LONG COVID: WORKER REHABILITATION, ASSESSMENT OF WORK ABILITY AND RETURN TO WORK SUPPORT

1 Background

The emergence of the COVID-19 pandemic represents one of the greatest threats to public health to date. While prevention and treatment have been the focus of many studies, there is a growing body of evidence that COVID-19's long-term consequences persist, and continue to affect the health, well-being and work ability of survivors. The long-term consequences are multiple, affect both physical and mental abilities (Deer et al., 2021) and increase the risk of developing other medical conditions.

1.1 Defining long COVID

The World Health Organization (WHO) provides a definition, where long COVID involves 'the continuation or development of new symptoms 3 months after the initial SARS-CoV-2 infection, with these symptoms lasting for at least 2 months with no other explanation'. The term 'long COVID' is interchangeable with post COVID conditions (PCC) ([1]). Post COVID conditions (long COVID) have been included into the 10th and 11th edition of the WHO-defined International Classification of Diseases (ICD-10/ICD-11), as the global standard for recording health information and causes of death (WHO pages on emergency use of coding related to COVID-19). As early as September 2020, a set of additional codes were included in the ICD-10 upon request by Member States to document or flag conditions that occur in the context of COVID-19. The need for distinction between acute disease, late effects or lengthy course led to the neutral formulation 'post-covid'. According to the ICD-11,

> *'Post COVID-19 condition occurs in individuals with a history of probable or confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms, and that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others, and generally have an impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time'.*

The most commonly reported symptoms include fatigue, shortness of breath and cognitive dysfunction, but as many as over 200 different symptoms have been reported, with potential detrimental impact on health and quality of life (Davis et al., 2021).

In 2022, the US Centers for Disease Control and Prevention (CDC) defined long COVID as '*signs, symptoms, and conditions that continue or develop after initial COVID-19 infection*'. The term post COVID conditions (PCC) has been used interchangeably ([2]). The signs, symptoms, and conditions are present four weeks or more after the initial phase of infection, may be multisystemic; and may be relapsing - remitting and worsening over time, with the possibility of severe and life-threatening events even months or years after infection.

Long COVID is not one condition. It represents many potentially overlapping entities, likely with different biological causes and different sets of risk factors and outcomes. In July 2021, long COVID was added as a disability under the Americans with Disabilities Act (ADA), as a recognition of its capacity to cause lasting damage and health consequences ([3]).

([1]) See: https://www.who.int/europe/news-room/fact-sheets/item/post-covid-19-condition
([2]) See: https://www.cdc.gov/coronavirus/2019-ncov/long-term-effects/index.html
([3]) See: https://www.hhs.gov/civil-rights/for-providers/civil-rights-covid19/guidance-long-covid--disability/index.html#footnote10_0ac8mdc

1.2 Recognition of COVID-19 and long COVID as being of occupational origin across Europe

According to a recent publication by the European Statistical Office (Eurostat 2024), long COVID, as COVID-19 can be recognised as being of occupational origin, as an occupational accident, an occupational disease, or both, depending on the national legislation and practices. Overall, fewer countries recognise long COVID as of occupational origin compared to the situation for the recognition of occupational COVID-19. Long COVID of occupational origin can be considered as:

1. only an occupational disease;
2. only an accident at work;
3. depending on certain national criteria, an accident at work or an occupational disease.

According to the report based on a survey among Member States and a number of additional countries, the following countries recognise Long COVID as an

- Occupational disease: Bulgaria, Estonia, France, Croatia, Cyprus, Lithuania, Luxembourg, Hungary, Netherlands, Poland, Portugal, Slovenia, Slovakia and Switzerland.
- Accident at work: Italy and Spain.
- Both accident at work and occupational disease possible: Belgium, Germany, Latvia, Finland, Sweden and Norway.

Most of the countries restrict the recognition to healthcare and personal care workers. However, in some countries, it is not possible any more to obtain a recognition as of occupational origin of Covid-19. This also limits the scope for the recognition and compensation of long COVID cases.

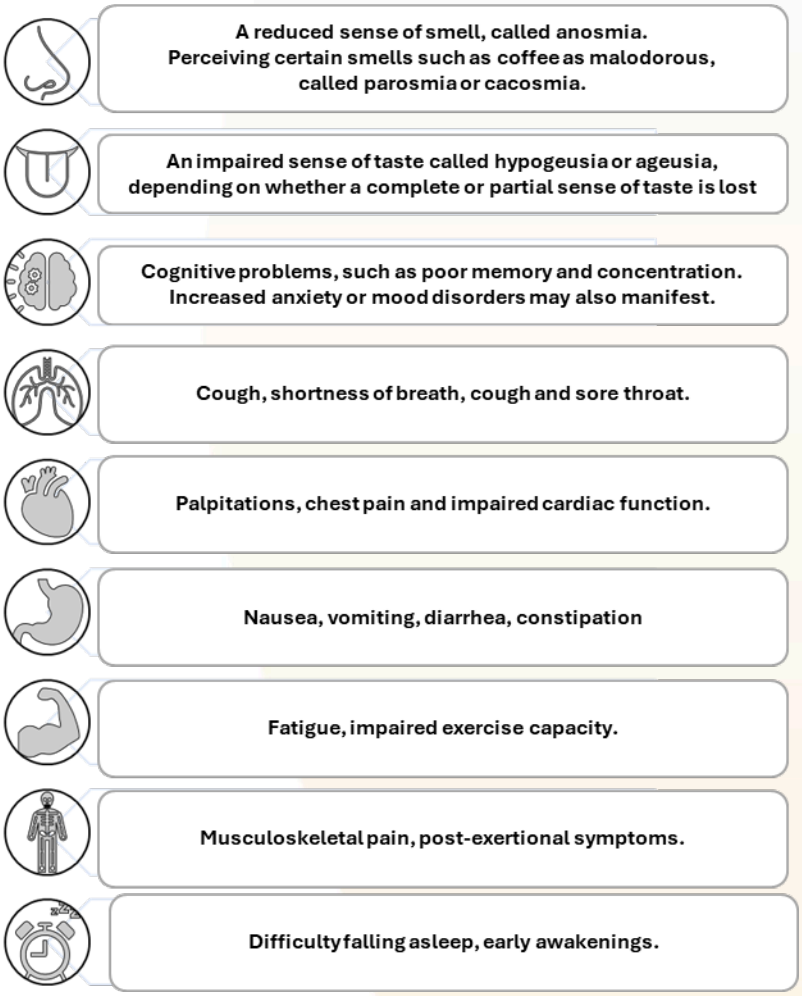
1.3 Long COVID presentations and their duration

Currently, there are no reliable predictors for how long COVID manifests, and the specific symptoms by which it may affect each patient, although research is continuously being updated, and efforts to create predictive models have been intensified (Sudre et al., 2021). Based on data from more than 800,000 COVID-19 patients, long COVID was found in 43% of those cases (Chen et al., 2022). There are several aspects of long COVID that are important factors to consider for rehabilitation and return to work (Moulac, 2023):

- Female sex (25-69 years of age) and previous hospitalisation have been identified as potential risk factors.
- Among long COVID patients, approximately 15% report symptom clusters for up to 12 months after the infection (Wulf Hanson et al., 2022). Several studies with the longest follow-up times to date, indicate that some symptoms may persist (Wahlgren et al., 2023). Long COVID should therefore be considered a chronic disease, with potential relapses and fluctuations.
- Several symptoms of long COVID may also mutually enhance their adverse effects. The persistent impairments and the resulting reduced capacity to work have mainly been studied in healthcare workers (Praschan et al., 2021).
- Vaccination against COVID-19 robustly reduces the prevalence of long COVID (Byambasuren et al., 2023).
- Long COVID may affect several body systems with a wide range of symptoms. It will not affect everyone in the same way: each affected person experiences long COVID differently, with regards to the symptoms involved, their development over time and their overall persistence.

The European Agency for Safety and Health at Work (EU-OSHA) has published a discussion paper that presents an overview of long COVID and its impact on the workplace (EU-OSHA, 2022a). A similar non-exhaustive account of possible symptoms can be found in a relevant WHO factsheet (WHO, 2022a). A summary of prevalent symptoms is also presented in Figure 1. Symptoms can affect any organ, but respiratory symptoms, fatigue and cognitive complaints are consistently identified across the literature and reviews of clinical studies (Deer et al., 2021; Davis et al., 2023).

Figure 1: Non-exhaustive list of long COVID symptoms



Source: George D. Vavougios

Frequent long COVID complaints such as fatigue, breathlessness and cognitive impairment are factors that can directly and severely impact occupational health and safety and can be readily and systematically identified and treated through rehabilitation (WHO, 2023). Long COVID can cause persistent impairments in work ability, restricting return to work and affecting quality of life for those concerned (Mandal et al., 2021; Tabacof et al., 2022). It was also shown to affect return to work even in mild COVID-19 cases, as far as 12 months after infection (Kisiel et al., 2022).

WHO and CDC have recognised the impact of long COVID on work ability and the return to work and suggest a bimodal approach of identifying long COVID characteristics and offering tailored rehabilitation. This review considers the impact of long COVID on physical and mental health, work ability, and, by extension, occupational health and safety. Long COVID patients´ rehabilitation prospects to ensure a safe return to work are described.

2 What are the challenges for effective rehabilitation?

Health systems, particularly in tertiary care became overloaded, and in many countries exhausted, during the pandemic, both regarding human personnel and resources. Long COVID is a 'pandemic' within a pandemic, and for rehabilitation to be effective, it must work with skill, care and equity. According to a WHO 2023 guideline, rehabilitation for long COVID should be individualised, and guided by specific symptoms and their persistence (WHO, 2023a).

There are several challenging aspects of long COVID for effective rehabilitation:

- Long COVID symptoms may be either under recognised by the patients (for example cognitive impairment) or underdiagnosed by physicians, thus delaying access to rehabilitation.

- Different long COVID symptoms may coexist or act synergistically (for example fatigue and cognitive impairment) (Ceban et al., 2022) and thus require multidisciplinary rehabilitation approaches.
- Workers of higher income are more likely to be accurately directed to rehabilitation services compared to workers of lower socioeconomic backgrounds (Pfaff et al., 2023). Even when a timely diagnosis of long COVID is made, workers with lower income may have limited access to rehabilitation services and individualised care (Harden et al., 2022).
- Certain symptoms may persist for several months and relapse (Davis et al., 2021). Even after extensive periods of sick leave and rehabilitation, long COVID may not have been resolved.

Currently, the effects of rehabilitation on long COVID are modest, and an extensive period of sick leave is often required. Research on novel rehabilitation approaches is continuing however, although most studies report on small sample sizes (Frisk et al., 2023).

An effective action plan on long COVID rehabilitation requires knowledge of long COVID. Data and feedback on the effectiveness of rehabilitation approaches and the impact on the occupational safety and health of those affected should be continuously and systematically collected and used to inform and adjust decision making.

3 National social security systems in Europe, the assessment of limitations due to long COVID and rehabilitation

Across Europe, post COVID outpatient clinics have been established to manage the rehabilitation of long COVID patients. A study reporting on 130 such centres across 26 European countries found that they employ multidisciplinary teams including physiotherapists, dieticians, nurses, psychologists, infectious disease specialists, psychiatrists, pulmonologists, cardiologists and neurologists (Valenzuela et al., 2022). The rehabilitation approaches were generally patient-oriented and tailored to each case. Notably, standard operating procedures were not uniform, and practice heterogeneity spanned countries and potentially centres; furthermore, most of these centres were associated with universities / research units.

Below are two examples, one from a northern and one from a southern European country, on how national social security systems in Europe deal with the assessment of long COVID rehabilitation needs, as well as the services that are provided by Sweden and Italy (WHO, 2021a).

3.1 Sweden

In Sweden, rehabilitation after COVID-19 was identified as a need as early as 2020. In September 2020, a national working group was set up to study COVID-19's post-acute consequences to provide guidance on rehabilitation and primary care practice and to disseminate knowledge. The assessment of long COVID is typically done through questionnaires that document potential health complaints, and a multidisciplinary team is responsible for rehabilitation, centred on the patient needs. Following a COVID-19 infection, at least one clinical follow-up is recommended by the Swedish Association of Local Authorities and Regions. Long COVID patients are broadly divided into two major groups:

1. The first group involves those previously hospitalised due to COVID-19. After completion of a questionnaire, patients are further ranked based on the severity of their problems and the most suitable rehabilitation approach and environment identified:
    - Those experiencing severe problems are called into the clinic.
    - Those experiencing moderate problems are contacted via telephone, where their specific rehabilitation needs are further determined.
    - Those with mild problems may be followed-up in a primary care setting.
2. The second group involves those referred to rehabilitation services from primary care when
    - Rehabilitation efforts have been insufficient in the community setting.
    - Specific or specialised medical care is required.
    - There is a need for neuropsychological evaluation.

3.2 Italy

In Italy, a national report on 124 long COVID care centres (Floridia et al., 2022) indicates that multidisciplinary teams employing multiple medical specialties and healthcare professionals were set up. While some variability among centres is reported, these services use questionnaires and scales to document and quantify long COVID symptom severity and the impact on quality of life. While not uniformly adopted across centres, WHO's case report form for the post COVID-19 condition has also been used (WHO, 2021b). Patient referral for long COVID follows similar pathways to Sweden, that is:

- Follow-up visits for previously hospitalised patients.
- Referrals from primary care or from healthcare professionals.
- Referrals from other types of regional health services.
- Rehabilitation services are provided both through hospital day care and as outpatient services, where appropriate. To a lesser extent, telemedicine approaches are also available. Furthermore, aside from the use of scales appropriate for reported symptoms, other medical tests including blood work up, lung function tests and computerised tomography are readily available.

3.3 The impact of long COVID on work ability and National Social Security frameworks across Europe

The European Parliament's Special Committee on COVID-19, convened on March 9th, 2023, identified several unmet needs and therefore targets for the management of long COVID and the necessary steps to be taken by national social security systems (Moulac et al., 2023). In their report, social security provisions were found to greatly vary from state to state, the result being an early return to work for some long COVID patients, despite significant disability.

A significant step towards addressing these issues by national social security systems is the recognition of COVID-19 as an occupational disease under the European schedule of occupational diseases ([4]). This recognition serves to link specific impairments and overall disability with current frameworks on the return to work and healthcare benefits.

As an example, in Italy, there are specific steps for workers and employees to link occupational diseases with specific benefits, according to the MISSOC database ([5]):

- Workers suffering from occupational diseases must inform the employer within 15 days of the appearance of said illness.
- In turn, the employer must notify INAIL (Italy's National Institute for Insurance against Accidents at Work), within 5 days of receipt of the corresponding medical certificate. Notification within this time is not binding, and a period of three years is available to register an occupational disease and avail social security benefits and access to rehabilitation services.
- According to MISSOC's report for social security rights in Italy regarding occupational diseases, the minimum period of exposure for risk compensation claims is estimated through a list of occupational diseases. If the illness contracted is not in said list, then it is the potential beneficiary's responsibility to prove a causal link between said illness and work activity.
- Upon determiningthat the worker is affected by an occupational disease, he/she is entitled to access to rehabilitation services until deemed fit to work. The recognition of COVID-19 as an occupational disease has therefore provided immense impetus for rehabilitation of affected workers.

([4]) Commission recommendation (EU) 2022/2337 of 28 November 2022 concerning the European schedule of occupational diseases. See: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32022H2337

([5]) The EU's Mutual Information System on Social Protection (MISSOC) provides detailed, comparable and regularly updated information about national social protection systems in English, French and German. MISSOC publishes twice a year (January and July) updated information on the social protection systems in the 27 EU Member States plus Iceland, Liechtenstein, Norway and Switzerland. See: https://ec.europa.eu/social/main.jsp?catId=815&langId=en

- Rehabilitation progress, residual impairment and work ability are evaluated by regular medical examinations.
- In the event of permanent disability, whereby constant assistance to carry out basic activities of daily living is required, financial support is also available and individually determined.

More examples of national social security system approaches on occupational disease, worker rights and worker and employer obligations for each European country can be found on MISSOC's website.

A recent study (Calvo Ramos, S. et al., 2024) has estimated the impact of long COVID on labour supply and on productivity, which is difficult to determine with precision. The estimates suggested, however, a prevalence of long COVID cases of around 1.7% of the EU population in 2021 and 2.9% in 2022, resulting in a negative impact on labour supply of 0.2-0.3% in 2021 and 0.3-0.5% in 2022. With a population size of 447 million (all age groups), this would mean that on average, around 7.6 million people in the EU would have been affected by long COVID at any point in time over 2021, and 13 million in 2022. The study also concludes that long COVID could have caused an output loss of 0.1–0.2% in 2021 and 0.2–0.3% in 2022. This effect was not expected to be the same across all economic sectors and appeared to more strongly affect women as well as the health care, long-term care and education sectors.

4 How could work ability impairments from long COVID be assessed?

The assessment of long COVID complaints is continuously updated, as more knowledge is gained. Currently, using the WHO Case Report Form for PASC (WHO, 2021b) is a reasonable approach to actively and thoroughly documenting a wide range of symptoms of long COVID.

Regarding work ability, there is no specific marker or index formally adopted and suggested by either WHO or the EU. Typically, as previously mentioned, long COVID is diagnosed by a physician based on symptoms and a history of COVID-19, disability is assessed and an individualised assessment and an estimation of whether the patient is fit to work is made.

A refinement of this procedure is proposed below (Figure 2), using standardised scales that may help quantify overall capacity to work as well as individual symptoms affecting work ability, listed in Table 1. The proposed process should also provide feedback for cases where long COVID may relapse. In some cases, return to previous ability may not be feasible. It is therefore important to provide:

- **An overall estimate of work ability** preferably by a standardised scale, such as the Work Ability Index (WAI) (de Zwart et al., 2002, Ilmarinen et al., 2007). The WAI is an instrument used in clinical occupational health and research to assess work ability during health examinations and workplace surveys. The index is determined based on the answers to a series of questions which take into consideration the demands of work, the worker's health status and resources. The worker completes the questionnaire before the interview with an occupational health professional who rates the responses according to the instructions. The WAI is a summary measure of seven items. These are current work ability compared with the lifetime best, work ability in relation to the demands of the job, number of current diseases diagnosed by a physician, estimated work impairment due to diseases, sick leave during the past year/12 months, own prognosis of work ability two years from now and mental resources.
- **Estimation of physical activity** using scales such as the Duke Activity Status Index (DASI) ([6]) (Hlatky et al., 1989) and the Visual Analogue Scale to Evaluate Fatigue Severity (VAS-F) ([7]) (Lee et al., 1991) tools.

([6]) The Duke Activity Status Index is an assessment tool used to evaluate the functional capacity of patients with cardiovascular disease, such as coronary artery disease, myocardial infarction and heart failure. It is a 12-item questionnaire that assesses daily activities such as personal care, ambulation, household tasks, sexual function and recreation with respective metabolic costs. Each item has a specific weight based on the metabolic cost (MET).

([7])The visual analogue scale to evaluate fatigue severity (VAS-F) consists of 18 items relating to the subjective experience of fatigue. Each item asks respondents to place an 'X, representing how they currently feel, along a visual analogue line that extends between two extremes (for example from 'not at all tired' to 'extremely tired').

- **Estimation of cognitive impairment and mood** using scales such as the Montreal Cognitive Assessment (MoCA) ([8]) (Nasreddine et al., 2005), or the Hamilton Anxiety[9] (HAM-A) (Thompson, 2015) and Depression ([10]) (Hamilton, 1960) rating scales.
- Where appropriate, for example for professional drivers, other measurements may also be relevant for assessing work ability that are otherwise not accounted for by the scales mentioned here; for example sleepiness in professional drivers, which can be assessed by the Epworth Sleepiness Scale (ESS) ([11]) (Johns, 1991).

Table 1: Scales assessing specific symptoms relevant to long COVID and when to consider them

Scale	When to consider it?
Work Ability Index	A worker's ability to perform is compromised by long COVID
Duke Activity Status Index	Long COVID symptoms affect physical condition
Visual Analogue Scale to Evaluate Fatigue Severity (VAS-F)) Fatigue Severity Scale ([12])	Workers experiencing excessive fatigue.
Modified Borg Dyspnoea Scale	Breathlessness related to long COVID
DePaul Symptom Questionnaire – 2	Workers experiencing worsening of long COVID symptoms after exertion
Visual Analogue Scale Pain (VAS)([13])	Workers experiencing acute and chronic pain associated with long COVID
Epworth Sleepiness Scale	Workers experiencing excessive daytime sleepiness
The Orthostatic Discriminant and Severity Scale (ODSS) ([14])	Workers that have orthostatic intolerance and experience discomfort and are consequently unable to stand for prolonged periods of time
Montreal Cognitive Assessment	Long COVID symptoms affect cognition

([8]) The Montreal Cognitive Assessment (MoCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains: attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations and orientation.

([9]) The Hamilton Rating Scale for Anxiety (HAM-A) was one of the first rating scales developed to measure the severity of anxiety symptoms and is still widely used today in both clinical and research settings. The scale consists of 14 items, each defined by a series of symptoms, and measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety).

([10]) The Hamilton Rating Scale for Depression (HRSD), also called the Hamilton Depression Rating Scale (HDRS), sometimes also abbreviated as HAM-D, is a multiple-item questionnaire used to provide an indication of depression, and as a guide to evaluate recovery. Originally published in 1960, it was revised in 1966, 1967, 1969 and 1980. The questionnaire is designed for adults and is used to rate the severity of their depression by probing mood, feelings of guilt, suicide ideation, insomnia, agitation or retardation, anxiety, weight loss and somatic symptoms.

([11]) The ESS is a self-administered questionnaire with 8 questions. Respondents are asked to rate, on a 4-point scale (0-3), their usual chances of dozing off or falling asleep while engaged in eight different activities. The higher the ESS score, the higher that person's average sleep propensity in daily life, or their 'daytime sleepiness'. It is also used to diagnose obstructive sleep apnoea. See: https://epworthsleepinessscale.com/about-the-ess/

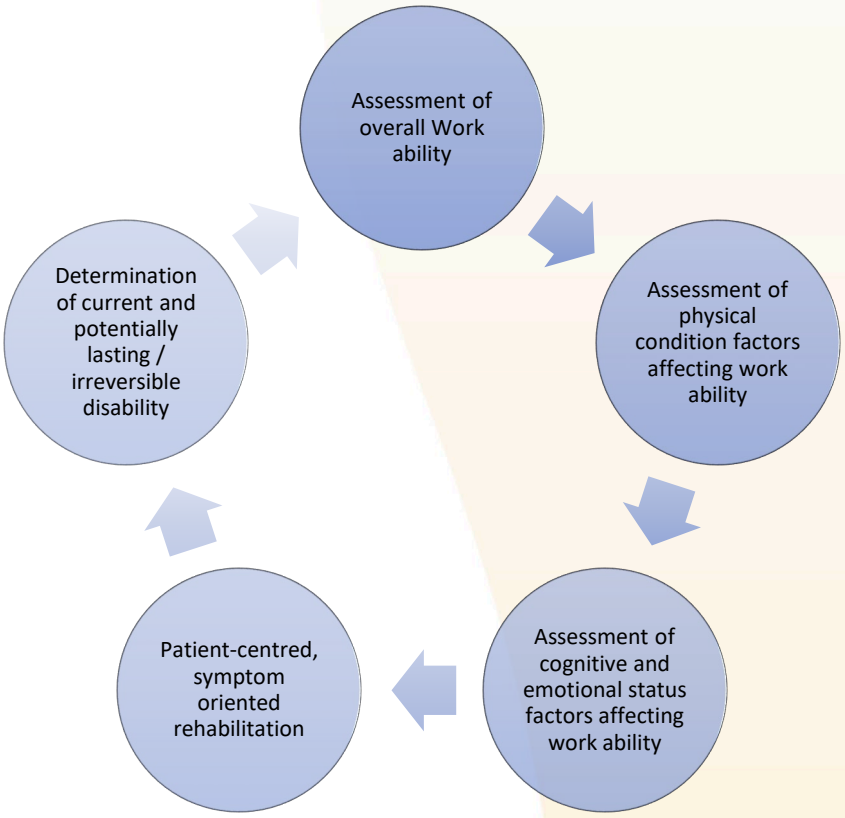
([12]) The Fatigue Severity Scale (FSS) is a self-reported measure designed to capture the impact of fatigue on a person's daily functioning and quality of life. A set of predefined statements are answered by a Likert-scale ranging from "strongly agree" to "strongly disagree".

([13]) The Visual Analogue scale (VAS) is a pain rating scale first used by Hayes and Patterson in 1921. Scores are based on self-reported measures of symptoms that are recorded with a single handwritten mark placed at one point along the length of a 10-cm line that represents a continuum between the two ends of the scale –'no pain' on the left end (0 cm) of the scale and the 'worst pain' on the right end of the scale (10 cm). The values can be used to track pain progression for a patient or to compare pain between patients with similar conditions. In addition to pain, the scale has also been used to evaluate mood, appetite, asthma, dyspepsia and ambulation.

([14]) The Orthostatic Discriminant and Severity Scale (ODSS) scale was developed to discriminate the origin of common, non-specific symptoms such as dizziness, light-headedness and fatigue as either related to orthostatic intolerance or not.

Scale	When to consider it?
Hamilton Rating Scale for Anxiety	Long COVID symptoms include anxiety
Hamilton Rating Scale for Depression 6-Item Hamilton Depression Rating Scale ([15])	Long COVID symptoms include depression

Figure 2: Adapted procedure to assess workers´ work ability, impairments and the effects of rehabilitative measures



Following these assessments, the occupational health and safety (OSH) expert, normally the occupational physician or health service, can **determine a worker´s capacity to work and provide specific goals for cognitive and physical rehabilitation of long COVID complaints.**

It is also important to consider that this process may require re-evaluation, especially in cases where long COVID may relapse, or new symptoms arise. The use of scales would allow the comparison between scores, where available, and help to objectively document improvement or deterioration.

The use of standardised scales should complement other medical tests and results could prompt further action (for example, a severely impaired MoCA[16] score should prompt a neurology referral and neuroimaging, even if other indices or overall work ability appear to be adequate).

([15]) The HAM-D_6 covers the following core depressive symptoms: depressed mood (item 1), feelings of guilt (item 2), loss of interest (item 7), psychomotor retardation (item 8), psychic anxiety (item 10), and general somatic symptoms (item 13).
([16]) See footnote 8.

5 What strategies, policies, initiatives, good practices and steps could be followed for the assessment and effective rehabilitation and return to work of workers suffering from long COVID?

Our current understanding of long COVID is that of an individual experience, which includes symptoms, duration and the possibility of relapses, and varies from person to person. Current approaches in long COVID rehabilitation address related symptoms and health issues in a manner similar to those of other, comparable health conditions (WHO, 2023b). Impairment caused by long COVID is considered similar to the effects of other chronic diseases, and an emerging body of studies has shown that they are amenable to similar rehabilitation measures.

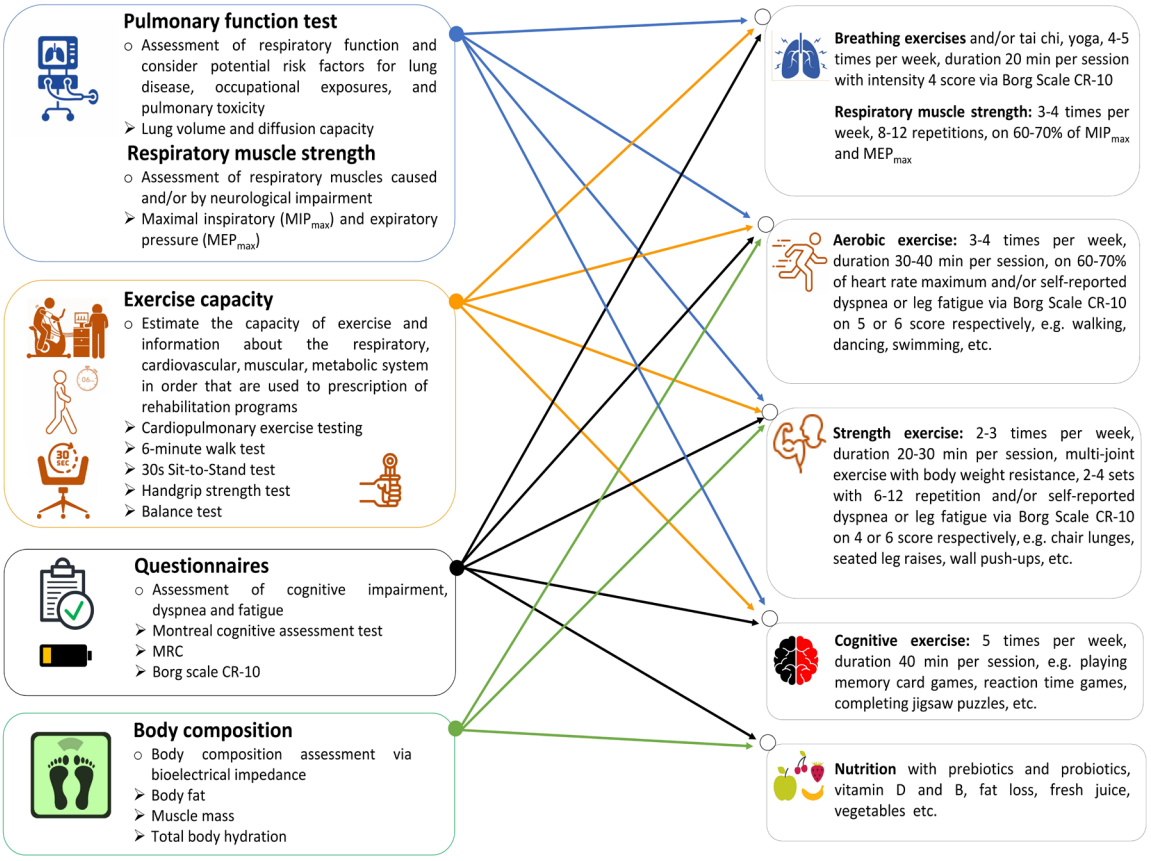
Strategies for the rehabilitation of people with long COVID should be tailored to every case and recovery should draw upon support from family, peers and employers. Work disability sets in remarkably quickly and rehabilitation measures should focus primarily on manageable symptoms that are also work-relevant.

The benefits of rehabilitation are well documented and should be available to all patients (Gloeckl et al., 2023). However, the highly variable symptoms affect workers with many socioeconomical backgrounds, different levels of job and economic security, in different occupations (Lukkahatai et al., 2023). Manual workers, for example, may be more affected by physical impairment due to breathlessness, fatigue or cardiac symptoms (Ahn et al., 2019); returning to arduous physical work may require access to rehabilitation services, and this may compromise their job security. Health inequalities in mental health service access may result in later diagnosis of cognitive impairment for workers with lower income (Grasset et al. 2019; Petersen et al., 2021). Delayed detection of cognitive complaints and limited access to cognitive rehabilitation may threaten the patient's work ability and eventually, job security (Silvaggi et al., 2020).

Rehabilitation programmes can be delivered within the hospital setting, outpatient, home-based (supervised), and/or tele-rehabilitation (unsupervised) (Stavrou et al., 2021; Stavrou et al., 2022). The average duration of international rehabilitation programmes ranges from six to nine weeks, with some providing ongoing maintenance programmes. Exercise training is considered the foundation of rehabilitation, making up 76 to 100% of programmes internationally. Exercise reduces symptoms, increases functional ability, improves sleep quality and quality of life, reduces dyspnoea and fatigue, and improves hemodynamic parameters, antioxidant capacity and body composition (Stavrou et al., 2021a; Stavrou et al., 2021b). Rehabilitation programmes are designed to reduce symptoms of the disease and increase functional ability, improving skills, cognitive performance (Sudo et al., 2022) and access to work (Agostini et al., 2021; Stavrou et al., 2021a).

Individualised rehabilitation (and/or tele) programmes with necessary duration and follow-up for long-COVID have a beneficial effect in all COVID-19 survivors, both hospitalised and non-hospitalised (Stavrou et al., 2022). Figure 3 provides an overview of the assessment of patients for these programmes and methods and tools for rehabilitation for long COVID patients.

Figure 3: Assessment and rehabilitation in long COVID patients



Source: Konstantinos I.Gorgoulianis

5.1 General principles that employers and healthcare providers should consider

Below are general principles that employers and healthcare providers involved in OSH and rehabilitation should consider in tackling long COVID.

- Long COVID requires rehabilitation. The specific goals for rehabilitation depend on which symptoms are experienced, but the broader goals can be described as in Figure 4: the basis of any rehabilitation attempt is restoring overall health and well-being, and the final goal should be regaining prior work ability and skill level. Timely and appropriate rehabilitation means that disability will be avoided where possible, and individual skills as well as work ability will be restored and preserved. However, some symptoms, such as a loss of smell and taste, loss of hair, or skin diseases might be particularly difficult to manage and present a challenge for rehabilitation (Schrimpf et al., 2022).
- The restoration of work ability and the return to work should first focus on restoring quality of life, baseline mental and physical capacity, and then, by extent, work ability (Holmlund et al., 2022). Symptoms that directly affect quality of life, work ability and performance should be assessed and addressed. Generally, both physical and cognitive rehabilitation measures will be required (Stavrou et al., 2023; Duñabeitia et al., 2023).
- The most important obstacles towards returning to work should first be identified. Tools such as scales of, for example, cognitive performance, functional status and somnolence (as presented in Table 1 above) are widely available and could be used to screen workers potentially suffering from long COVID. Furthermore, these scales are a reliable and replicable measure that can guide rehabilitation. Among them, as mentioned, the Work Ability Index should be used in each case, as an overall measure of work ability and the return to baseline.

Figure 4: Priorities in setting rehabilitation goals

Source: George D. Vavougios

- Screening should be carried out by occupational physicians or health services, and confidentiality of medical data needs to be preserved. They can advise the employer on measures that could be taken to ensure workers can safely return to work and monitor their status to ensure timely adaptation when their status or symptoms worsen.
- Long COVID is a novel and evolving challenge, and our knowledge continuously grows. It is therefore important that occupational physicians and rehabilitation specialists regularly update their practices to adopt effective strategies to identify long COVID and provide effective rehabilitation as early as possible (Platz et al., 2023).
- Workplace culture should encourage unity among workers and employers. Employers should closely work with occupational physicians or occupational health services to ensure everyone is informed on all aspects of long COVID. These include symptoms, related health conditions, interaction with pre-existing health conditions, disability, expected duration, impact on work ability and quality of life. Furthermore, employers should maintain a positive workplace environment where those potentially suffering of long COVID are encouraged to seek appropriate help through occupational physicians or occupational health services (Lau et al., 2023).
- Employers should encourage worker feedback, to finely adjust policies based on evidence and tailor approaches to the workplace setting.
- Employers could agree how to regularly stay in touch with workers absent from work or attending rehabilitation, ensuring that the times and content of communication are mutually agreed. Employers and line managers could offer phased return to work and modifiable duties for long COVID patients returning to work, including teleworking for workers with physical symptoms but capable of working at home, where possible (EU-OSHA, 2021a and b; Pawluk et al., 2023). Phased return to work, workload management and redistribution and workplace modifications can facilitate gradual return to work and could be developed by employers and human resource departments in close collaboration with the workers. Employers should also stay in touch and communicate openly with workers who have returned to work but may be experiencing long COVID fluctuations or relapses.

- Continuing procedures should be reviewed, evaluated systematically and readjusted, in close cooperation with occupational physicians and human resource departments, to assess whether current workplace practices are up to date, comply with regulations set by national social security systems and provide appropriate leave coverage to workers suffering from long COVID.
- Employers should work with workers, occupational health services/physicians and related rehabilitation services (that is hospitals or long COVID rehabilitation centres) to draw up a framework and timeline for the safe return to work tailored to the specific setting and workplace (EU-OSHA, 2021b; Lunt et al., 2022).
- Company policies addressing long COVID in the workplace can benefit from established workplace health promotion programmes. Workplace health promotion ([17]) relies on a pre-existing infrastructure that provides workers with access to health services and occupational physicians, or health services, relies on evidence-based, continuous improvement and offers a path to other (for example tertiary) health services. It can provide the basis in dealing with long COVID and its consequences. Guidelines exist at European level (ENWHP) and EU-OSHA has analysed the key reasons, arguments and motivations for employers to implement workplace health promotion (WHP) initiatives, (EU-OSHA, 2012)

5.2 Rehabilitation from physical complaints linked to long COVID

The following sections, describe each of the physical complaints linked to long COVID and propose both means of identification and state-of-the-art measures of rehabilitation (Figure 3).

5.2.1 Fatigue

- **Definition**: Fatigue in the setting of long COVID refers to subjectively reported exhaustion, lack of energy and physical activity intolerance. This loss of well-being is not proportional to physical activities attempted and is not alleviated by rest or sleep.
- **What the worker needs to know**: Fatigue is a frequently reported symptom of long COVID. Fatigue may be a symptom of other underlying conditions and lifestyle issues, such as poor sleep habits or lack of exercise.
- **Self-rehabilitation**: Physical activity that is adjusted to symptom severity and can be modified according to symptoms and exercise tolerance. Patient education by a rehabilitation specialist and individualised training regimens can be provided and followed by patients at home.
- **Specialist rehabilitation**: While reports of fatigue are subjective, objective measurements should be considered to establish a baseline that will set the goals for future rehabilitation. These could include a simple measure of physical fitness, such as the 6-minute walk distance test ([18]) or the 30 seconds sit to stand test ([19]). Persistent fatigue should prompt further medical examination for other underlying conditions, both related to long COVID or other conditions such as infections, nutritional deficiencies, metabolic or endocrine disorders, or mood and mental disorders. Rehabilitation specialists should also be wary of the co-existence of post-exercise malaise (PEM; reviewed in section 5.2.2), in which case aerobic exercises should be avoided.
- **Workplace adaptations**: Fatigue is not only disabling as regards physical activity, but also impairs overall quality of life, functioning and work ability. Phased return to work, workload review and workplace modifications should be provided to workers to make the transition to their previous functionality seamless.

([17]) Workplace health promotion is the combined efforts of employers, workers and society to improve the health and well-being of people at work. Developing and sustaining a healthy work environment and workforce has clear benefits for companies and employees.

([18]) The six-minute walking test (6MWT) was developed by the American Thoracic Society, and it was officially introduced in 2002, together with a comprehensive guideline. The distance covered over a time of 6 minutes is used as the outcome by which to compare changes in performance capacity. This test measures the distance that a patient can quickly walk on a flat, hard surface in a period of 6 minutes.

([19]) The 30 Second Sit to Stand Test is also known as 30 second chair stand test (30CST), is for testing leg strength and endurance in adults. The 30-second chair stand involves recording the number of times a person can stand in 30 seconds.

5.2.2 Post-exertional symptom exacerbation

- **Definition**: Post-exertional symptom exacerbation (PESE) or post-exertional malaise (PEM), is defined as the worsening of long COVID symptoms, typically 12 to 72 hours after performing cognitive or physical activities that were previously tolerated.
- **What the worker needs to know**: PEM leads to symptom worsening that lasts for days or weeks and may be responsible for long COVID symptom relapse or fluctuation. When workers try to do too much on a 'good day' to make up for lost time, this effort can lead to relapse.
- **Self-rehabilitation**: The main consideration is for the worker to determine their 'energy envelope' (CDC, 2024a and b) or energy limits for physical activity and adjust their daily routine activity. Patients need to determine their individual limits for mental and physical activity, and plan activity and rest to stay within these limits. Limitations may be different for each patient. Keeping individual activity and symptom diaries may be helpful for patients to identify their personal limitations (CDC 2024b). Patients should work with their doctor and other healthcare specialists to determine effective exercise regimens.
- **Specialist rehabilitation**: The first consideration should be to do no harm. Intense activity, especially aerobic, may do more harm than good; activity must be balanced against prolonged inactivity, that will lead to muscle deconditioning.
- **Workplace adaptations**: Increased physical burden, especially work-related, will only serve to prolong and establish PEM in patients. A phased return to work plan, with a self-adjustable burden, will be of immense help and support the worker's long-term recovery and restoration of their work ability.

5.2.3 Orthostatic intolerance

- **Definition**: Orthostatic intolerance refers to blood pressure and heart rate variability when standing upright. It can include additional symptoms such as temperature dysregulation, excessive sweating, lightheadedness, chest pain and loss of consciousness.
- **What the worker needs to know**: Sitting upright for prolonged periods of time may be especially harmful, as orthostatic intolerance may evolve into loss of consciousness.
- **Self-rehabilitation**: Exercise training, increasing salt uptake in foods and getting up slowly are among the easiest to implement measures. Self-assessment and self-care advice is also available online (for example Mayoclinic; CDC 2024b)
- **Specialist rehabilitation**: Orthostatic intolerance may not only involve blood pressure and should prompt further medical investigations for potential cardiovascular problems. Furthermore, if PEM is also present, exercise regimens may need to be modified.
- **Workplace adaptations**: Orthostatic intolerance may require workplace modification to prevent severe OSH risks. Workers working at heights and/or on uneven floors or surfaces may be at an increased risk of falling. Workload modification to minimise time standing, with frequent breaks, and the possibility to telework, could also be considered.

5.2.4 Breathing impairment

- **Definition**: Breathing impairment or dyspnoea refers to a subjective feeling of inadequate breathing that causes distress.
- **What the worker needs to know**: long COVID patients can experience dyspnoea in various settings, for example while resting or upon physical exertion. It may be constant or fluctuating and may be accentuated by mood disorders, especially anxiety.
- **Self-rehabilitation**: Self-rehabilitation for breathing impairment focuses on both physical and mental aspects, training the patient on management techniques such as:
    - modifying lying and sitting positions;
    - breathing exercises, such as controlled and paced breathing;
    - nasal breathing;
    - physical exercise, when PEM is absent;
    - and psychological support, when anxiety or depression is also a contributing factor.

- **Specialist rehabilitation**: Those who deal with the worker in primary care, respiratory medicine and their occupational physician should be aware that dyspnoea may be linked to potentially undiagnosed or evolving medical conditions, including mood disorders or cardiovascular disease (Grewal et al., 2023). Dyspnoea should be managed, prompting re-evaluation if persistent, evolving, or disabling.
- **Workplace adaptations**: As breathlessness may not be continuous, or enhanced by stress and anxiety, workload modification and psychological support should be available to workers suffering from this condition. Work that requires the use of respiratory protection should be avoided.

5.2.5 Arthralgia

- **Definition**: Arthralgia refers to inflammatory joint pain. In long COVID, this pain may be of any quality, onset and duration.
- **What the worker needs to know**: Arthralgia needs prompt evaluation by a medical specialist, as it may related to an evolving condition (that is autoimmune arthritis).
- **Self-rehabilitation**: Pain and self-management strategies for chronic pain may be effective, as well as tailored exercise training (England et al., 2023), in the absence of PEM and guided by symptoms such as joint pain and stiffness, inflammation of the urinary tract, eye inflammation and so on.
- **Specialist rehabilitation**: Arthralgia in a setting of long COVID may be associated with reactive arthritis ([20]) and polyarthralgia ([21]). A prescription for anti-inflammatory medication may be required, and aqua exercise, tai chi and yoga recommended. Physical exercise training and aquatic exercises may be effective in improving joint pain, physical function and quality of life.
- **Workplace adaptations**: Pain and the potential involvement of joint inflammation represent important restricting factors in resuming physical activity. Demanding physical work should be avoided until pain is manageable and PEM is excluded.

5.2.6 Other physical symptoms

Aside from symptoms directly affecting work ability, long COVID may cause a multitude of symptoms in any combination and severity. Over 200 of such symptoms have been reported, some of which are included below:

- **Problems with the sense of smell**

Problems with olfaction, that is the sense of smell, are frequent in those with a history of COVID-19. Rehabilitation should be attempted through a process called olfactory training. This includes retraining the patient in identifying smells by presenting specific odours using essential oils in screw-cap jars. There are indications that such symptoms are a challenge for rehabilitation (Schrimpf et al., 2022), although they may be very relevant to some professions such as cooks.

- **Voice impairment (dysphonia)**

In COVID-19 survivors, voice impairment is frequent and typically affects those that suffered more severely from the disease and potentially required admission to the intensive care unit (ICU). It is often underestimated, possibly due to its appearance along with other symptoms such as persistent breathlessness or fatigue (Espina Gonzalez et al., 2024). Voice rest, non-verbal communication methods, for example writing down something that would take too long to explain, may be effective. In addition, any combination of respiratory exercises and vocal training may be considered. Currently, not enough is known about voice impairment linked to COVID-19 infections to safely determine which approach may have the best results.

Voice impairment may particularly affect workers in professions where speaking is required, such as in education or call centres. General guidance on voice management exists, but more targeted strategies are needed, to support workers in these professions.

([20]) Reactive arthritis usually involves inflammation of the joints (arthritis) and tendons, which can cause joint pain, tenderness and swelling – usually in weight-bearing joints such as your knees, feet and ankles; also lower back and buttock pain; swelling of fingers and toes; and joint stiffness – particularly in the morning. It is usually linked to infections.

([21]) People with polyarthralgia have pain in multiple joints. Symptoms may include pain, tenderness, or tingling in the joints and reduced range of motion. Polyarthralgia is similar to polyarthritis, but it doesn't cause inflammation.

- **Swallowing impairment**

As with voice impairment, swallowing impairment occurs typically in those patients suffering more severely from the disease or experiencing ICU admission and procedures such as intubation ([22]). The process may result in weakness of the muscles used for one's voice and swallowing. Swallowing impairment is a potentially serious condition, as it may lead to aspiration pneumonia ([23]) and result in an infection. In rehabilitation, a combination of education and skills training for head and body positioning, manoeuvres and dietary modifications are recommended. They include modifying food composition depending on whether swallowing is more difficult with solids or liquids, as well as swallowing exercises. Again, there are insufficient data to determine whether these approaches are efficient in long COVID cases.

Cognitive impairment, when severe, can also be a contributing factor and should be screened for.

Affected workers may need to spread meals over the day and may therefore need an adaptation of work schedules and breaks and a calm place where they can have their meals without being disturbed.

5.3 Cognition and Emotion

Cognition refers to the mental processes that represent our means of understanding and interacting with the world. Cognitive complaints of any origin may affect work ability and quality of life (Berezuk et al., 2021). Cognitive complaints occurring after hospitalisation have been previously studied in several diseases such as breast cancer (Von Ah and Crouch, 2021) or cerebrovascular disease (Wallmark et al., 2016; Saar et al., 2023) and in patients requiring admittance to an intensive care unit (ICU)(Schofield-Robinson et al., 2018). They can have a considerable impact on a person's capability to return to work (Sekely et al., 2023). Cognitive complaints due to long COVID are common, of variable severity and may be underdiagnosed, while their duration is currently unknown (de Erausquin et al., 2022). Long COVID patients have described these symptoms as brain fog (Asadi-Pooya et al., 2022). Depression and anxiety may also occur and persist following hospitalisation (Ahmed et al., 2020; Ghoneim et al., 2016; Bartels, 2009), as in the case of long COVID (Han et al. 2022). Furthermore, fatigue may also both enhance and interact with cognitive and emotional aspects of long COVID (Herrera et al., 2021). Post-traumatic stress symptoms have also been identified in COVID-19 survivors (Tu et al., 2021)

5.3.1 Proposed Interventions

- **In the healthcare setting:**

An assessment of cognitive function, depression and anxiety should be incorporated into evaluation of workers for long COVID.

- Persistent cognitive impairment may reflect an underlying condition that, if promptly recognised, may be treatable, for example vitamin deficiency, metabolic disease, or sleep disorders.
- The assessment could include established screening measures such as the Montreal Cognitive Assessment ([24]) (Crivelli et al., 2022) for a baseline and follow-up estimate, with the option to refer to specialist services should these complaints persist.
- The Post COVID-19 Functional Status scale (PCFS) (Klok et al., 2020) is another screening tool that can help clinicians get a broad estimate of the potential underlying long COVID syndrome and identify cognitive complaints, depression and anxiety.
- Cognitive impairment due to long COVID may be persistent and is often complicated by mood disorders, anxiety and depression (Tu et al., 2021). Regular (that is every six months) evaluations may therefore be reasonable (Premraj et al., 2022).
- Extending the follow-ups to 12 months may be mandated in specific cases where the cognitive impairment is persistent or deteriorating (Wulf-Hanson et al., 2022) and further medical advice sought.
- Cognitive rehabilitation is feasible, and examples of successful return-to-work abundant in the literature (Fure et al., 2021; Wisenthal and Krupa, 2013). Rehabilitation should be targeted at those complaints that affect the worker.

([22]) Intubation is the process of placing an artificial ventilation tube into the trachea of an unconscious / sedated patient, connected to a mechanical ventilation device. Extubation is the process of removing the mechanical ventilation from a person that may be capable of respiration without mechanical assistance.
([23]) Drawing food into the respiratory system rather than the oesophagus, resulting in infection.
([24]) See footnote 11

- Rehabilitation should focus not only on strengthening affected cognitive domains, but also on helping the patient to develop mechanisms to cope with ongoing disability.

- A baseline evaluation by a psychologist should be available. The experience from other disease models is that several rehabilitation strategies such as cognitive strengthening ([25]) or cognitive – behavioural training ([26]) may be effective and is readily available (Scheenen et al., 2017).
- Cognitive and physical rehabilitation should be combined where possible (Barker-Davies et al., 2020), as both can help a worker to return to work and experience improved quality of life.

- **In the workplace and daily life:**
  - Cognitive and emotional complaints in the workplace and daily life are often underreported due to social bias and stigma (Garand et al., 2009; Rewerska-Juśko and Rejdak, 2020), especially in younger sufferers and people with low job security (Silvaggi et al., 2020). COVID-19 survivors with impaired mental health may experience both job insecurity and financial instability (Wilson et al., 2020).
  - EU-OSHA has previously published a guide for managers (EU-OSHA, 2021b) that provides guidance on general aspects of long COVID and the return to work:
    - Employers should work with human resource managers, line managers, worker supervisors and OSH services and physicians to establish an open communication policy about mental health complaints. They should also ensure that workers who are affected and their co-workers are informed about cognitive or affective long COVID symptoms.
    - Adjustable working hours, adjustable workload and phased return to work may facilitate return to work, especially regarding demanding mental tasks that workers may need time to readjust to.
    - Employers should also seek support from social services and consider government or social security provisions, COVID-19 specific or otherwise, that will keep workers employed. This includes schemes that support a phased return to work or temporary disability schemes that may compensate employers or workers.
  - As with other symptoms, workers suffering from long COVID should be actively encouraged to express their concerns as well as perceived cognitive changes. This has been shown to be successful in other diseases complicated with cognitive complaints (Yan et al., 2023), where cognitive training was shown to prevent cognitive decline. Cognitive behavioural therapy and appropriate referral to neurological and psychological services can also be beneficial and have been suggested by COVID-19 specific rehabilitation guidelines (Barker-Davies et al., 2020).

5.4 Sleep disturbances

Sleep disturbances are known to affect work ability (Lian et al., 2015), productivity and well-being (Giurgiu et al., 2021) in a wide range of professionals (Watkins et al., 2021; Mahdinia et al., 2022), including in healthcare (Gómez-García et al., 2016). Sleep health and quality is strongly linked to cognition, fatigue and emotional health (Scott et al., 2021; Benkirane et al., 2022). Daytime sleepiness because of sleep disturbances may cause major OSH risk in certain professions, such as professional drivers.

5.4.1 Proposed Interventions

- **In the healthcare setting:**
  - An assessment of sleepiness and the potential development of sleep disordered breathing should be incorporated into standard practice for the evaluation of long COVID. It could include

([25]) Cognitive improvement refers to an increase in performance on tasks of mental abilities including learning, thinking, memory, problem solving, logical reasoning, decision making and attention.
([26]) Cognitive behavioural training (CBTraining) is an organised process that uses systematic, highly structured tasks designed to improve cognitive functions. Functions such as working memory, decision making and attention are thought to inform whether a person has an impulsive behaviour or a premeditated behaviour. The aim of CBTraining is to affect a person's decision-making process and cause them to choose a premeditated behaviour over the impulsive behaviour in their everyday life.

established measures such as the Epworth Sleepiness Scale (ESS) ([27]) and the Berlin Questionnaire (Netzer et al., 1999; Chiu et al., 2017) ([28]).
  - Baseline and at least six month post discharge follow-ups should be scheduled based on current knowledge on the persistence of sleep disturbances such as obstructive sleep apnoea (Ahmed et al., 2021).

- **In the workplace and daily life:**
  - Workplace adjustments, including adjustable workload and working hours may be a reasonable approach offered by employers as workers aim to overcome the consequences of sleep deprivation, which affect both cognitive and physical performance. For certain professions, such as professional drivers or workers who supervise critical industrial processes, daytime sleepiness is a major OSH risk. Consequently, the risk to the worker as well as to other workers needs to be considered when setting measures and planning tailored workplace adaptations. Hence, slower phasing into previous work duties could be considered. Occupational physicians and services therefore have a major role to play in the assessment of workers and in providing support to workers and employers for a successful return to work. In addition, they can provide tailored advice to help workers address the symptoms.
  - A climate of trust is paramount for workers to be open and communicate sleep related problems.
  - Sleep disturbances may be connected to other long COVID symptoms such as anxiety, fatigue and exercise intolerance. It is important to consider all these symptoms together when addressing either one.
  - Sleep hygiene advice ([29]) and advice on stress management may promote sleep health. Psychological interventions such as cognitive behavioural therapy ([30]) may also be effective.
  - Persistent sleepiness and other respiratory symptoms should prompt a thorough re-evaluation. A regular assessment of the status should be planned in, as mentioned previously.

6 The role of the management and policy related to long COVID

EU-OSHA has provided guidance on managing OSH risks stemming from long COVID, the necessary steps at policy level, as well as possible threats to the health and safety of workers (EU-OSHA, 2022b, 2025a, 2025b). Information from both from OSH guidance and current literature is summarised below.

6.1 Policy and management of OSH risks and threats due to long COVID on the national level

There are several steps that can be undertaken by policy-makers to mitigate long COVID risks and threats to the occupational safety and health of workers on a national level:

- **Long COVID may be underdiagnosed and lead to work ability loss**. National health systems reviewed in this paper, such as Italy and Sweden, have opted for regular follow-up of patients after hospitalisation for COVID-19; this is a reasonable measure to prevent premature return to work. Primary care health services should also be integrated into long COVID diagnosis and rehabilitation services. This is particularly relevant for COVID-19 patients who have not been hospitalised.

([27]) See footnote 14. The ESS is a questionnaire that can be used to quantify daytime sleepiness and by extent the likelihood of a sleep disorder.
([28]) The Berlin questionnaire is a survey that has been used to identify patients with obstructive sleep apnoea. It was developed in 1996 in Germany by a group of respiratory and primary care physicians through consensus. The initial version was then validated in the primary care setting. The questionnaire is self-administered and consists of 10 questions in three categories related to the presence and severity of snoring, frequency of daytime sleepiness and the presence of obesity or hypertension. It serves to estimate the likelihood of obstructive sleep apnoea, the most prevalent sleep disorder.
([29]) Sleep hygiene advice includes suggestions and education in behaviours that promote healthy sleep, such as fixed sleeping hours, the limitation of psychostimulants such as caffeine, nicotine or alcohol, regulating energy uptake and so on.
([30]) See footnote 30

- **Long COVID patients need rehabilitation**. Where appropriate, the option for telerehabilitation should also be offered. All these points should be considered within a national plan to tackle specific challenges associated with long COVID in each country.
- **Vaccination for COVID-19** as previously mentioned, is an effective means of reducing long COVID prevalence and its implementation should be carefully considered by healthcare policy-makers.
- **Systematic approaches in documenting long COVID are needed** and can help in identifying rehabilitation goals as well as potential OSH risks. WHO's Case Report Form for Long-COVID (WHO, 2021b) is an easy to use and standardised way to systematically approach long COVID and document potential disabilities. Along with other scales it can provide a more objective estimation of complaints such as mental or affective disorders (see for instance examples of assessment tools and scales in Table 1). It would therefore be beneficial to establish a uniform approach on a nation-wide level to a screening and documentation policy that would additionally serve to determine access to rehabilitation and social security benefits. These approaches should be adapted by governments into national healthcare systems and social security services.
- **Recognition of COVID-19 as an occupational disease** is recommended by the European Union through the European schedule for occupational diseases and should be considered for national health systems of Member States. Policy-makers should consider necessary adaptations to healthcare and national social security systems so that workers are systematically assessed following recognition and offered streamlined access to rehabilitation and social benefits. A number of Member States recognise long COVID as an occupational disease and this should be known to employers and workers, as well as to occupational physicians and the physicians treating sufferers.
- **Healthcare innovation and integration** is a reasonable goal that several Member States have set themselves in response to the COVID-19 pandemic. The same should apply to how long COVID is dealt with, with necessary innovations linking health care services, the provision of rehabilitation and national social security systems.
- **Legislation reforms** may also be required to protect job and income security, with measures that support workers who are absent from work for rehabilitation. They may also provide a flexible framework for hiring additional personnel to replace those absent and support for part-time return to work or for working from home, where possible.

6.2 Policy and management of OSH risks and threats due to long COVID risks on the workplace level

In some cases, major changes may be needed to mitigate OSH risks related to long COVID: change in shifts, hiring additional personnel or reduced working hours (Praschan et al., 2021). To effectively implement a policy at the enterprise level:

- **Workers should be informed** about long COVID, its impact and the symptoms that those affected may experience. They should also receive information about available health services and social security amenities.
- **Employers should be informed** about specific requirements for COVID-19 as an occupational disease, including how to notify a case or communicate with those services that must be informed of a potential long COVID case. These include healthcare, social security and/or rehabilitation centres.
- **It should be ensured that occupational physicians are informed of long COVID and the role they can play at the workplace level.** For example, in the recognition of long COVID symptoms and assessment of what workers can do or what they need to safety return to work.
- To ensure a smooth transition of a worker back into work, occupational physicians and health services should be able to communicate with health services who treated the affected worker and rehabilitation services, while respecting confidentiality of data.
- There are tools that can support occupational physicians or health services in assessing work ability. Enterprises should support them in the use of these tools and follow advice for workplace adaptation, while respecting the confidentiality of the personal and medical data of workers.
- **Workers should be able to attend rehabilitation** and be supported by appropriate leave and flexible work schemes. Where self-rehabilitation measures or more frequent rest breaks are

needed, enterprises should consider providing an appropriate rest and exercise area. This ensures privacy and a calm environment and can be set up in agreement with the occupational physician or health services. **Providing the possibility to work from home** where possible or relevant is another option. For workers with care responsibilities, flexibility in work schedules is important to enable them to attend rehabilitation. Childcare services could also be provided.

- An agreement about communication can be helpful by allowing employers or supervisors to stay in touch with the worker when absent, in treatment or in rehabilitation.
- **Enterprises should aim to keep the workplace COVID-19 free** by maintaining appropriate hygienic measures. More information can also be found in the relevant OSH wiki.

7 What insights are interesting from the perspective of employers and workers?

Long COVID is a chronic disease that may worsen, relapse and in some cases become a source of permanent disability. Workers may exhibit symptoms and conditions associated with long COVID even months after COVID-19 infection. It is important to note that the diagnosis of long COVID, unlike COVID-19, is based on symptoms and a previous exposure to COVID-19, rather than any specific test or biomarker. It is furthermore important to stress that long COVID may be occurring as the result of an occupational disease. Its diagnosis is associated with specific procedures for its rehabilitation, and those suffering could also seek social security benefits. Workers and employers should work together to overcome the challenge of long COVID and its impact on work ability. EU-OSHA has previously provided detailed guides for workers (EU-OSHA, 2021a) and employers (EU-OSHA, 2021b) for return to work after COVID-19. Two new guides are also available (EU-OSHA, 2025a and b), focusing on workplaces and occupational physicians respectively.

7.1 Insights from the perspective of workers

- Some long COVID symptoms, such as cognitive impairment and mood disorders may develop slowly over time. Severe impairments may also arise from mild COVID-19 disease. This is why workers should consider unusual symptoms or an overall decrease in quality of life or work ability as potential long COVID symptoms.
- Workers who have been infected with COVID-19 and experience unusual symptoms should seek either primary care or occupational health services´ or occupational physician´s advice. Where procedures have been established at the enterprise level, workers should report a potential long COVID symptom and seek appropriate medical advice. Workers with prior hospitalisations may be subjected to a COVID-19 evaluation in most countries and should be willing to be examined.
- Given the wide variety of symptoms of long COVID and their combinations, workers should be able to ask for an in-depth assessment of their work ability regarding the specific tasks they have to carry out at work, whether physical or mental. They should be given the possibility to consult occupational health services or physicians regarding this assessment. Workers should however be aware that contact between the OSH services or physicians with rehabilitation services may be required.
- Once a long COVID diagnosis is made, the physician responsible should also assess work ability and rehabilitation needs. If the worker cannot continue working, the employer should be notified, and the appropriate sick leave scheduled. Workers could communicate that the cause of potential absence or work ability impairment is long COVID. Specific symptoms and related impairments need not be reported, while workers' personal data should be handled confidentially and data protection rules respected at all times.
- Workers with a diagnosis of long COVID should inform their corresponding social security services to receive assistance with rehabilitation and any other additional benefits. They should also receive information regarding support for a return to work, such as the possibility for part-time return to the workplace.

- Workers could opt to maintain regular contact with the employer or the human resource department regarding the progress of rehabilitation and the potential to return to work. Communication could be supported by the occupational physician or occupational health service, where available.
- Self-management rehabilitation practices for specific symptoms have been suggested and may be easy to implement. For example, the WHO self-management guide on COVID-19 related illness (WHO, 2020), which provides basic exercises and advice. This includes addressing common symptoms, such as breathlessness, starting exercise, getting back to functional activities and mental health. It also covers post intubation symptoms such as voice weakness, as well as eating, drinking, and attention and memory deficits.
- Returning to work is not a guarantee that long COVID is resolved; if symptoms return, workers should seek a re-evaluation by occupational physicians or health services, where available.

7.2 Insights from the perspective of employers

- Employers should communicate openly with the workers and encourage them to seek medical evaluation should they suspect that long COVID symptoms may appear.
- Employers should enable workers to undergo rehabilitation as needed and seek support from occupational physicians or health services, where available.
- Employers should cooperate with their occupational physician or occupational health service to ensure a proper assessment of the worker´s ability to work and support any workplace adaptations. This includes the provision of safe and appropriate spaces for those who engage in self-rehabilitation exercises, and the return-to-work process for those who must undergo rehabilitation from long COVID while on sick leave. It should also safeguard the confidentiality of personal medical data.
- Employers should review the workload for workers affected by long COVID that are undergoing rehabilitation or have recently returned to work. Reducing strain and easing the return to work and their former duties can help them adapt and reach their previous work ability. However, it is recommended to do this in cooperation with occupational physicians or health services and the worker and avoid unsolicited and imposed adaptations.
- Employers should consider providing means of teleworking, where possible, or other means of modified work to enable workers to attend rehabilitation and support them in coping with their symptoms.
- Employers should consider:
  - Adopting, promoting, and regularly reviewing work health promotion policies and setting up an effective framework or policy for rehabilitation and safe return to work for those diagnosed with long COVID and seeking medical help and rehabilitation.
  - Providing support, together with HR departments and social services, with practical issues, such as childcare and long-term care issues for workers who may have to attend rehabilitation.
- Employers should also consider supporting job security for workers requiring prolonged rehabilitation. Towards this end, they should work closely with their human resources (HR) departments and maintain an overview of workers, absence, and workloads, both individually and companywide.
- Employers should be informed of their duty to report cases to social security services to support workers in accessing their rights related to long COVID rehabilitation and the recognition of COVID-19 or long COVID as an occupational disease.

8 What insights are interesting from the perspective of OSH experts?

One of the main aspects of providing timely and adequate rehabilitation for long COVID patients is prompt recognition. Occupational safety and health experts should adopt a worker-centred approach and aim to provide a thorough evaluation of workers with potential long COVID. EU-OSHA has already published

guidance on the impact of long COVID on work ability and the role of OSH experts (EU-OSHA, 2022a, 2025a). A general approach that can be tailored to specific symptoms and medical conditions could cover the following actions (Landhuis, 2023):

- Encouraging the worker to communicate potential symptoms that could be linked to long COVID and impact on their work ability or well-being at work and supporting the worker when dealing with the employer and the HR department.
- Occupational health services/physicians could:
  - Familiarise themselves with scales and measures that are simple and effective for screening specific symptoms, such as cognitive impairment scales, reviewed in section 4.
  - Actively screen for the most common symptoms: fatigue, respiratory dysfunction (namely breathlessness, cough), or cognitive impairment, taking into account potential risk factors, such as previous COVID-19 hospitalisation.
  - Adopt a standardised approach to recording the cases, for example by using the WHO Case Report Form for PASC (WHO, 2021b), to provide a thorough assessment of potentially underrecognised symptoms.
  - Attempt to assess the relationship between long COVID symptoms (for example anxiety and insomnia, depression and cognitive impairment) and whether they reinforce each other.
  - Assess their duration, recurrence and evolution:
    - Do they seem to improve with time or worsen?
    - Do new symptoms appear?
  - Assess the impact of these symptoms on the worker´s work ability, for example:
    - Does a worker who handles data processing retain their cognitive abilities?
    - Does a worker with strenuous physical tasks have a complete check-up regarding lung, heart function and overall physical fitness?
  - Assess the worker for any conditions similar to long COVID (that is vascular cognitive impairment and chronic fatigue syndrome), which may require a different approach.
  - Recommend further evaluations as necessary (for example a person with daytime sleepiness may require overnight polysomnography).
- Ideally, OSH preventive services should cooperate with the rehabilitation services to assess the situation, while preserving the confidentiality of medical data, to determine optimal interventions and their duration and ensure a successful return to work.
- Informing workers about possibilities of self-rehabilitation and support them, as appropriate.
- Organising a return to work assessment focused on the worker's ability to resume their work and the capacity in which they are able to work.
- Re-evaluating as necessary and recommending any steps to be taken in the workplace to provide accommodations for workers. For example, reduction of workload, changes in break regimes, and advice for workspaces where workers can do self-rehabilitation exercises.
- Supporting the process of registering occupational diseases or accidents, in accordance with national legislation and practices.
- Recommending any additional health surveillance and measures for vulnerable workers, such as young workers, pregnant and breastfeeding women and workers with pre-existing diseases.

9 What insights are interesting from the perspective of policy-makers?

As long COVID is a novel condition linked to a new, previously unknown disease, rapid adaptation of health and social security systems is needed to effectively deal with it. Successfully preserving and restoring work ability heavily relies on top-down policies that support the provision of adequate and uniform care and rehabilitation to those affected. A meta-analysis by WHO on key aspects of health care systems dealing

with long COVID has provided several best practice and policy pointers for policy-makers, which directly affect OSH (Décary et al., 2022):

- A multi-professional rehabilitation model is necessary to deal with a multi-faceted disease.
- Rehabilitation approaches should be both individualised and prioritise the most frequent complaints and health threats. Harmonised approaches across national centres, and international collaboration within the EU should be pursued.
- Rehabilitation infrastructures need to be appropriately funded to handle the large number of long COVID patients that are expected.
- Long COVID is a novel condition that combines, however, impairments that have been previously encountered. Policy-makers should therefore aim to build on the strengths and experience of their health systems in dealing with similar conditions to set up an appropriate infrastructure for rehabilitation.
- The socioeconomic aspects of long COVID should be studied, to help identify and support potentially vulnerable groups who may have limited access to rehabilitation or face job insecurity when affected by long COVID because of their social or economic status.
- Awareness-raising actions, preferably on a large scale, could help diminish the stigma associated with long COVID, and improve the social perception of those who are undergoing rehabilitation and return to work processes. Policy-makers could cooperate with sectoral organisations to bring the message to the workplace.
- Medical professionals that are assigned long COVID patients or their screening (including occupational and primary care physicians) should be thoroughly and formally trained through centralised programmes and actions. These should include how long COVID affects work ability to enable an easier return to work for those affected.
- Clinicians and researchers should be enabled to generate and analyse data that will support evidence-based practices and increase patient safety. Data collected by occupational physicians and health services could also help in identifying successful rehabilitation and return to work policies and practice.
- National social security and healthcare frameworks should provide access to rehabilitation for workers affected by long COVID and support them in returning to work. For example, through schemes that financially support part-time return to work or vocational retraining. Easy communication among primary care and occupational physicians and health services that assist the reintegration of workers should be supported.
- Employment services engaged in the retraining of workers should be informed about the effects of long COVID symptoms and the challenges of returning to work. This will ensure tailored rehabilitation and appropriate retraining of workers is put in place and ease workers' reintegration into employment.

10 Final considerations

The impact of long COVID on the European population is huge, affecting millions of people with its devastating effects. Therefore, further research and insights into the development of long COVID cases and its impact at the workplace level is needed. The success of rehabilitation and the impact of return- to-work schemes should be assessed to identify those practices that are most successful. It is important that the findings are fed back to workplaces to continuously improve the situation. Sustained efforts are also needed to keep up awareness and improve knowledge at the workplace level among employers and line managers, HR departments and coworkers. Collaboration with sectoral organisations, those representing both the employer and the worker side, could support these efforts. Finally, to ensure successful reintegration, it is important for those who treat long COVID patients and ensure their rehabilitation to communicate and collaborate with the workplace actors.

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