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Covid-19 Infection And Return-To-Work Status Among Workers

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ABSTRACT

INTRODUCTION: To date, more than 120 million working-age Americans have had COVID-19 infection. Up to 80% of those infected have reported substantial persistent symptoms, known as long COVID. While current research continues to investigate long-term health effects of COVID-19 infections, less information exists on COVID-19's impact on employment and return-to-work status. This study aims to better characterize the issues related to return-to-work status in those with long COVID.

METHODS: Participants were recruited form the Yale Post-COVID-19 clinic. A mixed-methods survey was administered to collect demographic and employment information. Standardized scales were utilized to assess symptoms and functional status. Survey responses were entered into a Qualtrics database and analyzed using SAS software.

RESULTS: Thirty-one participants have been enrolled to-date with a variety of job categories. Twenty-one respondents (67%) had returned to work in some capacity. The mean length of time away from work for those who had returned to work was 3 months, while the mean time for those who had not returned to work was 16 months. Ninety percent of participants who did not return to work had less than a college degree and 50% had a decreased DLCO. Half of those who had not returned to work were healthcare workers. Fifty-two percent of participants thought their COVID-19 infection was work-related, but only 50% of those individuals applied for Workers' Compensation.

CONCLUSION: In this selected group of workers with history of COVID-19 infection and persistent symptoms, two thirds of employees had returned to work, but the average number of lost workdays was substantial. Given the millions of U.S. workers experiencing persistent symptoms following COVID-19 infection, there is a need to better understand the impact of COVID-19 on workers, including risk factors for prolonged sick leave and unemployment, and how to improve work outcomes.

Acknowledgements

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INTRODUCTION

More than 120 million working-age Americans have been infected with COVID-19 since the spring of 2020 (3). The first reported case of COVID-19 in the US was in mid-February 2020 (1). Connecticut had its first confirmed case in mid-March 2020 and was at the center of the first wave of COVID-19 cases in the United States (2) (see Figures 2 and 3). Connecticut experienced its second wave during the fall of 2020 resulting in further hospitalizations and disability. To date, there have been more than 760,000 cases of COVID-19 in Connecticut, resulting in almost 11,000 deaths (4). Connecticut had a working population of approximately 1.9 million individuals when COVID-19 first arrived in the state, and has resulted in significant loss of work hours and disability (5). The long-term health and socioeconomic consequences of COVID-19 remain uncertain.

Acute COVID-19 Disease

COVID-19 is the illness caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS CoV-2). Acute COVID-19 infection can result in a wide range of disease severity. It has been reported that up to 30% of COVID-19 cases may be asymptomatic (6). Typically, symptomatic COVID-19 initially presents with fever and dry cough (7). Disease severity is typically mild in about 80% of cases and does not require hospitalization (8). More severe disease is characterized typically by pneumonia with bilateral patchy infiltrates on chest imaging and hypoxia, which commonly requires oxygen supplementation. Up to twenty percent of patients who are hospitalized with COVID-19 pneumonia develop severe acute respiratory distress syndrome (ARDS), requiring ICU-level care including mechanical ventilation (7, 9). Risk for severe disease includes older age, male sex, obesity, and lower socioeconomic status (10-13). Almost two thirds of adults hospitalized with COVID-19 have been aged 45 years or older (14). Since the introduction of COVID-19 vaccines in early 2021, the morbidity and mortality

of COVID-19 has been reduced among those vaccinated (15, 16), but there has continued to be disease spread (2).

Long COVID

While most individuals improve over the course of weeks following COVID-19 infection, an entity has been described where individuals have had symptoms persist for months following acute illness. It was reported that 85% of ICU patients experienced fatigue 6 months following initial infection (17). Known as Post-Acute Sequelae of Sars CoV-2 (PASC), this condition has been called informally long COVID. While initially described in patients with more severe COVID-19 disease, long COVID also occurs after mild cases of COVID-19 infection. Previous studies have concentrated mostly on populations who were previously hospitalized and have measured persistent symptoms and overall quality of life outcomes (18). A wide range of symptoms, from mild to debilitating, has been described in long COVID, and have been reported to persist for months after initial COVID-19 infection (19). The most common symptoms are fatigue, shortness of breath and neurocognitive dysfunction—often described as *brain fog*. Literature suggests that anywhere from one quarter to more than 80% of those infected with COVID-19 may develop persistent symptoms beyond their initial acute infections (20, 21). There is a phenotype of long COVID with objective findings including fibrosis following severe COVID-19 pneumonia (22). There are also reports of postural orthostatic tachycardia (POTS) that can persist for months after acute infection (23). While some individuals have abnormalities noted on exam and diagnostic testing, the majority of those with long COVID symptoms have normal medical evaluations and laboratory testing (24).

Limited prior studies have described the work status of individuals who were employed at the time of their COVID-19 infection. These studies have focused primarily

on hospitalized patients outside the United States. Several studies have shown that approximately 50% to 80% of patients return to work between 3 to 6 months after their illness, depending on the study population (18, 24-26). One Danish study showed that those with worse disease courses, such as ICU-level care, were less likely to return to work by six months following illness (27). Several studies in health care workers have shown that persistent symptoms are common, but most of these workers have been able to return to work (28, 29).

Context of Study:

Few studies have looked at the impact of COVID-19 on workers across different industry sectors, the duration of time away from work, ability to return to work, accommodations needed, and type of work-related benefits. This pilot study serves as an opportunity to identify important issues faced by workers with COVID-19 who have persistent symptoms.

Methods:

This study was approved by the Yale University Institutional Review Board (study #2000030952). Participants were recruited for this pilot observational study from the panel of patients who had been evaluated at the Yale Winchester Center for Lung Disease Post COVID-19 Recovery Program (RECOVERY). Briefly, individuals are referred to this clinic from the community for persistent COVID-19 infections or following hospitalizations. Less than half of participants in this clinic have been hospitalized. This multidisciplinary clinic evaluates patients utilizing pulmonary function tests (PFTs), baseline labs, a standardized shortness of breath scale and a PROMIS Global-10 evaluation for patient-perceived global health. Not all patients are referred for imaging or invasive testing. The RECOVERY clinic has enrolled approximately 900 participants to date (30). Participants were asked if they were willing to participate in the study following their evaluation at RECOVERY clinic. The average time from symptom onset to survey enrollment was approximately sixteen months (495 days). Inclusion criteria included those who have already been referred to the RECOVERY clinic, adults 18 years of age or older, English speakers, and individuals who were employed at the time of their COVID-19 infections. Fifty-one participants were approached and asked to participate in the study. Twenty patients were unable to schedule telephone interviews to complete the survey. Verbal consent was obtained either in-person or over the phone. Thirty-one participants have been recruited to date. See Figure 1 for an approximate timeline of events related to recruiting.

A mixed methods survey was administered to collect demographic information, employment information such as job title and industry, whether COVID-19 was thought to be work-related, current work status, duration of time off work for COVID-19, job modifications and employment benefits. Standardized scales were utilized to assess

symptoms. This included the Modified Medical Research Council dyspnea scale (mMRC) (31), Cognitive Failures Questionnaire (CFQ) (32) and the PROMIS Global-10 questionnaire (33). Chart review was performed to confirm COVID-19 diagnosis, and the timing and severity of illness. Additional information available from respondents' clinic visits included pulmonary function tests, PROMIS Global-10 survey and mMRC dyspnea scale obtained at the time of initial RECOVERY clinic visit. Data was entered into a Qualtrics database.

Data was analyzed using SAS software (34). Data analysis was primarily descriptive in nature. For analysis of symptoms, Fisher Exact T tests were utilized given the limited number of participants. Qualitative answers were reviewed from the interviews and discussed in a descriptive nature.

Results:

To date, 31 participants have enrolled in the study. Table 1 presents a summary of the study population characteristics. The study population is predominantly female (84%). The mean age of participants was 48.2 years. The population is predominantly white (77%) and non-Hispanic (74%). Most of the respondents owned a home at the time of their COVID-19 infection (68%). Regarding pre-existing health conditions, more than half of study participants were obese (52%), four (13%) had hypertension, three (10%) had Diabetes Mellitus II, and 2 (7%) had a pre-existing lung disease.

Table 2 presents a summary of employment characteristics for participants at the time of their initial COVID-19 infections. These characteristics are further summarized by return-to-work status. Participants were employed in a variety of job sectors, including healthcare (32%), education (29%), management (26%), transportation/production (7%), and self-employed (7%). Healthcare positions included medical support staff, nurses, direct care staff and one MD. The differences between job sectors and return-to-work status are visualized in Figure 2. Twenty-nine percent of respondents had a total household income between $50,000 and $100,000 per year, while 26% made less than $50,000. Fifteen percent made more than $100,000 per year and 26% either did not know their household income or preferred not to say. For statistical analysis, education was dichotomized to two distinct levels; those with a college degree or more and those with a high school diploma or associate degree or some college. Fifty-two percent of the participants had a college degree or more, while 48% had a high school diploma, associate degree or some college. Of those individuals that had not returned to work, only 10% had a college degree or more, while those that did return to work, 71% had a college degree or more. This difference was statistically significant ($p=0.0024$).

At the time of their initial COVID-19 infection 77% of the respondents were employed full time, 74% reported having employer-sponsored health insurance, 23% reported receiving health insurance from another source (either the state or through a spouse) and only one respondent did not have health insurance at the time of their initial infection. The benefit differences among those who did and did not return to work were not statistically significant.

Table 3 describes the general clinical course of participants' COVID-19 infections. Most respondents were not hospitalized (81%) during their initial COVID-19 infection. Of those that were hospitalized (n=6), 3 were admitted to the ICU, two of whom were intubated. Lung function test results at the time that participants were enrolled in the study are summarized. Nineteen percent of participants had a reduction in FEV1 of < 80%, and 21% of participants had a reduction in DLCO of < 70%.

As shown in Table 3, the mean number of days from COVID-19 infection to first visit at the Yale Post COVID-19 Recovery clinic was 249 days (about 8 months). The mean number of days from initial clinic date to participation in study interview was 230 days (about 8 months). In total, approximately 16 months passed from time of infection to study enrollment. Sixty-eight percent of participants had returned to work by the time of interview, while 10 respondents (32%) had not returned to work in any capacity, two of whom had attempted to return, but had to stop work shortly after returning (<2 weeks) due to severe symptoms. For the purposes of this study, this group is categorized as having not returned to work. Of the respondents who had returned to work, the mean number of days out of work from time of infection to first day back was 93.9 (about 3 months). Individuals who had not returned to work had been away from work for a mean of 495 days (almost 17 months). Approximately half of the participants (52%) believed that they had a COVID-19 infection that was most likely obtained at work.

Table 4 summarizes clinical characteristics, lung function testing and symptoms of participants at the time of the study interview for all participants, comparing those who returned to work and those who did not. Half of the participants who did not return to work had a DLCO <70%, while only one participant who did return to work had a DLCO <70%. This difference was statistically significant (p=0.0105).

The number of days from first symptoms to survey was a mean of 471 days (approximately 16 months) and was similar for both those who had and had not returned to work. Almost all respondents reported that they still had symptoms at the time of the interview. The most prevalent symptom was fatigue (84%), followed by shortness of breath (74%), and neurocognitive symptoms including brain fog (65%). Differences between those who had and had not returned to work were not significant. The mMRC dyspnea scale asks participants to self-rate their shortness of breath from 0 to 4, 0 being shortness of breath only with strenuous exercise, and 4 being too short of breath to leave the house. Participants averaged a score of 1.7, which was not statistically significant between those who have and have not returned to work.

PROMIS Global-10 questionnaire was administered at study enrollment. The mean global physical score was 8.9 (approximate T-score in the 32nd percentile) and the mean global mental score was 11.6 (approximate T-score in the 43rd percentile). Notably, on the PROMIS Global-10 question regarding fatigue, 38% of respondents noted that their fatigue was *severe* or *very severe.* Baseline PROMIS Global-10 scores were also obtained at the time of initial RECOVERY clinic visit (data not shown). These scores were not significantly different despite the approximate 8 months between RECOVERY survey and interview survey, demonstrating the chronicity of reported symptoms.

The Cognitive Failures Questionnaire was administered at the time of interview, which asked questions regarding concentration, memory, and attentiveness, with high scores indicating a higher level of cognitive dysfunction, with a score of 50 being about average (32). Participants scored slightly below the average (39.8), and there were no statistical differences between those who had and had not returned to work.

Table 5 illustrates the work readiness of those who were able to return to work. Of the individuals who had returned to work, only 19% reported that they felt ready to return, and almost half (43%) had received formal accommodations. Accommodations included light duty, fewer hours, remote work or altered schedule. Most individuals (67%) still reported formal accommodations at the time of interview. Of the provided responses, 87% worried that they would not return to their baseline prior to their COVID-19 infection.

A summary of the utilization of benefits for individuals in the study population is shown in Table 6. Individuals were asked if they had applied for any disability benefits during their time off. Over a third had applied for disability (39%), either short term or long term. Of those who had applied, 83% had received some form of disability benefit, the remaining of which were pending. Of those that responded that their COVID-19 infection was work-related, only half have applied for Workers' Compensation. As of this writing, only 2 cases have been accepted, 1 was denied, and 5 were still pending. Notably 25% of those who had work-related COVID-19 infections reported that they were advised by their employers to not apply for Workers' Compensation.

Discussion:

Several findings in this pilot study exploring work outcomes in employees with long COVID are notable. While all but one participant had health insurance, about a third (36%) reported not having any paid leave benefit as part of their employment at the time of their COVID-19 infection. Although only 19% were hospitalized, persistent symptoms were common over a year after their acute COVID-19 illness, especially fatigue (85%), shortness of breath (74%), and memory problems (65%). Despite these on-going symptoms, two-thirds of participants were able to return to work. However, they were away from work for an average of over 3 months and 90% remained concerned that they would not return to their baseline.

Of note, a third of participants have been unable to return to work, and their mean time out of work is 16 months. Those unable to return to work were more likely to have a reduced DLCO on their pulmonary function testing, were more likely to be a healthcare worker and were less likely to have a college degree or higher. A number of clinical, job and personal characteristics were not associated with post-COVID work status, including the severity of the acute illness, severity of symptoms or job benefits.

Also notable, 50% of participants thought that their COVID-19 infection was most likely work-related, although only half of these participants applied for Workers' Compensation, and to-date, over a year after their COVID-19 illness, only 25% who applied have had their claim accepted.

The findings of this study are generally consistent with the limited studies to date evaluating work status and determinants of return-to-work ability following COVID-19 infection. Previous studies have shown that persistent symptoms are common anywhere from 3 to 6 months following initial COVID-19 illness (9, 18, 35). This study further demonstrates that symptoms of long COVID can persist up to 16 months after

initial infection, with no significant improvement noted from the time of initial evaluation in the post COVID recovery program to interview for this study, a mean of 8 months.

Previous long COVID studies have explored return-to-work status as an outcome following COVID-19 infection, with around 80% of individuals returning to work (26). A large Danish study found that up to 98% had returned to work after six months following their COVID-19 infection (27), however, the study was conducted using a Danish population which may not be characteristic of the US population. Furthermore, the study lacked a distinction among specific job categories. Early in the pandemic there had been studies specifically exploring the relationship of healthcare workers returning to work after COVID-19 infection (28, 36, 37), which showed that most health care workers are able to return to work despite on-going symptoms. Studies that explore return-to-work issues in employees outside of the healthcare field are very limited. The findings presented here describe the impact of long COVID on workers from a number of different job sectors.

The use of standardized questionnaires for individuals with COVID-19 infection enables comparison across studies. In a cross-sectional study of all individuals presenting to the Cleveland Clinic during the COVID-19 pandemic, PROMIS-10 questionnaires were administered showing a PROMIS-10 Global Physical T-score of 48.5 and a PROMIS-10 Global Mental T-score of 45.8 (38). The results of our study are lower for both Global Mental and Global Physical T scores, 32 and 43 respectively, showing lower physical and mental health, and also no improvement in scores over time. This difference may be due to the fact that the Cleveland Clinic study did not limit participants to those with COVID-19 infection, but also included non-COVID patients presenting during the pandemic, and also did not select for patients with long COVID.

Previous studies have looked at mMRC scores in COVID-19-infected populations. One such study showed that those with lower oxygen saturations, likely with worse COVID-19 pneumonia, experienced greater shortness of breath (higher mMRC scores) on questionnaire. (39). Our study results were not significantly different for those who had and had not returned to work.

The Cognitive Failures Questionnaire has been used in previous studies to measure attention and distractibility. The original studies validating the CFQ indicated that the mean score was 34 to 55 depending on specific sample population (32). The mean of 39 found in our study indicates that respondents had a score that was about average in reported general populations. To the best of our knowledge, there have been no studies to evaluate the use of the CFQ in COVID-19.

The findings of this study are also consistent with previous literature discussing how there is a subset of patients who have decreased lung function after COVID-19 infection, particularly in those with severe COVID-19 illness (18, 26) and that these patients have more trouble returning to work.

This pilot study found that although the many individuals with long COVID were able to return to work, there is still a significant number of individuals who have been unable to return. The individuals in this study population represent a group that was primarily infected within the first year of the COVID-19 pandemic, and despite this almost a third have still not been able to return to work. The majority of respondents in this study were not severely ill during their initial infection but have had symptoms persist for more than 16 months. Healthcare workers were more likely to not return to work. This may be partly due to their inability to have accommodations at work, including the nature of their in-person work that cannot be done remotely. It is notable that of those that did apply for a disability benefits, most did receive it in some form after

their initial infection. Also notable, those who did not return to work did have a more significant decrease in their DLCO. Employees felt as though their infections were work-related, though many did not apply for Workers' Compensation.

Individuals with less than a college education were more likely to have not returned to work. This reflects that jobs requiring less education may be more physical in nature. More manual jobs may have less flexibility to accommodate such offerings as remote work, modified scheduling, or adjusted work duties.

One strength of this study is that we are looking at a US population of workers who had relatively mild disease, which is the case for most people who contract COVID-19 infection, which makes it more generalizable to the larger number of people who have had relatively mild disease. Another strength is the length of time between initial COVID-19 infection and study involvement. As noted, many studies have looked at individuals only a few months after their COVID-19 infections, but this study indicates that symptoms are lasting much longer and may continue to persist for years after COVID-19 infection.

There are several important limitations of this study. One is that this is a selective sample of patients from a group that had been referred to a post-COVID-19 recovery program. These individuals, by definition, do not represent a *typical* COVID-19 patient. Despite being a self-selected group of individuals within a long COVID-19 clinic, a significant proportion were still able to return to work. The number of those that returned to work may be partly explained by the extended time between initial infection and the interview. Another limitation of this pilot study is the small sample size. There did not appear to be a statistically significant association with symptoms or occupation category and return-to-work status, but there are trends that can be noted. By recruiting a larger

sample, it may be possible to gain greater insight into the characteristics that affect the ability to return to work.

Given that we will continue to deal with COVID-19 infections in the future, we will likely see an increasing number of individuals suffering from long COVID, resulting in loss of work and disability. Although this is a pilot study, it may be used to direct future research in the field. More work needs to be done to identify risk factors for inability to return to work and interventions that can help workers who want to return to work do so. Further research needs to address why individuals with lower education may be less likely to return to work. There is also a need to better educate workers about their rights regarding accommodations and benefits.

Figures and tables:

Figure 1. COVID-19 Infections in Connecticut & Timeline of Study

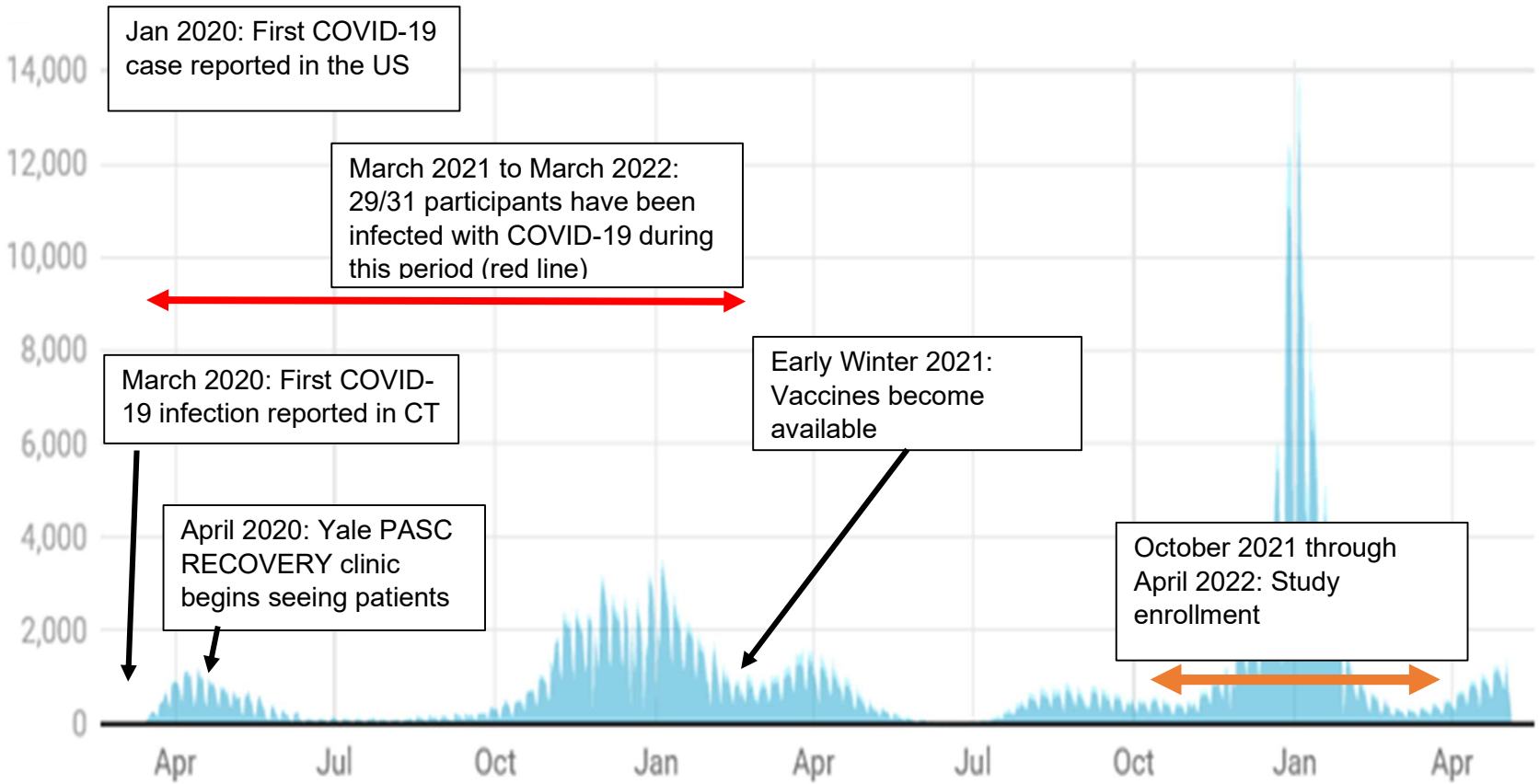

Figure 1 displays the total number of COVID-19 positive cases (Y-axis) in Connecticut from mid-March 2020 through April 2022 (X-axis). Superimposed, is a general timeline of COVID-19 in CT and this study. The mean number of days from initial COVID-19 infection to first encounter with the Yale PASC RECOVERY clinic was 249 days, or approximately 8 months. The mean time from initial COVID-19 infection to time of interview for this study was 479 days, or approximately 16 months. Data (1), Figure source (2).

Table 1. Demographics	
Demographic characteristics **N=31**	n (%)
Age (years), mean ± SD	48.2 ± 13.8
Sex	
Female	26 (83.9)
Male	5 (16.1)
Race	
White	24 (77.4)
African American or Black	3 (9.7)
American Indian	1 (3.2)
Other	3 (9.6)
Education	
High School Grad/GED	6 (19.4)
Some College or Associate	9 (29.0)
College Graduate	5 (16.1)
More Than College	11 (35.5)
Housing Status	
Own	21 (67.7)
Rent	10 (12.3)
Smoking Status	
Never	23 (74.2)
Former	7 (22.6)
Current	1 (3.33)
Pre-existing conditions	
BMI >30kg/m^2	16 (51.6)
Hypertension	4 (12.9)
Diabetes	3 (9.7)
Prior Lung disease	2 (6.6)
Table 1 consists of baseline demographics for the study population.	

Table 2. Employment Characteristics			
Employment descriptors N=31	**Total N=31**	**Returned to work N=21**	**Have not returned N=10**
Type of work			
Healthcare	10 (32.3)	5 (23.8)	5 (50.0)
Education	9 (29.0)	7 (33.3)	2 (20.0)
Management	8 (25.8)	7 (33.3)	1 (10.0)
Transport/Production	2 (6.5)	2 (9.5)	0 (0.0)
Self-employed	2 (6.5)	0 (0.0)	2 (20.0)
Household Income			
<$50,000	8 (25.8)	5 (23.8)	3 (30.0)
$50,000-$100,000	9 (29.0)	1 (4.8)	0 (0.0)
>$100,000	6 (15.4)	10 (47.6)	4 (40.0)
Don't know/Prefer not to say	8 (25.8)	5 (23.8)	3 (30.0)
Education			
College Degree or More	16 (51.6)	15 (71.4)*	1 (10.0)*
Associate Degree or Some College	15 (48.4)	6 (28.6)*	9 (90.0)*
Self-Reported Time Working			
Full-Time	24 (77.4)	18 (85.7)	6 (60.0)
Part-Time	7 (22.6)	3 (14.3)	4 (40.0)
Health Insurance			
Employer sponsored insurance	23 (74.2)	17 (81.0)	6 (60.0)
Other health insurance source	7 (22.6)	4 (19.0)	3 (30.0)
None	1 (3.3)	0 (0.0)	1 (10.0)
Paid Leave offered by employer			
Yes (Sick/Vacation or other)	20 (64.5)	13 (61.9)	7 (70.0)
None	11 (35.5)	8 (38.1)	3 (30.0)

Table 2 is a summary of employment characteristics of the study population at the time of their initial COVID-19 infection.
*Education was dichotomized and differences were measured using Fisher Exact T test which was significant with a p= 0.0024.

Table 3. Clinical Course	
Illness characteristics **N=31**	n (%)
Severity of Illness	
Not Hospitalized	25 (80.6)
Hospitalized	6 (19.4)
Highest level of care (n=7)	
Medical Floor	3 (43.0)
ICU	3 (43.0)
Most Recent PFTs	
FEV1 <80%	6 (19.4)
DLCO <70% (n=29)	6 (20.7)
Both FEV1 <80% and DLCO <70%	3 (9.7)
Duration, mean ± SD	
Days from infection to Yale PASC clinic	249 ± 148
Days from infection to study enrollment	479 ± 162
Returned to work?	
Yes	21 (67.7)
No	10 (32.3)
Days out of work, mean ± SD	
Those who have returned to work	93.9 ± 118
Have not returned to work	495 ± 188
Do you believe your COVID-19 was work related?	
Yes	16 (51.6)
No	15 (48.4)
Table 3 describes the clinical course for participants. Two participants did not have DLCOs obtained on PFTs	

Table 4. Characteristics at Time of Interview			
Clinical characteristics	**Total N=31**	**Returned to work N=21**	**Have not returned N=10**
Age, Mean ± SD	48.2 ± 13.8	46.7 ± 15.4	51.3 ± 9.53
Sex			
Female	26 (83.9)	17(81.0)	9 (90.0)
Male	5 (16.1)	4 (19.0)	1 (10.0)
Days from symptom onset to study interview	479 ± 162	471 ± 152	495 ± 188
Symptoms at time of Interview			
Shortness of breath	23 (74.1)	16 (76.2)	7 (70.0)
Fatigue	26 (83.9)	16 (76.2)	10 (100.0)
Memory/Neurocognitive	20 (64.5)	14 (66.7)	6 (60.0)
Palpitations	11 (35.4)	7 (33.3)	4 (40.0)
Chest pain	11 (35.4)	6 (28.6)	5 (50.0)
mMRC dyspnea scale (0 to 4 scale), mean ± SD SOB score	1.7 ± 1.1	1.6 ± 1.2	1.9 ± 09
PROMIS Global-10 (4 to 20)			
Post Global Physical	8.9 ± 2.3	9.5 ± 2.2	7.7 ± 2.1
Post Global Mental	11.6 ± 2.9	12.0 ± 2.2	10.7 ± 4.1
Cognitive Failure Questionnaire (0 to 100)	39.8 ± 18.9	38.7 ± 19.2	41.9 ± 19.2
DLCO <70% (n=29)	6 (20.7)*	1 (5.3)*	5 (50.0)*
FEV1 < 80%	6 (19.4)	3 (14.3)	3 (30.0)
Worry you will not return to baseline? (n=30)			
Agree	26 (86.7)	18 (90.0)	8 (80.0)
Disagree	4 (13.3)	2 (10.0)	2 (20.0)

Table 4 characterizes the clinical characteristics, lung function and symptoms at the time of study enrollment.
*Fisher Exact two-sided T test was preformed and was significant at p=0.0105

Figure 2 displays those who have and have not returned to work based on job sector

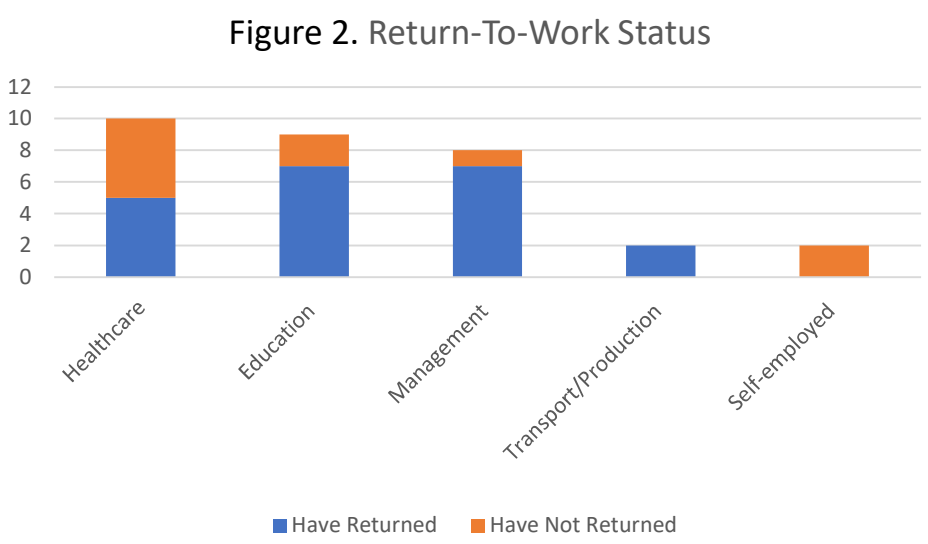

Table 5. Work Readiness For Those That Returned	
Work characteristics **N=21**	n (%)
Did you feel ready to return to work?	
Yes	4 (19.0)
No	17 (81.0)
Did you receive accommodations?	
Yes	9 (42.9)
No	12 (57.1)
Do you still have accommodations? (n=9)	
Yes	6 (66.7)
No	3 (33.3)
Individuals were asked about how they felt about returning to work. Accommodations consisted of reduced hours, different job duties, and remote work options.	

Table 6. Work-Related Benefits			
Specific benefit inquiries	**Total N=31**	**Returned to work N=21**	**Have Not returned N=10**
Applied for Disability?			
Yes	12 (38.7)	6 (28.6)	6 (60.0)
No	19 (61.3)	15 (71.4)	4 (40.0)
Disability Status? (n=12)			
Received	10 (83.3)	6 (100.0)	4 (66.7)
Pending	2 (16.7)	0 (0)	2 (33.3)
Do you believe your COVID-19 was work related?	16 (51.6)	10 (47.6)	6 (60.0)
Yes	15 (48.4)	11 (52.4)	4 (40.0)
No			
Applied for Workers' Compensation? (n=16)			
Yes	8 (50.0)	4 (40.0`)	4 (66.6)
Status of Workers' Compensation case? (n=8)			
Accepted	2 (25.0)	1 (25.0)	1 (25.0)
Denied	1 (12.5)	1 (25.0)	0 (0.0)
Pending/unsure	5 (62.5)	2 (50.0)	3 (75.0)

Table 6 characterizes work-related benefits in both those who have and have not returned to work. Individuals were asked where they most likely were infected with COVID-19.

References:

1. CDC. CDC Museum COVID-19 Timeline. CDC; 2022.
2. CTDPH. Connecticut COVID-19 Update. 2022.
3. CDC. Covid Tracker Weekly Review. CDC.GOV; 2022.
4. NYTimes. Tracking Coronavirus in Connecticut: Latest Map and Case Count. New York Times; 2022.
5. Labor Market Information. CT Department of Labor; 2022.
6. Oran DP, Topol EJ. The Proportion of SARS-CoV-2 Infections That Are Asymptomatic : A Systematic Review. *Ann Intern Med*. 2021;174:655-662.
7. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review. *JAMA*. 2020;324:782-793.
8. Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72314 Cases From the Chinese Center for Disease Control and Prevention. *JAMA*. 2020;323:1239-1242.
9. Hodgson CL, Higgins AM, Bailey MJ, et al. The impact of COVID-19 critical illness on new disability, functional outcomes and return to work at 6 months: a prospective cohort study. *Crit Care*. 2021;25:382.
10. Gao YD, Ding M, Dong X, et al. Risk factors for severe and critically ill COVID-19 patients: A review. *Allergy*. 2021;76:428-455.
11. Pijls BG, Jolani S, Atherley A, et al. Demographic risk factors for COVID-19 infection, severity, ICU admission and death: a meta-analysis of 59 studies. *BMJ Open*. 2021;11:e044640.
12. Magesh S, John D, Li WT, et al. Disparities in COVID-19 Outcomes by Race, Ethnicity, and Socioeconomic Status: A Systematic-Review and Meta-analysis. *JAMA Netw Open*. 2021;4:e2134147.
13. Yoshikawa Y, Kawachi I. Association of Socioeconomic Characteristics With Disparities in COVID-19 Outcomes in Japan. *JAMA Netw Open*. 2021;4:e2117060.
14. Team CC-R. Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) - United States, February 12-March 16, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69:343-346.
15. Sharif N, Alzahrani KJ, Ahmed SN, Dey SK. Efficacy, Immunogenicity and Safety of COVID-19 Vaccines: A Systematic Review and Meta-Analysis. *Front Immunol*. 2021;12:714170.
16. Zheng C, Shao W, Chen X, Zhang B, Wang G, Zhang W. Real-world effectiveness of COVID-19 vaccines: a literature review and meta-analysis. *Int J Infect Dis*. 2022;114:252-260.
17. Horwitz LI, Garry K, Prete AM, et al. Six-Month Outcomes in Patients Hospitalized with Severe COVID-19. *J Gen Intern Med*. 2021;36:3772-3777.
18. Michelen M, Manoharan L, Elkheir N, et al. Characterising long COVID: a living systematic review. *BMJ Glob Health*. 2021;6.
19. Sandler CX, Wyller VBB, Moss-Morris R, et al. Long COVID and Post-infective Fatigue Syndrome: A Review. *Open Forum Infect Dis*. 2021;8:ofab440.
20. Menges D, Ballouz T, Anagnostopoulos A, et al. Burden of post-COVID-19 syndrome and implications for healthcare service planning: A population-based cohort study. *PLoS One*. 2021;16:e0254523.
21. Groff D, Sun A, Ssentongo AE, et al. Short-term and Long-term Rates of Postacute Sequelae of SARS-CoV-2 Infection: A Systematic Review. *JAMA Netw Open*. 2021;4:e2128568.
22. Ambardar SR, Hightower SL, Huprikar NA, Chung KK, Singhal A, Collen JF. Post-COVID-19 Pulmonary Fibrosis: Novel Sequelae of the Current Pandemic. *J Clin Med*. 2021;10.
23. Raman B, Bluemke DA, Luscher TF, Neubauer S. Long COVID: post-acute sequelae of COVID-19 with a cardiovascular focus. *Eur Heart J*. 2022;43:1157-1172.
24. Vanichkachorn G, Newcomb R, Cowl CT, et al. Post-COVID-19 Syndrome (Long Haul Syndrome): Description of a Multidisciplinary Clinic at Mayo Clinic and Characteristics of the Initial Patient Cohort. *Mayo Clin Proc*. 2021;96:1782-1791.

25. Danesh V, Arroliga AC, Bourgeois JA, Widmer AJ, McNeal MJ, McNeal TM. Post-acute sequelae of COVID-19 in adults referred to COVID recovery clinic services in an integrated health system in Texas. *Proc (Bayl Univ Med Cent)*. 2021;34:645-648.
26. Sanchez-Ramirez DC, Normand K, Zhaoyun Y, Torres-Castro R. Long-Term Impact of COVID-19: A Systematic Review of the Literature and Meta-Analysis. *Biomedicines*. 2021;9.
27. Jacobsen PA, Andersen MP, Gislason G, et al. Return to work after COVID-19 infection - A Danish nationwide registry study. *Public Health*. 2022;203:116-122.
28. Chaudhry ZS, Cadet L, Sharip A. Return to Work, Demographic Predictors, and Symptomatic Analysis Among Healthcare Workers Presenting for COVID-19 Testing: A Retrospective Cohort From a United States Academic Occupational Medicine Clinic. *Cureus*. 2021;13:e19944.
29. Gholami M, Fawad I, Shadan S, et al. COVID-19 and healthcare workers: A systematic review and meta-analysis. *Int J Infect Dis*. 2021;104:335-346.
30. Lutchmansingh DD, Knauert MP, Antin-Ozerkis DE, et al. A Clinic Blueprint for Post-Coronavirus Disease 2019 RECOVERY: Learning From the Past, Looking to the Future. *Chest*. 2021;159:949-958.
31. Munari AB, Gulart AA, Araujo J, et al. Modified Medical Research Council and COPD Assessment Test Cutoff Points. *Respir Care*. 2021;66:1876-1884.
32. Broadbent DE, Cooper PF, FitzGerald P, Parkes KR. The Cognitive Failures Questionnaire (CFQ) and its correlates. *Br J Clin Psychol*. 1982;21:1-16.
33. Hays RD, Bjorner JB, Revicki DA, Spritzer KL, Cella D. Development of physical and mental health summary scores from the patient-reported outcomes measurement information system (PROMIS) global items. *Qual Life Res*. 2009;18:873-880.
34. SAS Software. SAS Institute Inc.; 2020.
35. Jacobson KB, Rao M, Bonilla H, et al. Patients With Uncomplicated Coronavirus Disease 2019 (COVID-19) Have Long-Term Persistent Symptoms and Functional Impairment Similar to Patients with Severe COVID-19: A Cautionary Tale During a Global Pandemic. *Clin Infect Dis*. 2021;73:e826-e829.
36. Gaber TAK, Ashish A, Unsworth A. Persistent post-covid symptoms in healthcare workers. *Occup Med (Lond)*. 2021;71:144-146.
37. Zhang JC, Findlater A, Cram P, Adisesh A. Return to work for healthcare workers with confirmed COVID-19 infection. *Occup Med (Lond)*. 2020;70:345-346.
38. Lapin BR, Tang WHW, Honomichl R, Hogue O, Katzan IL. Evidence of Stability in Patient-Reported Global Health During the COVID-19 Pandemic. *Value Health*. 2021;24:1578-1585.
39. Berezin L, Zhabokritsky A, Andany N, et al. Diagnostic accuracy of subjective dyspnoea in detecting hypoxaemia among outpatients with COVID-19: a retrospective cohort study. *BMJ Open*. 2021;11:e046282.