Long COVID and Occupational Medicine Practice

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The national public health emergency declared in response to the worldwide pandemic of "coronavirus disease 2019" or COVID-19 ended on May 11, 2023, in the United States.[1] Whereas most Americans infected with the causative agent of COVID-19—the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)—recover their usual state of health, others experience a broad array of new or continuing debilitating symptoms. Grouped together, these various post–COVID-19 symptoms are collectively known by the patient-generated term, "long COVID; by the term, "postacute sequelae of SARS-CoV-2 infection[2]; or by the World Health Organization's term, "post–COVID-19 condition."[3,4] In this editorial, the term "long COVID" will be used.

Although a single case definition has not been widely accepted, the World Health Organization has defined long COVID as "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."[5] The US Department of Health and Human Services emphasizes that "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."[6]

CME Learning Objectives

After completing this enduring educational activity, the learner will be better able to:

- Outline and discuss back to work options for workers with long COVID while stressing the variations in symptoms and length of recovery for these patients
- Strategize on best practices for handling the return to work of long COVID patients and the impact on workload
- Design a back to work plan to assist employers and employees with creating safe and resourceful work environment for long COVID workers return to work

MEDICAL ASPECTS

Symptoms

More than 200 different symptoms associated with long COVID have been identified from all 12 organ systems of the body.[7] Prominent among these symptoms are postexertional breathlessness, cognitive impairment or "brain fog," headache, fatigue, dysautonomia, and gastrointestinal symptoms.[8,9] While long COVID studies continue to cite different symptom criteria to define the condition,[10] the National Institutes for Health recently developed a working case definition of long COVID/postacute sequelae of SARS-CoV-2 infection based on the frequency of 37 self-reported symptoms using a large prospective cohort study design.[11] An international consensus study, using a "2-round online modified Delphi process," involving 1148 participants from multiple countries, developed a core outcome set (COS) of long COVID symptoms.[4] Consensus was achieved for 11 in a final COS: (1) fatigue; (2) pain; (3) postexertion symptoms; (4) work or occupational and study changes; (5) survival; and functioning, symptoms, and conditions for each of (6) cardiovascular, (7) respiratory, (8) nervous system, (9) cognitive, (10) mental health, and (11) physical outcomes.[4] Recovery was also included in the COS because of its relevance to the course of a post-COVID condition and because it was included in a previously published study.[4]

Clinical Course

The clinical course of long COVID is highly variable, and its chronicity is not well-understood. Studies of long COVID are challenged by COVID's diverse symptomatology, reliance on self-reported symptoms, the varying severity of acute disease, vaccination status, and the lack of a diagnostic test for the condition. These limitations create uncertainty regarding the temporal limits of long COVID.[12] For example, a study enrolling unvaccinated individuals who contracted the original strain of SARS-CoV-2 showed that 6 months following acute COVID-19, 22.9% of cases still had long COVID symptoms, but the proportion with symptoms decreased to 18.5% at 1 year and 17.2% after 2 years.[13]

Prevalence

Because of the absence of a widely accepted case definition and diagnostic criteria for long COVID, national prevalence estimates can range anywhere from 5% to 50%.[14,15] Vaccination status and disease severity can influence the prevalence of long COVID. The prevalence rate for vaccinated individuals is estimated to be 10% to 12%,[16] 10% to 30% for nonhospitalized cases, and 50% to 70% for hospitalized cases with severe COVID-19 disease.[17,18]

Risk

Several demographic and medical comorbidity risk factors for long COVID have been identified. These include female sex,[19] older age,[7] tobacco smoking, high body mass index, and comorbidities such as diabetes, asthma, and chronic obstructive pulmonary disease.[20] Other risk factors include vaccination status and the severity of the acute infection.[21] For example, individuals bedridden for 7 days or more with acute COVID-19 compared with those not confined to bed demonstrated the highest prevalence of severe physical symptom burden, whereas those never bedridden had a symptom prevalence similar to individuals not diagnosed with COVID-19.[22]

Although studies indicate that COVID-19 vaccines have a protective effect against long COVID, the strength of the effect varies from study to study.[23] A majority of studies show that COVID-19 vaccination is associated with a consistent protective effect against long

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COVID symptoms[24,25]; others demonstrate partial protection,[16,26,27] and some demonstrate no protective effect.[28] The risk of new-onset long COVID after a second SARS-CoV-2 infection seems to be lower than following a first infection for those older than 16 years, but there is no difference in risk for those younger than 16 years.[29]

Pathogenesis

A heterogeneous set of hypotheses have been proposed to explain the pathophysiology of long COVID involving viral factors, host factors, and tissue damage.[30] Prominent causal hypotheses include the following: (1) viral persistence, either of infectious virions, viral RNA or viral proteins[31,32]; (2) reactivation of latent viruses[33]; (3) immune dysregulation and autoimmunity triggered by the infection[30]; and (4) chronic tissue and organ damage characterized by thrombotic endothelialitis, endothelial inflammation, hyperactivated platelets, and fibrinaloid microclots.[34] Which of one or more of these factors may be causative is unknown. Long COVID may have different pathophysiologic mechanisms in different patients, which suggests that not everyone would benefit from the same treatments.[35]

Prevention

Although evidence continues to accumulate that COVID-19 vaccination provides some protection against developing long COVID,[20] further preventive interventions are needed. In a recent study of nirmatrelvir and ritonavir (Paxlovid) used to treat acute COVID-19, researchers found that the antiviral reduced the risk of long COVID by 26% over a 6-month period.[36] During the same time span, Paxlovid decreased the risk of death by 47% and the risk of hospitalization by 24%.[36] The role of antivirals in the treatment of long COVID remains an area of investigation.[37]

In a study of individuals following acute COVID-19, 6.3% (95% confidence interval [CI], 4.2% to 8.2%) of individuals taking metformin at the time of their bout of acute COVID-19 and 10.4% (CI, 7.8% to 12.9%) of those who received a placebo developed long COVID (hazard ratio, 0.59; 95% CI, 0.39 to 0.89; $P = 0.012$).[38] Although preventing long COVID is important, therapeutic interventions for those individuals already suffering from long COVID are crucial for maintaining activities of daily living and employment.

Treatment

No definitive treatment exists for long COVID.[8] Recommendations exist for occupational medicine (OM) physicians seeing patients presenting with new or continuing symptoms postacute COVID.[39,40] Currently, therapeutic care is directed at symptom management, especially reduction in sympathetic hyperactivity, rehabilitation, and reassurance and support.[39] Clinical experience in treating conditions such as fibromyalgia, myalgic encephalomyelitis/chronic fatigue syndrome, and postural orthostatic tachycardia syndrome may be relevant. Cognitive pacing for cognitive dysfunction and symptom-specific drug options, such as immunoglobulins for immune dysfunction or β-blockers for postural orthostatic tachycardia syndrome, are being used as treatment for long COVID.[8] Importantly, physical activity as a treatment has been shown to worsen the health of 75% of long COVID patients.[41] Research is needed to better understand how to safely return patients to physical activity without worsening their long COVID symptoms.

EMPLOYMENT ASPECTS

Although information regarding the impact of long COVID on the working population is still developing,[42] it is generally accepted that long COVID symptoms can impact the activities of daily living, including the ability to maintain employment.[7] Effects of long COVID on the labor market may be significant with estimates that long COVID may account for 15% to 18% of unfilled jobs.[43,44] Employment issues pertaining to return to work, reasonable accommodation, modified work schedules, impairment, and disability are vital areas of health care affecting working adults with long COVID.[45]

Work Disability Prevention

To prevent long COVID from becoming a disabling condition, the treating OM physician should prioritize functional-outcome measures together with clinical process measures in caring for a worker with long COVID.[46] The importance of work to worker well-being is key in the clinical approach to preventing work disability in workers with long COVID.[47] Helping workers stay at work or return to work is critical to an OM physician's role in treating workers with long COVID.[47]

Preventing work disability requires attention to both the impairment—the objective deficits in body function or structure—and all other factors that threaten optimal participation in work. Nonclinical factors can include social system impediments, such as lack of work accommodations, limited access to vocational rehabilitation, and individual difficulty overcoming health challenges. These factors can be compounded by a worker's emotional state and other personal factors. To help workers manage persisting and potentially disabling long COVID symptoms that impact function at work, the treating OM physician will need to address more than symptoms to prevent work disability. Determining what areas of function are most affected by a diagnosis of long COVID and what areas of function are of the greatest concern to the worker, a treatment plan will be more likely to result in increased quality of life for the worker.[48] By addressing functional impact and the relevance to the individual's work and by establishing treatment goals related to improving function, the treating OM physician can support their long COVID patients' continuing participation in work.

Evaluating Function

Function should be assessed at every visit, with questions about how the condition has impacted an individual's functioning at work and at home, exploring how exactly the individual's symptoms interfere with work activities. There are many different patient-reported outcome measure tools that can be used to systematically track baseline against progress in functional outcomes.[46] Functional limitations should be assessed in relation to work requirements. In many cases, simply interviewing the patient provides the needed information, but in some cases, written job descriptions may be needed. This is especially important when there is a need to understand the essential job duties to satisfy a formal accommodation request.

Job Accommodations

Some workers with long COVID cannot work at all, whereas others can with employer-provided job accommodations. Workers with long COVID symptoms that last for months or years may be covered by the Americans with Disabilities Act (ADA).[49] The ADA applies to individuals with long COVID if their condition "substantially limits one or more major life activities."[45,50,51] Workers with long COVID symptoms that last only weeks may not be covered by the ADA but may be protected by the Family and Medical Leave Act of 1993.[52,53]

Under ADA or the Family and Medical Leave Act of 1993, when the treating OM physician determines there may be job accommodations that would permit the individual to perform his/her essential job duties, the Job Accommodation Network is a source of assistance in prescribing specific accommodations.[54] Job accommodations for workers with long COVID can help employers retain workers in a tight labor market.[55] Long COVID may be covered by applicable state or federal workers' compensation insurance systems.[56,57]

OCCUPATIONAL MEDICINE PRACTICE

Despite a limited understanding of long COVID's pathophysiology and the absence of evidence-based treatment modalities, there is a

recognized need to promote the recovery of health and work ability for those workers with long COVID.[58] Experience in caring for workers with long COVID to recover function and livelihood is accumulating primarily in large academic medical centers. The following OM practice recommendations for caring for workers with long COVID are based on a large, self-insured, medical center's experience with hundreds of workers with the signs and symptoms of long COVID.

Return to Work

After an acute COVID-19 illness, workers with long COVID often experience difficulties in coping with their symptoms and in returning to work. These workers can benefit from evaluation and treatment by an OM physician.[59] The optimal and efficient return to work in the setting of long COVID requires utilization of both overarching strategies and specific recommendations. It has been well documented that return to work as early as possible is beneficial for recovery and long-term health. However, for workers with long COVID, returning to work too early, as is true with exercise, can result in health deterioration.[41] Because of the prolonged reconditioning and frequent postexertional malaise associated with long COVID, one return-to-work strategy used in a large hospital-based OM practice for long COVID workers is the use of a gradual work titration.

Gradual work titration is a long-standing OM strategy used in a variety of conditions, which can be used in workers with long COVID.[60] The aim of gradual work titration is to support a worker in adjusting to their work environment whether or not the work involves physical demanding tasks. Using gradual work titration as a part of a return-to-work plan starts with collaboration between the employee and the OM physician.[61] If the OM physician plans to include any type of physical exercise in a return-to-work plan to aid recovery, the OM physician should first review studies showing physical activity improvements on postexertional symptom exacerbation among individuals with long COVID,[62] as well as studies indicating a lack of improvement when graded exercise therapy is used in myalgic encephalomyelitis/chronic fatigue syndrome—condition similar in some respects to long COVID.[63]

Currently, there is no standard protocol to guide the OM physician in developing a gradual work titration plan for long COVID because the efficacy of gradual work titration in long COVID has not been shown. Given that each worker with long COVID presents a unique grouping of symptoms, a gradual work titration should be pursued only when both the patient and the OM physician believe it is appropriate. Even then, the OM physician should expect to experience variability of response to physical activity capabilities in workers with long COVID.[41]

One recommended practice is to start work titration prescription with 4-hour work shifts, limited to three shifts per week. From this initial prescription, work hours and duties can be slowly increased, with changes being made every 2 to 4 weeks. It is important to note that a gradual return to work contrasts with the typical expectation from employers that workers return to work only when they are 100%. The use of the gradual return-to-work strategy will often require collaboration between the worker, the employer, and the OM physician

Communication

Frequent and collaborative communication among the worker, employer, and the OM physician is essential to a successful treatment plan. As with other sensitive medical conditions, communication between employers and workers with long COVID often breaks down. The best outcomes occur when OM physicians foster ongoing communication among the worker, employer, and the OM physician. Workers are only required to share their OM physician's work recommendations with their employers. However, if a worker shares additional details about the specific symptoms the worker is experiencing, this additional information can help employers understand a worker's unique return-to-work needs. Such clinical details may be needed to support a formal request under the ADA.

Occupational medicine physicians can contribute to optimal communication by using more frequent follow-up visits and by providing frequent updated work restrictions and accommodation prescriptions. Two- to 3-week intervals between work recommendation updates are optimal in the setting of long COVID. It is also important to remind patients that should they need modification of their work recommendations; because of changes in symptoms and function, they do not need to wait until scheduled appointments for updates. Long COVID symptom dynamics often change frequently. Electronic medical record systems provide workers the ability to send messages to their care team regularly. Communication via such electronic tools, outside of the confines of a scheduled appointment, can hasten recovery of health and improvements in work ability.

Remote Work

A silver lining of the COVID pandemic was the creation and use of remote work for many workers around the world. When available, access to remote work arrangements can further optimize a worker's long COVID treatment plan. Many workers with long COVID suffer from physical and cognitive sensitivity to environmental conditions such as heat and noise. Working from home allows greater control of a worker's environment and may increase work ability. For example, if someone has cognitive impairment and has difficulties working in an environment characterized by multiple conversations, enhancing work ability may be more successful in a quiet remote environment. When feasible, the opportunity for remote work allows for more effective rest periods.

Work Task Prescriptions

Tailoring a work task prescription to a worker's job tasks can optimize their return to health and work ability. For example, individuals with fatigue may need to be restricted to work that is not highly paced or work that does not involve extreme physical exertion. Workers with sleep disturbances can be prescribed a later start time. Specific work task prescriptions may be necessary to keep long COVID workers safe at work and during any rehabilitation program. As stated previously, each work with long COVID presents a unique grouping of symptoms, and any long COVID rehabilitation plan needs to be personalized especially when strenuous physical performance is involved.[64]

Workers with cognitive impairment may need to be restricted from operating heavy machinery. Workers with disturbed smell can be at risk in a job where olfactory function is crucial for safety. Consultation with the worker and the employer who together know the inherent risks of a particular job can help the OM physician develop the best work task prescription. Each worker with long COVID needs an individualized job task assessment including understanding the essential duties of the job from the employer perspective. It can be difficult for the OM physician to encompass all the potential work dangers in specific work task prescription. As a worker's long COVID symptoms change over time, it will be necessary for the OM physician to make periodic adjustments to their work task prescription for a worker with long COVID.

CONCLUSION

Following an acute episode of COVID-19, individuals may develop a broad array of new and/or continuing symptoms for up to 2 years postacute COVID-19,[65] impairing their ability to continue gainful employment. Despite the absence of a definition, or a pathophysiological explanation of long COVID, OM physicians may be called upon to evaluate a worker with symptoms of long COVID. When presented with a worker exhibiting long COVID symptoms, it is critical for the OM physician to understand the medical aspects of long COVID, ways to utilize functional measures to prevent a long COVID impairment from becoming a disabling condition, and practical approaches to assist the worker in maintaining employment.

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