. Lorsqu'il y a une défaillance de l'un des éléments, les autres sont touchés, pouvant amener l'ensemble à une décompensation. La décompensation respiratoire désigne la défaillance ou l'incapacité du système à fonctionner. Les patients sont hospitalisés en réanimation et bénéficient d'une supplémentation en oxygène, d'un support ventilatoire pour compenser la fatigue des muscles respiratoires et d'un traitement médicamenteux visant à réduire les symptômes et à lutter contre les infections acquises. À la sortie de l'hospitalisation, les patients post-COVID-19 sévère se trouvent dans un état physique et psychologique fébrile. La sensation vécue par ces personnes est celle d'une fatigue physique et mentale ; autrement dit, l'incapacité de trouver des ressources suffisantes pour effectuer des activités simples. Cette fatigue est vécue comme une dépression, une sensation qui elle seule risque d'aspérer le patient dans une spirale descendante : soit d'une fatigue en une absence de motivation, puis de sédentarité en déconditionnement musculaire. Ainsi, il y a un lien étroit qui existe entre progrès physique et renforcement psychologique, les deux sont interdépendants, un déclin dans l'un risque d'entraîner l'autre, mais, à l'inverse, une évolution positive dans l'un fait évoluer l'autre. Se rendre compte de l'amélioration de l'état physique permet de nourrir sa motivation et de trouver de l'énergie permettant de continuer à être physiquement actif. Le travail de réadaptation physique doit tenir compte de ces facteurs psychologiques, de la même manière que tout suivi psychologique doit tenir compte des facteurs physiologiques. Pour les personnes subissant un COVID-19 sévère, le retour à la vie normale peut être déstabilisant et les souvenirs de leur état de crise peuvent déclencher un syndrome de stress post-traumatique (SSPT). Les professionnels de la santé et les psychologues jouent un rôle important dans les soins post-hospitaliers et dans la prévention secondaire, c'est-à-dire la prévention des rechutes et des ré-hospitalisations.

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## 1. Introduction

COVID-19 has been impacting our daily lives for more than two years now [4–6,9,14,19,22,28]. This Pandemic has been characterized from the beginning by emergency: the state of emergency declared by the authorities and the parallel state of emergency for patients admitted to intensive care [4]. However, for the majority of COVID-19 patients there was no need to resort to intensive care [19,39]. For some, the disease was not severe and did not require hospitalisation, but the consequences and sequelae lasted long after the initial phase – 20 to 60 days – thereby giving rise to the terms “moderate COVID” and “long COVID”.

For many patients, medical investigations fail to explain symptoms such as fatigue, pain or breathing difficulties. Experience acquired to-date allows for better understanding of the disease and its daily consequences. Irrational apprehensions are reduced [19], knowledge evolves and can be assessed with hindsight. Certain preventive measures [12], originally exceptional, have become commonplace and know-how concerning the care of these patients is continuously being developed. Care that patients receive in the various stages of the disease is increasingly protocolized, from the hospitalisation phase in intensive care units till their discharge, in order to optimise management.

Thus, since 2020, the French High Authority for Health has defined and published a number of recommendations, including Quick Response Sheets [15], that are regularly updated, with emerging data, and in collaboration with professional organizations, learned societies and user associations. These are valuable tools for diagnosis and management of, e.g., fatigue in the long COVID, prolonged symptoms, prolonged somatic disorders, functional disorders, dysautonomic disorders, etc.

This interview is the first of two [20] in which Zeev Maoz, Isabelle Huet, and Jean Luc Sudres discuss the somatic and mental condition and the rehabilitation of severe COVID-19 patients that have undergone resuscitation. For these patients, symptoms are medically urgent and life-threatening. The sequelae of this viral attack and immune response are significant. They are apparent on functional tests and medical imaging and often persist for months after discharge from intensive care. For some of these patients, respiratory rehabilitation, aimed at physical strengthening and restoration of lost confidence, is necessary.

Zéév MAOZ is a psychologist at Saint-Orens Cardiovascular and Pulmonary Rehabilitation center (near Toulouse), where he provides psychological support to COVID-19 patients undergoing rehabilitation at the clinic. He is also an associate research professor at the University of Toulouse Jean-Jaurès in Toulouse. Isabelle Huet is a pneumologist at the Saint-Orens Rehabilitation center. She also has an independent practice and provides consultations at her office in Foix. Jean-Luc Sudres is a hospital psychologist. He is also a Professor of psychology at the University of Toulouse Jean-Jaurès.

## 2. Interview

### 2.1. Jean-Pierre Bouchard: Who are the severe COVID-19 patients

**Zeev Maoz and Isabelle Huet:** Many of the severe COVID-19 patients are people who did not have pre-existing chronic disease diagnoses, although some already had significant risk factors or background diseases with which they live fairly normally.

Among risk factors [16,34], we find classic ones, such as obesity, smoking, alcohol and substance abuse, but these are co-morbid

with psychosocial risk factors, such as loneliness, sedentary lifestyle, depression, and mental pathologies.

These at-risk people did not necessarily consider themselves as such before COVID-19. They were able to go about their daily lives without necessarily feeling the sword of Damocles hanging over their heads. They differ, in that, from the chronic respiratory disease population, who were aware of the imminent danger [8,14] that COVID-19 presents for them, and, consequently, whose rate among hospitalized patients was – curiously – lower than expected [13,14].

For some people with risk factors, the pandemic induced a dynamic of change. For many others, it increased their anxiety level and generated social withdrawal [23,27,29,38]. Optimism and positive thinking may play important protective roles in maintaining psychological health in those conditions [21]. Stress induced by the COVID-19 pandemic, and social isolation created by the successive lockdowns [36], have increased, for some, risk behaviours, given that the sources of daily pleasures have decreased in parallel [6].

For many, the only risk factor was age. The steady increase in life expectancy and quality of care, as well as hygiene rules, have enabled a whole generation of seniors (especially those aged 75 and over) to live in physical comfort and to maintain activities that were once reserved for much younger people, sometimes through short periods of stay in the medical system.

The pandemic has challenged some of the medical and technological progress, threatening to set the clock back and reflecting for some people a destabilizing image of their impending death. It forced these frail people to be aware of their health status, almost in a quantified way, with statistics of hospitalizations and deaths. They could no longer avoid facing their frailty.

During the first wave, many people found themselves in emergency hospitals with complications, unfortunately too often leading to death [33]. Medical actors were too often helplessly facing the extinction of people whom they did not consider ill or at least not seriously ill.

## 2.2. Jean-Pierre Bouchard: How does the SARS-CoV-2 virus affect severe COVID-19 patients' bodies?

**Isabelle Huet:** To understand the condition of COVID-19 patients, it is necessary to describe the affected organs, and the oxygen cycle in the body. Schematically, the oxygen cycle can be divided into three interlocking systems: the entire respiratory system, cardiovascular system, and the muscular energy metabolism. These systems are interdependent: failure in one affects the others, which can lead to decompensation. The conductor of the orchestra is the brain, through automatic ventilatory control at the level of the brain stem and voluntary control at the cortical level.

Our lungs are a complex system comprising air ducts, viz. bronchi, and pulmonary alveoli. It is through them that oxygen enters the bloodstream. The role of the lungs is to allow gas exchange, allowing the diffusion of oxygen in the blood and the evacuation of carbon dioxide during exhalation. To achieve this action the pulmonary system has several functional parts: the thoracic cage which allows for opening of the lungs and entry of air by a mechanical action via the respiratory muscles, the diaphragm, intercostal muscles and even abdominal muscles, and the lung itself, which allows the diffusion of oxygen via surface contact between blood capillaries and air, which will diffuse through the alveolar wall. Failure of any one of these parts will destabilize the whole pulmonary function, thus the absorption of oxygen or evacuation of carbon dioxide.

The second link in the chain is the cardiovascular system, which ensures circulation. Oxygen attached to hemoglobin in the red

blood cells circulates throughout the body to reach the various organs. Hypoxemia, i.e. low level of oxygen in the blood, can lead to hypoxia – low level of oxygen in perfused organs. This results in functional fatigue, which leads to organ dysfunction and even tissue death. The body protects its vital organs, which are the brain and heart, by privileging distribution of blood, in order to maintain oxygen levels, to prevent cardiac or cerebral infarction whose outcome could be fatal.

Lastly, the third part in this system is effectors: the muscles, which contain mitochondria, the cell's energy factories, allowing cellular respiration in the physiological sense, i.e. the use of oxygen to produce energy necessary for organs to function. For muscles, this energy is used to generate bodily locomotion. The heart muscle will be able to pump a volume of blood to match metabolic demand.

The SARS-CoV-2 virus damages bronchial and alveolar mucous membranes, resulting in bronchial tubes becoming clogged with mucus, which makes breathing difficult. Thickening of the alveolar walls leads to a loss of elasticity of the lung and, consequently, the effort required to breathe increases. Additionally, the thickening of the alveolar wall increases oxygen transit time and leads to hypoxemia, and consequently lower partial pressure of oxygen in the blood.

Respiratory decompensation refers to the failure or inability of the system to function. Systemic inflammation leads to an increase in metabolic demand which leads to an increase in ventilatory demand to provide more oxygen. When oxygen is not delivered well, respiratory muscles used for this extra effort become exhausted. This condition is not specific to patients suffering acute respiratory distress syndrome (ARDS) with COVID-19 lung disease, but is present in patients with other chronic respiratory pathologies, such as bronchitis or chronic obstructive pulmonary disease (COPD) [7], who end up in aggravated circumstances.

Prognosis of patients depends largely on their health prior to hospitalization, and risk factors. A variety of medical care procedures, of varying degrees of intrusiveness, are used to help patients with dysfunctional respiratory systems, including drug therapy, and interventions to help maintain vital systems. Patients admitted to intensive care units receive oxygen supplementation, ventilatory support to compensate for respiratory muscle fatigue, and drug therapy to reduce symptoms and control acquired infections.

## 2.3. Jean-Pierre Bouchard: What are the procedures and goals of Assisted or Controlled Ventilation?

**Isabelle Huet:** In the acute phase of COVID, especially when the virus is still active, the goal of respiratory care is to provide sufficient oxygen to the body despite lung failure. Therefore, some patients receive respiratory support with assisted ventilation, i.e. via humidified nasal high-flow devices.

Assisted ventilation by way of inspiratory support reduces fatigue and improves exchange of gases. Thus, oxygen level in the blood (PO<sub>2</sub>) remains sufficient to allow organs to function, and above all, during this phase, to fight against Coronavirus and other pathogens, and to rebuild.

Controlled ventilated patients are anaesthetized, hospitalized in resuscitation units, and are regularly monitored for heart rate, blood pressure, oxygen levels, and body temperature. In addition, carbon dioxide and oxygen levels are measured via blood samples.

Tracheostomy is used when a patient underwent several unsuccessful attempts to breathe independently without the aid of a non-invasive machine, but also for patients with complications needing prolonged support in intensive care. The advantage of a tracheostomy is that the patient can be awakened from an

anesthetic-induced coma, and be more active and communicative, even if not always verbally.

Invasive techniques carry potentially infectious and functional side effects. The work of the respiratory muscles during Assisted or Controlled Ventilation (respiration) is replaced by a machine, resulting in a loss of muscle mass and efficiency. One key challenge of oro-tracheal intubation is prevention, or control, of bacterial infections, particularly of the lungs. This complication can delay a patient's recovery and prolong the duration of respiratory support.

The term 'weaning' is used to describe the process of reducing ventilatory support. Typically, 40% of the invasive breathing period is devoted to weaning. This is a graded process, which progresses according to the patient's condition, as assessed by various criteria and procedures. Repetitive attempts at spontaneous breathing, with the tube in place, allow for gradual progress, while assessing independent breathing capacity and applying minimal support. For example, initially a patient may be ventilated for two hours, then weaned for two hours. Intervals are incremented as the patient improves. Objective criteria allow resuscitators to detect respiratory muscle fatigue and thus determine the potential for extubation. This process can take from a few days to a few weeks, depending largely on the severity of the patient's condition.

Before weaning off of invasive ventilation, it is necessary to stop the anaesthesia. At this stage, the patient cannot speak because the ventilation tube passes between the vocal cords. They are unable to express suffering and are in a difficult physiological and psychological state. Psychiatric medication is often necessary to help cope with this state.

When patients begin to overcome the disease they are transferred to intensive care. They are able to breathe independently, but this is not a satisfactory respiratory process. As a result, many patients, even after extubation, may need non-invasive ventilatory support, and will have difficulty performing simple activities, such as walking slowly or toileting.

#### 2.4. Jean-Pierre Bouchard: When can a patient be discharged from intensive care? What is their physical condition by then?

**Isabelle Huet and Zeev Maoz:** Discharge from intensive care is conditioned on the patient's ability to maintain vitality and to progress without invasive medical assistance. At discharge, patients are considered cured of COVID, but are still febrile. Many must remain on oxygen therapy, possibly with the aid of portable devices, for some time before their lungs improve to the point where they no longer require respiratory support.

The severity of the respiratory impairments varies from patient to patient. Inflammation of the lining of pulmonary alveoli regresses slowly, and in rare cases will retain a thickening leading to a decrease in lung capacity. Although there are millions of healthy alveoli, their ability to compensate for damaged or eliminated alveoli is a gradual process that can last up to several months. If damage to the pulmonary alveoli remains significant, the patient will benefit from the introduction of oxygen therapy. The aim of this is to increase the oxygen level in the inspired air by enriching it.

Physical weakness in recovering severe COVID-19 patients has two origins: one is a direct result of COVID-19 with pulmonary sequelae due to activation of the immune system and inflammatory processes, and the other is physical weakness and deconditioning due to long care. Being bedridden, unable to move for a long period of time, inevitably creates complications that may lead the patient into a downward spiral [31], with multiple health aspects deteriorating, independently of the resolution of the initial problem.

Failure due to respiratory pathology results in insufficient oxygen levels in the blood – low saturation, or hypoxemia – and fatigue of the muscles, including the respiratory muscles. Chronic or acute inflammation is directly responsible for the decrease in muscle performance. The sensation experienced by the patient is that of physical and mental fatigue; in other words, the inability to find sufficient resources to perform simple activities. Performing the same activities as before the onset of disease is more difficult, because muscular output is less efficient.

We must remember that muscles are an important link in the system. As a result of their inactivation, they lose capacity and atrophy, and this applies also to the heart muscle. The respiratory muscles weaken and the functional capacity of the lungs is reduced. The exchange of gaseous air deteriorates, the alveoli lose their elasticity and their ability to resist pathogens.

As a patient loses their physical and respiratory capacities this fatigue is experienced as depression, a sensation which alone risks leading into a downward spiral: from fatigue to lack of motivation, then from sedentariness to muscular deconditioning. Being sedentary leads to increasing fatigue and demotivation. This downward spiral is accelerated by feelings of stagnation, due to the fact that the patient does not see themselves progressing, or even regressing and losing capacities.

Reversing the negative trend of one of the functional links can delay or even completely stop or transform the downward spiral into the upward spiral that improves the patient's initial condition. For example, post severe COVID-19 patients discharged from intensive care must quickly reactivate their muscles. This is one of the primary objectives of any cardiopulmonary rehabilitation [17].

Some hospitals and general clinics offer their patients initial supervised rehabilitation sessions, others do not have this capacity. Of course, they can refer these patients to specialised clinics, such as the Clinique de Saint-Orens, but others are directly discharged home.

The respiratory rehabilitation program targets the following three aspects of patient deconditioning [13]:

- improvement of respiratory capacity, through reinforcement of the respiratory muscles, the learning and practice of directed breathing, the practice of the lung decluttering, etc.;
- improving the perception of breathlessness, in order to recondition it through a positive experience, to the ventilation levels necessary to optimize muscle function;
- rehabilitation is aimed at strengthening the body and general muscles as well as physiological, psychological and social capacities;
- body activation of post severe COVID-19 patients must be done gradually, by movements adjusted to the state of patients. Initially, simple movements or activities such as walking, or even getting out of bed, may be adequate to start the recovery dynamics, due to their cardiopulmonary activation. Excessive activation can make patients vulnerable, exposing them to physical or psychological dangers.

#### 2.5. Jean-Pierre Bouchard: What is the role of psychological support during the respiratory rehabilitation process?

**Zeev Maoz and Jean-Luc Sudres:** If it is necessary to activate the patients, this process might seem at first contrary to natural tendency: the body's self-preservation instinct tends towards energy conservation. Thus the patient, paradoxically, does not want to activate their weakened body. This contradiction between sensations and the medical-psychological prescription is a source of anxiety and uncertainty about the path to recovery.



It is precisely at these moments that early psychological help is needed, aimed at self-cohesion, as well as restoration of the self-image and the body. Such help includes learning of sensory-motor actions, as well as constant, emphatic, non-verbal communication, and unfailing support from the nursing teams, in accompaniment to daily challenges.

Physiological recovery and psychological reinforcement are closely linked. The two are interdependent: a decline in one risk detriment to the other, and conversely, a positive evolution in one leads to the evolution of the other. Physiological rehabilitation work must take psychological factors into account, in the same way that any psychological follow-up is supposed to take physiological factors into account.

Given a slow and irregular progress, the line blurs between feelings of falling into a negative spiral, abandoning all effort, and seeing oneself engaged in a positive upward spiral. Psychological perception of the situation plays an important role, leading to interpretations of body sensations and emotions – pain, fatigue and mood swings. This psychological spiral can be borrowed from the model described by Beck [10]. It includes different psychological elements, such as self-confidence, or confidence in one's body, and ability to succeed and find pleasure.

The more confident a person is in their physical abilities, the more they will seek to activate their body, and find pleasure in this bodily and social activation. If, on the other hand, the person is fearful of their body, they would tend not to want to activate it, while not believing that their activities could produce pleasures. They may even experience physical pain.

Behind this dynamic lies a central psychological aspect that is part of any rehabilitation work: the question of motivation, or conversely, demotivation and depression. Motivation, also popularly designated “willpower” or “hope”, is a stable and consistent basis that allows a person to focus on their progress, leaving aside the difficulties.

Being aware of improvement in physical condition allows one to feed their motivation, and to find energy to continue being physically active. However, this physical progress is, especially at the beginning, slow and not always perceptible.

Thus, motivation is a concept that often requires specific psychological work to better exploit it, clarify it and allow it to be nourished. Such psychological work with the patient breaks down this notion into multiple facets and objects. Numerous small motivations are linked to moments of pleasure, to the love of loved ones, to objectives to be reached in the future, but also to fears, pains or losses that the person wishes to avoid. Identifying these different motivations helps to strengthen the ability to resist difficulties and moments of weakness. It is often enough to remember one or two concrete motivations – for this, a simple photo is very useful – to resist energy or morale dips.

## 2.6. Jean-Pierre Bouchard: How would you describe the psychological condition of post severe COVID-19 resuscitated patients?

**Zeev Maoz:** Many severe COVID-19 patients were, before their hospitalization, in a rather optimal, active somatopsychic state. This can constitute an important resource, or sometimes, a source of potential trauma [30].

From one day to the next, a person who would be vigorous, active and skillful finds themselves dependent, bedridden, and in an infantile position, with a weak body unable to breathe and perform even basic daily tasks. For these patients the degradation is so rapid that they often go from one state to another without understanding what is happening. They experience new and unfamiliar, anxiety causing sensations, along with the question of how long this state will last. In this respect, they

differ from patients with COPD or chronic respiratory disease, who know their illness, since their lives are punctuated by regular hospital stays, sometimes in intensive care. The latter see, from a certain stage onwards, deterioration gradually taking hold. They are aware of the progression of the disease, and expect it to evolve, whether slowly or rapidly, towards a possible oxygen therapy.

During intensive care, severe COVID-19 patients were bedridden, anesthetized and resuscitated for days or weeks. An episode of waking up from resuscitation often leaves difficult psychological traces, especially for intubated people. It creates memories related to the helplessness and the incapacity to carry out the simplest and banal actions, like speaking. This state induces a sensation of physical regression, which threatens to become mental, towards early childhood. At the same time, there is a deep fear of being invalid in old age, which for many of these people is near. The patient is bedridden and totally dependent on others, often young caregivers. They are unable to express suffering and are subjected to care that deeply affects their dignity.

Intubated, ventilated patients were often put under general anesthesia. Different drugs are used during anesthesia, depending on its intensity, to protect the patient from pain and allow the body to fight the disease. These are usually strong opiates, producing complex brain states, which last after the anesthesia. After waking up, patients often report hallucinations, strange sensations, and having had nightmares during anesthesia or sedation.

Clinical experience shows a large proportion of these patients are negatively affected by these drugs. They experience a significant contradiction between reality and the imaginary world in which they were temporarily immersed. They find themselves unable to share or explain this experience, and then suffer anxieties, destabilization, and sometimes report feeling “crazy”. Some effects last for weeks. There is great fatigue or hyper-emotionality, which patients interpret as depression, whereas it is the effect of these substances on the emotions – they cry easily – without the sadness that usually accompanies the depressive state.

Physical fatigue, due to muscular deconditioning but also deteriorated breathing, also contributes to this pseudo-depressive state. Indeed, depressed mood is one of the more prevalent psychological symptoms of post severe COVID-19 patients [31]. It consequently decreases the motivation to perform bodily movements, the desire to meet others, to speak or to engage in simple conversations. This motivational decline is also very similar to that encountered in a depressive state. Additionally, for some, regular or occasional feelings of anxiety [32] are triggered by the simple lack of breathing, leading to a state of panic.

Patients most surprised at this state are those who do not usually consider themselves depressed, and are generally active and sociable. They experience this state in an anxious way, and fear that they have, as a result of the illness or medical intervention, contracted another illness: a depression that will accompany them for life.

For these people, this hospitalization phase, whether short or long, creates parentheses that must be closed. But the psycho-physiological sensations do not help them turn the page on the disease, and returning to normal life, after leaving intensive care, can be destabilizing.

Memories that arise from the crisis state are likely to leave black holes in their history, which may trigger Post-Traumatic Stress Disorder (PTSD) [2,3]. Indeed, studies show that 25–30% of patients who have experienced severe COVID-19 would later develop significant PTSD symptoms [1,18,35].

This ratio is certainly high, yet it is unrepresentative of the difficult psychological state, which almost all resuscitation

patients go through. Given this experience, one would almost expect higher ratios.

It is likely that several factors related to the illness and its context may protect against the further development of psychological disorders. Those could be considered acquired protective factors, tools of self-care that are too often neglected – psychological care begins sometimes where we do not expect it.

The first factor concerns societal dynamics, referring to societal experience of the emergency state. Patients do not feel alone, abandoned in the face of personal illness. They are like soldiers in an army, in times of emergency. This feeling of belonging to an exceptional time can give rise to exceptional beliefs, which can, paradoxically, take on a protective role against psychological shock.

For some, the socio-cultural dynamic of over-mediatization, “fake news” and “infodemia” [25,28], or even a defensive perspective dynamic based on conspiracy theories [24,26], produce a protective effect. In this way, they only partially perceive themselves as responsible for their state, even when some risky behavior appears in their peri-COVID-19 history.

The second factor concerns the patient's personal history, referring to the personal feeling of being a survivor, which creates a specific, additional resilience inducing cognitive representation. The patient is happy to be alive in their pandemic journey, which increases their motivation to continue fighting. Their personal story is integrated within the collective history. By having put their vital prognosis at risk and by escaping, they acquire a new social status – that of a survivor.

The third factor describes the dynamics of the COVID-19 illness and recovery, referring to the progress of recovery once a patient is out of the potentially life-threatening zone. Even if the patient does not quickly, or at all, regain their pre-disease abilities, they can actually see their condition progress. The positive progression induces a surge of optimism, which plays an important role in their psychological reinforcement [21]. Most patients are aware of their condition right before entering the induced coma, some even leave verbal last minute instructions to the family. The positive feeling is increased by the gap between this hazardous situation and the fact they survived it.

### 2.7. Jean-Pierre Bouchard: What support networks do patients find when returning home?

**Zeev Maoz and Jean-Luc Sudres:** For most patients, family and close carers constitute the most important source of emotional and social support, and basis for physical and psychological reconstruction.

Some patients need to be provided with solutions concerning their living environment. These are usually people who already suffered from living conditions prior to hospitalisation or people whose support in their usual living environment was inadequate or lacking. They are integrated into community care. Medical follow-up is entrusted to local doctors, specialists, psychologists [40], private nurses, paramedical [37] and social workers and other community healthcare actors [1,11]. These actors have a role both in post-hospital care and in secondary prevention [12], i.e. prevention of relapse and re-hospitalization.

Alternatives to psychiatric care and hospitalization have emerged with telecounseling, with the mutualization of means and psychology specialties that respect the intimacy as well as autonomy and socialization of patients [4]. And then, as the history of any crisis/war shows, human creativity surprises us in its capacity to innovate.

### Disclosure of interest

The authors declare that they have no competing interest.

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