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Post-COVID condition or "long COVID", return-to work, and occupational health research

Since the beginning of the COVID-19 pandemic, there has been a growing literature on COVID and work (1). Major editorials (2–4) and reports from international associations and agencies (5–8) have highlighted the importance of occupational health research in COVID-19 prevention and management. Occupational health research has focused on specific worker populations with high prevalence of COVID-19, particularly healthcare workers, and has studied the associations between different work exposures to SARS-CoV-2 and incidence of COVID-19. Some countries have also begun to provide workers' compensation for occupationally-acquired COVID-19 (9–13). Return to work (RTW) following COVID-19 is another crucial topic that has been studied among patients with severe cases of SARS-CoV-2 infection in different countries (14–18).

Clinicians have also observed patients who suffer from persistent symptoms following COVID-19, often called "long-COVID" (19). Through analyses of large health databases, a variety of post-acute sequelae among patients with COVID-19 have been identified, including malaise, fatigue, musculoskeletal pain, anemia, and other respiratory, neurocognitive, mental health, metabolic, cardiovascular, and gastrointestinal disorders (20). The World Health Organization defined a "post COVID-19 condition" among individuals with a history of probable or confirmed SARS-CoV-2 infection with symptoms continuing three months from the onset of COVID-19 infection, which last for at least two months, and which cannot be explained by an alternative diagnosis (21). Common symptoms include fatigue, shortness of breath, cognitive dysfunction, and generally have a significant impact on everyday functioning. Symptoms may be of 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 "Global Burden of Disease Long COVID Collaborators", a worldwide collaboration, defined three main post-COVID condition symptoms: (i) persistent fatigue with bodily pain (myalgia) or mood swings; (ii) cognitive problems, often forgetfulness or concentration difficulties, commonly referred to as "brain fog;" and (iii) ongoing respiratory problems (shortness of breath and persistent cough as the main symptoms) (22). This task force showed that, in a pooled study of over one million subjects, the prevalence of post-COVID condition was 0.9% [95% confidence interval (CI) 0.3–2.0%] after one year, but was at as high as 15% for symptoms that were presents at three months. Different factors were associated with a post-COVID condition, including age 20–49 years, female sex, and initial severity of illness (including hospitalization, intensive care unit admission, and mechanical ventilation) (22–24). For example, 26.6% (95% CI 11.5-47.8) of women who needed intensive care support had a post-COVID condition after a year. In 2023 in the United Kingdom, it was estimated that 2.0 million people living in private households (3.0% of the population) were experiencing self-reported post-COVID conditions (defined as symptoms continuing for more than four weeks after the first confirmed or suspected COVID-19 infection that were not explained by something else) (25). In the sample, more than 85% were in the working age.

The consequences of such unexpected persistence of disease on the health of the workforce are large. Most of the post-COVID symptoms found in the general population were similar for workers: in a recent review including 60 cohort studies of working age adults and 10 cases studies, the most frequently reported post-COVID-19 symptoms were fatigue (92%), shortness of breath (82%), muscle pain (44%) and joint pain (35%) (26). In a recent study with a 15-month follow-up of workers, similar symptoms were reported as well as cognitive symptoms and autonomic dysregulation (27). This study also assessed the Work Ability Index, and found that women had a larger self-reported reduction in work ability following COVID infection than men. RTW and work factors related to post-COVID condition have been examined in small samples of workers, and found that poorer work ability was

related to previous comorbidities, symptoms of fatigue, and some occupational and work organizational factors (28–31). Previous comorbidities related to chronic disease (obesity, hypertension and respiratory disorders), were associated with slower RTW among healthcare workers hospitalized for COVID-19. Asthenia / reported loss of memory and sleep disorders were associated with the longest duration of work absence (>3 months) (29). Some type of work and activity sectors have also been related to RTW outcomes. For example, in a small Canadian descriptive study, among healthcare workers physicians had better improvement than nurses and healthcare assistants (28), and business, finance and management sectors had overall the RTW outcome though not significant (31). Modification of work duties improved RTW in this same study, whereas skeptical reactions from employers and colleagues and lack of support from the social welfare system complicated RTW in a qualitative study (30).

Aben et al (32) conducted a study among employees who reported sick due to COVID-19 (N=30 396) or flu-like symptoms not due to COVID-19 (N=15,862), using routinely collected data from a national Dutch occupational health service. Even though there was a 100% RTW rate three months after a flu-like syndrome, the RTW rate after COVID-19 was only 92.8%. The authors were also able to determine important predictors contributing to later return to work in specific statistical models: older age [hazard ratio (HR) 0.99, 95% CI 0.99–0.99], female sex (HR 0.88, 95% CI 0.86–0.90), belonging to a risk group – including chronic illness, compromised immune system, diabetes, and obesity (HR 0.85, 95% CI 0.82–0.89), and some specific symptoms like shortness of breath and fatigue (HR for both symptoms 0.70, 95% CI 0.68–0.72) (32). However, other potential predictors (working conditions and workplace factors, economic context, resources, personal and lifestyle factors) were not exhaustively considered, and understanding causal relation between these factors and the RTW predictors identified is difficult. Aben et al (32) also highlighted that time-to-RTW was shortened as different virus variants became dominant over time. For example, 12.8% of employees who contracted COVID-19 were absent from work for >12 weeks during the alpha virus dominant period, but this number declined to 5.8% in the delta virus-dominant period and to 1.4% in the omicron virus dominant period (32).

Strategies promoting return to work for those with post-COVID-19 conditions will need to be implemented and could be comparable to programs developed for other chronic conditions, since post-COVID conditions share some similarities to post-intensive care syndrome, fibromyalgia, and chronic fatigue syndrome (15, 33, 34). These patients have better outcomes following integrative health approach that combines traditional medical management, non-pharmacological treatments including physical therapy, and behavior and lifestyle changes (35, 36). As with RTW following other illnesses, RTW efforts post-COVID should look out for potential red flags or complications (19). Guidelines recommend that occupational practitioners should be included in the process as early as possible, and give importance to job accommodations for improving work ability of such workers (5, 8, 37). An observational study on a small sample of workers undergoing specific rehabilitation for post-COVID conditions reported significant but modest improvements on a variety of symptoms, though only half of the participants were able to return to work (31). Additional research in working populations is needed with larger observational cohorts, randomized controlled trials, and mixed approaches to evaluate the cost-effectiveness of integrative care and other approaches in preserving work ability for these patients (38–40).

In conclusion, COVID-19 remains an important topic for the occupational health research agenda, including acute and post COVID conditions. Although there is still debate about the definition of what a 'post-COVID condition' entails, the sheer number of patients who are not returning to work in a timely manner or returning to work with limitations, and the lack of research interventions available should lead occupational health practitioners and researchers to work not only to prevent infection but to prevent or reduce work disability resulting from the COVID-19 pandemic and future pandemics.

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