

Good afternoon. I'm Commander Ibad Khan, and I'm representing the Clinician Outreach and Communication Activity, COCA, with the Emergency Risk Communication Branch at the Centers for Disease Control and Prevention. I would like to welcome you to today's COCA Call, Evaluating and Supporting Patients Presenting With Fatigue Following COVID-19. All participants joining us today are in listen only mode.

Free continuing education is offered for this webinar. Instructions on how to earn continuing education will be provided at the end of the call.

In compliance with continuing education requirements, CDC, our planners, our presenters, and their spouses/partners wish to disclose they have no financial interests or other relationships with the manufacturers of commercial products, suppliers of commercial services, or commercial supporters, except Benjamin Abramoff, who would like to disclose that he does receive honorarium for educational grant rounds when he presents on post-acute sequelae of SARS-CoV-2 infection that are arranged through Medical Education Speakers Network.

Planners have reviewed content to ensure there is no bias.

The presentation will not include any discussion of the unlabeled use of a product or a product under investigational use, except part of the presentation will address the use of COVID-19 vaccine outside of approved age group. Except parts of the presentation when we discuss treatments for COVID and long COVID, which are all under investigation of use.

CDC did not accept commercial support for discontinuing educational activity.

At the conclusion of today's session, the participants will be able to accomplish the following, determine which clinical assessments and tests are needed for individual patient with fatigue; explain how post-exertional malaise impacts patient management; and describe how to apply health equity considerations to clinical care, activity management, and reconditioning of long COVID patients.

After the presentation, there will be a Q&A session. You may submit questions at any time during today's presentation.

To ask a question using Zoom, click the Q&A button at the bottom of your screen and type your question in the Q&A box. Please note, we receive many more questions than we can answer during our webinars.

If you're a patient, please refer your questions to your healthcare provider.

If you're a member of the media, please contact CDC Media Relations at 404-639-3286 or send an email to [media@cdc.gov](mailto:media@cdc.gov).

I would now like to welcome our presenters for today's COCA call. We are pleased to have with us Dr. Maureen Miller, part of the Research, Surveillance, and Management Unit in the Natural History, Post-COVID Conditions Team on the Epidemiology Task Force as part of CDC's

COVID-19 Response. Dr. Benjamin Abrams, who is an assistant professor of clinical physical medicine and rehabilitation with Department of Physical Medicine Rehabilitation at Penn Medicine. Dr. Joseph E. Herrera who is a professor and system chair of rehabilitative medicine in the Department of Rehabilitation and Physical Medicine at Mount Sinai Health system. And Dr. Monica Verduzco Gutierrez who is a professor and chair of physical medicine and rehabilitation at the Department of Physical Medicine and Rehabilitation at UT Health San Antonio.

It is now my pleasure to turn it over to Dr. Miller. Dr. Miller, please proceed.

Thank you, Dr. Khan. Good afternoon. I am Dr. Maureen Miller, a medical officer from the CDC COVID-19 Response presenting on behalf of the Natural History and Post-COVID Conditions Team. Thank you for the opportunity to present this information on evaluating and supporting patients presenting with fatigue following COVID-19. Next slide, please.

The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official presentation of the Centers for Disease Control and Prevention. Next slide.

Post-COVID conditions is an umbrella term for the wide range of physical and mental health consequences that are present four or more weeks after SARS-CoV-2 infection, including by patients who had initial mild or asymptomatic acute infection. They are associated with a spectrum of physical, social, and psychological consequences. Conditions are heterogeneous and attributable to different underlying pathophysiologic processes. Long COVID is used by many patients for post-COVID conditions. Next slide.

CDC is proposing this framework terminology for thinking about the conditions that occur following COVID-19.

On the left are processes that occur as a result of being ill and hospitalized or receiving treatment. On the right are processes that are more specific to infection with SARS-CoV-2. These conditions frequently overlap, and patients may experience any combination. Next slide.

It is clear that there are a wide range of longer term outcomes from COVID-19. COVID-19 may worsen preexisting conditions and disabilities. For this discussion, it's important to remember that people with disabilities may face barriers to adopting mitigation strategies and access to care. Worsening preexisting conditions may mean that prior workplace accommodations may not be sufficient to allow continued participation in the workforce. COVID-19 may cause direct organ damage to a wide variety of organ systems from infection or hypercoagulability events. In this group of patients, the resulting pathology can be identified and care would follow established patterns.

More challenging are the patients presenting with debilitating symptoms with unclear pathology. Symptoms may include fatigue, cognitive impairment, dysautonomia, post-exertional malaise, sleep problems, joint pain, and tachycardia. Routine tests are often normal in these patients. However, patients in this group are often misunderstood by healthcare providers who are not aware of this type of problem. Finally, mental health issues of anxiety, depression, and PTSD are

common and can occur in any patient affected by COVID-19. Regardless of the cause or underlying pathophysiology, whether known or unknown, individuals with post-COVID conditions may experience disability. Next slide.

So, how frequently do post-COVID conditions result in disability? Systematic data on outcomes lasting longer than 12 months is not yet available. Studies do agree that most patients' symptoms slowly improve with time. One cohort study of COVID-19 patients found that the proportion reporting symptoms decreased from 13% at 28 days to 2.3% at greater than 12 weeks. A recent study from China on hospitalized COVID-19 patients found 88% return to their original work by 12 months. However, this excluded 50% who were retired or not employed before COVID-19. The extent of disability associated with persistent symptoms is unknown though. We need further information to determine the extent of disability in the population associated with post-COVID conditions.

A disproportionate impact of post-COVID disability is expected to follow the disproportionate incidence of SARS-CoV-2 infection in some demographic groups. Given the size of the pandemic, even a low disability rate at one year will have a significant impact on society. The potential extent of disability in these individuals has prompted post-COVID conditions researchers to learn more about their degree of disability. Next slide.

We do have evidence of disability associated with post-COVID conditions. JAMA News highlighted a recent CDC article in MMWR with the headline "Post-COVID-19 Symptoms Were Worse Than Cancer's Effect". This study was based on data from a network of rehabilitation clinics in 36 states and the District of Columbia. Compared with patients referred for cancer rehabilitation, patients with post-COVID conditions had poorer physical health in many measures. In addition, patient and advocacy groups reports have brought attention to disability associated with post-COVID conditions and the importance of including patients and caregivers and related research. Next slide.

We also continue to learn about health equity issues in the diagnosis and management of long COVID. Occurrence of post-COVID conditions is expected to reflect the disproportionate incidence of infection by race, ethnicity, and socioeconomic status, and to highlight ongoing inequities in healthcare. Infection induced seroprevalence may suggest risk for developing long COVID by group. A CDC study published in JAMA examined infection and vaccine induced seroprevalence of SARS-CoV-2 in the population of US blood donors based on antibody testing to estimate the impact of how many individuals in the US population may have been infected and were vaccinated by demographic group. The graph at right shows estimated SARS-CoV-2 seroprevalence in US blood donors over time, both before and after the introduction of vaccines in December 2020, which is marked by the light blue perpendicular line.

The dotted lines show infection induced zero prevalence increasing over time. The solid lines show infection and induced -- and vaccine induced zero prevalence combined. For both these measures of seroprevalence, US blood donor data indicated higher infection in Hispanic and non-Hispanic Black persons than for other racial and ethnic groups. And that is shown on the blue and green lines respectively. Given this disproportionate incidence of infection by race and

ethnicity, CDC is making efforts to address healthcare inequities in the diagnosis and management of post-COVID conditions. Next slide.

Examples of CDC's efforts addressing post-COVID conditions include partnering with clinicians to develop interim clinical guidance, analyzing electronic health data to describe outcomes within several months after COVID-19 diagnosis, and establishing studies with external partners. The next slide gives more details about CDC studies, excuse me, of post-COVID conditions. Next slide.

CDC studies of post-COVID conditions enroll cohorts of patients with COVID-19 and controls without COVID-19. They assess baseline health of the participants, monitor participants over time and for multiple years, assess outcomes of interest, including long-term immunologic response and cardiovascular, respiratory, renal, neurological, psychiatric, mental, and physical functioning, and identify epidemiologic risk factors for post-COVID conditions. Next slide.

CDC will continue to explore frequency, severity, and duration of post-COVID conditions, groups disproportionately impacted, association of SARS-CoV-2 variants and vaccination with the incidence of post-COVID conditions, and models of health care to assure equity and access to care. Next slide.

In summary, post-COVID conditions are new or persistent symptoms four or more weeks after infection. They are not uncommon and may occur among patients with COVID-19 regardless of the severity of the acute illness. In addition to respiratory symptoms, patients may present with fatigue, sleeping difficulties, depression, anxiety, palpitations, joint pain, and post-exertional malaise with changes in renal function, nervous, and circulatory systems also reported. Next slide.

Next, we feature three speakers from the American Academy of Physical Medicine and Rehabilitation who are subject matter experts in the diagnosis and management of fatigue in COVID-19 patients. The AAPM&R released consensus guidance on the assessment and treatment of fatigue in patients with post-COVID conditions.

They will also acknowledge the importance of health equity and delivering quality health care for patients with these conditions. CDC and AAPM&R speakers will take questions at the conclusion of all presentations, as stated earlier. We scheduled about 15 minutes for questions from the audience at the end. Thank you and next slide.

Now we'll turn it over to our speakers for AAPM&R with Dr. Benjamin Abramoff. Thank you.

You can go to the next slide. Thank you, Dr. Miller. So, as mentioned today, we're going to review the AAPM&R's multidisciplinary collaborative consensus guidance statement on the assessment and treatment of fatigue patients with post-acute sequelae of service COVID to infection, which is also known as PASC. Next slide.

And just to reiterate, the discussion today represents our own views, does not necessarily represent any official positions of the CDC. Next slide.

Fatigue during an acute viral illness is common. However, individuals with PASC often present with fatigue in the weeks and months after infection, which can exist on a spectrum from mild and non-interfering to long lasting and debilitating, even after recovery from their acute COVID infection. Next slide.

Today's learning objectives are that following this presentation, participants will be able to apply the PASC consensus guidance statement methods into everyday practice, identify and diagnose fatigue in individuals with PASC, utilize assessment recommendations, differentiate and apply appropriate PASC-related fatigue treatments, identify health equity considerations and examples in PASC-related fatigue, and summarize the future directions in assessing and treating PASC-related fatigue. Please note, these consensus guidance statements are intended to reflect current best practices in patient assessment, testing, and treatment. This should not preclude clinical judgment, must be applied in the context of the specific patient with adjustment for patient preferences, comorbidities, and other clinical factors. Next slide.

The PASC collaborative, which now includes 32 PASC clinics from across the country, is following an iterative approach to achieve consensus on assessment and treatment recommendations in order to create a series of guidance statements focused on the most common and prominent symptoms of PASC.

The process is illustrated in this slide and is described in the published manuscript as well. Through this process, the PASC collaborative sought input from patient representatives with a history of PASC and patient-led research initiatives to inform recommendations. As guidance statements were released, education will be provided to stakeholders on a rolling basis. Next slide.

Fatigue is a feeling of weariness, tiredness, or lack of energy that can be physical, cognitive, or emotional, mild to severe, intermittent to persistent, and affect a person's energy, motivation, and concentration. Fatigue can negatively affect an individual's sense of wellbeing and quality of life, and it generally lacks objective measurements. Common descriptions of PASC-related fatigue include severe exertion after minimal physical or mental exertion, meaning severe exhaustion, a sense of being weighed down all day, the feeling of crashing, requiring several days of recovery after having increased activity level or having a quote, good day, persistent tiredness or exhaustion, even after sleeping.

Extensive evidence supports the high prevalence of fatigue in patients following COVID infection. A systematic review found that an average of 24% in not hospitalized patients and 30% of previously hospitalized patients continue to experience fatigue following the resolution of their acute illness. Among non-hospitalized adults with a history of COVID-19 and enrolled in an integrated health system in Georgia, approximately two-thirds had at least one outpatient medical encounter between one and six months after their diagnosis with COVID and approximately two-thirds of these patients received a new primary diagnosis, with fatigue being one of the most common based on ICD10 codes. It is clear individuals are seeking care from their clinicians for fatigue following COVID-19. Due to this, consensus guidance standard was created. Next slide.

This slide illustrates the guidance statement recommendations for assessment of PASC-related fatigue. All guidance statement recommendations include additional context and discussion, which can be found in the published manuscript.

When assessing fatigue, it's important to note, it is not unusual for individuals to have persistent and fluctuating fatigue during their initial recovery from acute COVID-19, particularly in the first one to two months. Additional assessment and management of PASC-related fatigue should be considered if a patient is not continuing to improve after the initial four weeks and symptom onset, if symptoms are severe, or if the patient is experiencing significant negative impacts on quality of life or ability to carry out day-to-day activities. In cases of mild fatigue that is not functionally limiting, it is appropriate in the early stages to monitor for improvement as part of the natural recovery from COVID-19. It is also important to note that fatigue can involve both physical and cognitive components.

This guidance statement focuses largely on physical fatigue. Subsequent guidance statement, currently under review, will focus on cognitive issues following COVID-19. The current guidance statements recommend monitoring fatigue patterns throughout the patient's normal day, for example, if fatigue is worse in the morning or the evening, patients' response to initiating and escalating activity on their fatigue, patients' change in daily function and activity levels, as well as physical functioning and endurance, which should be assessed in order to inform activity and therapy recommendations. The patients should be assessed for changes in activities of daily living, independent activities of daily living, school, work, and any vocational activities like hobbies. A full patient history with review of preexisting conditions should be conducted. Patients should be evaluated for conditions that may exacerbate fatigue symptoms and warrant further testing and potential subspecialty referral, which I'll discuss in a moment.

Medications should be reviewed as they may contribute to fatigue, particularly antihistamines, anticholinergic medications, and antidepressants, and anxiolytics, medications that are often prescribed to patients with PASC are common causes of fatigue. Basic lab work-up should be considered in new patients for those without lab work-up in the previous three months, including complete blood count with differential chemistries, including renal and hepatic testing, thyroid stimulating hormone, c-reactive protein, or ESR and creatine kinase. Other laboratory tests may be considered based on the results of the above tests or if there's a specific concern for a comorbid conditions. Next slide.

When evaluating the ideology of fatigue, the following should be considered as central or potentially contributing factors to their fatigue. Based on the patient's signs and symptoms, additional evaluation and referrals can be considered. Some examples of central or contributing factors include cardiac disorders, respiratory disorders, endocrine disorders. Next slide. Next slide.

Auto immune disorders, mood disorders, and sleep disorders. These tables are also available in the manuscript. Next slide.

The presentation of fatigue in individuals with PASC may appear similar to myalgic encephalomyelitis, also known as chronic fatigue syndrome ME/CFS for short. It is likely that

many individuals with PASC have or will later develop ME/CFS. However, the collaborative recognize that many individuals with PASC do not meet that ME/CFS diagnostic criteria.

The collaborative consensus guidance covers the care of all individuals with PASC with these considerations in mind. Specific diagnostic criteria for ME/CFS and additional information are available from the CDC's website. I will now turn it over to Dr. Herrera for further discussion of the treatment of PASC-related fatigue.

Thank you, Dr. Abramoff. Next slide. So, I'm the Chair of the Department of Rehabilitation and Human Performance for the Mount Sinai Health System. And I've been actively caring for PASC patients through the Mount Sinai Post-COVID Center.

As with PASC patient assessment, therapeutic options for PASC vary and should be customized based on history, comorbidities, and treatment response today. It is important to note that if specific etiology of fatigue are identified, they should be addressed as part of the treatment plan. These treatment recommendations are based on the experience of the PASC collaborative clinics and have helped alleviate symptoms in cases in which specific contributing ideologies have not been identified, or despite addressing, symptoms persist. Let's go through these one by one, starting with treatment recommendation one, begin an individualized and structured titrated return to activity program. An individually titrated symptom guided program of return to activity is recommended for patients presenting with fatigue.

The goal of a rehabilitation program is to restore patients to previous levels of activity and improve quality of life. Until those goals have been achieved, the rehabilitation program should not focus on high intensity, aerobic exercises, or heavy weightlifting to build strength and endurance. So, this is important. I'll repeat that again, until those goals have been achieved, the rehabilitation program should not focus on high intensity, aerobic exercises, or heavy weight lifting to build strength and endurance. This is not a progressive exercise program.

If the rehabilitation program is advanced too quickly or is too intense, it may worsen symptoms and lead to post-exertional malaise, a diagnostic criterion of ME/CFS. The titrated approach encourages patients to perform activities at a submaximal level to avoid exacerbation of fatigue and post-exertional malaise. Activity should be adjusted in response to symptoms that develop during or after activity. Before starting this program, it is crucial for the clinician to educate the patient on recognizing perceived exertion and the use of other metrics such as heart rate or exertion scales, such as the Borg Rating of Perceived Exertion Scale, that can guide the individual towards submaximal exertional activities. Smartphones and activity trackers may also be effective methods to monitor duration and intensity of activity. As treatment efficacy of therapeutic options emerge, these recommendations will be reviewed and revised on a periodic basis. Next slide, please.

The severity of PASC fatigue can range from mild to severe. Most patients with PASC have -- who have presented to the multidisciplinary clinics report moderate to severe symptoms. There are multiple well-validated measures available to measure fatigue such as the fatigue severity scale, the fatigue impact scale, and the brief fatigue impact score.

Previous literature has defined levels of fatigue in cancer patients on a 10-point scale from 0, not present, to 10, as bad as you can imagine, with scores of 1 to 3 representing mild fatigue, 4 to 6 representing moderate fatigue, and 7 to 10 representing severe fatigue. In the context of ME/CFS, the National Institute of Health and Care Excellence in their 2007 guidelines defined severity of fatigue. Based on our experience, we find these definitions appropriate as a basis for the following classification of PASC-related fatigue. So, mild fatigue, individuals who have intact mobility, can perform activities of daily living, and do light housework, often without difficulty -- often with difficulty. They are also able to continue working or going to school but may have stopped other non-essential activities. They often take time off, require modifications to their schedule, and use weekends to recover from their work week.

Now, moderate fatigue, individuals have decreased community mobility and are limited in their performance of instrumental activities of daily living, particularly preparing meals, shopping, doing laundry, using transportation, and performing housework. They require frequent rests or rest periods and naps and have generally stopped work or school. Now severe fatigue, individuals are mostly confined to the home and may have difficulty with activities of daily living, eating, bathing, dressing, transferring, toileting, and mobility. Leaving the home for these individuals is very limited and often leads to prolonged severe after effects. The recommended program depends on the severity of PASC-related fatigue. Next slide please.

So, let's tackle mild fatigue. So, we advise patients to continue all household and community activities that have been tolerated with a slow return to high intensity activities and exercising following the rule of 10s. The rule of 10s consists of increasing duration, intensity, and frequency of activity/exercise by 10% every 10 days. Using the rate of perceived exertion scale, start the RPE from 10 to 11, which is light, and progressing to 14 to 15, which is hard on resumption of exercise. If patients do not feel comfortable with initiating this program or if gentle resumption of physical activities has previously been tried unsuccessfully, we recommend using the program for moderate fatigue. Next slide, please.

So, moderate fatigue -- oops, one slide back please. Thank you.

Moderate fatigue, we recommend continuation of household and limited community activities that have been tolerated. Patients should begin an activity or aerobic exercise program with exertion at submaximal levels, an RPE of 9 to 11, very light to light. The activity or exercise can then be slowly advanced if the patient tolerates it, as long as it does not cause worsening of symptoms. But this may be delayed until the evening or days after the activity or exercise session. If symptoms worsen, activity should be returned to the previously tolerated level. Consider referral to a rehabilitation therapist with knowledge of post-COVID care to guide an individually titrated symptom guided program. Next slide, please.

So, for severe fatigue or significant post-exertional malaise, continue any household activities that have been tolerated without symptom exacerbation. Patients can begin a physical activity program, which should initially consist of upper and lower extremity stretching and light muscle strengthening before any targeted aerobic activity. Once tolerated, patients can begin an activity or aerobic exercise program at submaximal levels, RPE of 7 to 9, which is extremely to very light. The activity or exercise can then be slowly advanced as the patient tolerates as long as it

does not cause worsening of symptoms. This may be delayed until the evening or days after the activity exercise session. If symptoms worsen, activity should be returned to the previous tolerate level. Consider referral to a physician with knowledge of post-COVID care, such as a physiatrist, to guide an individualized rehabilitation program that were -- that may require starting with a home health program for patients with very limited tolerance of community activities. Next slide, please.

We also recommend educating patients on energy conservation strategies to aid in recovery. One framework is the four P's: pacing, prioritizing, positioning, and planning. Pacing is a concept of avoiding the push and crash cycle that is common in post-COVID recovery. Ways to achieve optimal pacing include keeping activities reasonable and often shorter duration, or alternatively, giving more time to complete activities to avoid rushing and including scheduled rest breaks with activities. Patients should pay attention to the body and avoid or moderate activities that lead to the need for prolonged recovery periods.

Prioritizing encourages the patient to focus on and decide on which activities need to get done on that -- on specific days, and which activities can be postponed or on -- or are unnecessary to do at all to avoid any over exertion or crashing. Positioning is modifying activities to make them easier to perform. For example, it may be possible for patients to sit during an activity or have a workspace at a comfortable height with all necessary equipment within easy reach. Another example would be the use of a shower chair or bench rather than standing for shower. Lastly is planning.

Planning encourages the patient to plan the day or week to avoid overexertion and to recognize energy windows. Energy windows are periods during the day when patients have more energy to complete tasks. Patients are often aware of their optimal energy window, which may vary throughout the week. Asking patients to keep a diary of good days, bad days, and energy windows is helpful for optimizing timing of therapy and activities. As such, it is important for patients to plan rest breaks.

Other elements of planning include determining steps for completion of tasks and preparing for tasks ahead of time, daily routines may also be helpful. Finally, planning may consist of gradual return to previous activities. Next slide, please.

In addition, in particular, returning to work may be of concern to individuals with PASC-related fatigue. We recommend patients work with their physician and employers to create a specific plan for return to vocational activities. Patients should be advised on ways to resume work, even if recommendations are needed or is -- or in a limited capacity as long as it does not worsen symptoms or lead to significant post-exertional malaise. Example of possible accommodations include working a limited number of hours, working from home, adjusting work activities, such as seated instead of standing, using durable medical equipment, such as mobility aids to increase walking tolerance, providing additional breaks throughout the day, and adjusting the work environment, such as allowing the patient to park closer. These activities and return to work should be advanced as the patient tolerates. When available -- one available referral to vocational rehabilitation counselor can be helpful in structuring the return activities and communicating with employers. Next slide, please.

At this time, there are no scientific data to support the prescription of one specific diet for the management of PASC-related fatigue. General nutritional recommendations should reflect the individual patient's underlying comprehensive health profile. General nutrition guidelines suggest a diet including vegetables, fruits, whole grains, healthy fats, fish, poultry, beans and eggs, dairy and limited intake of red meat. Adequate intake of water and the avoidance of alcohol is also recommended. Acute symptomatic COVID-19 is associated with a vigorous immune response, and PASC has been theorized to be related to persistence of this immune dysregulation.

There has been significant interest in the link between proinflammatory states and chronic disease related fatigue. Single nutrients, such as polyunsaturated fatty acids, antioxidative vitamins, polyphenols, protein, amino acids, and specific diets, such as whole grain high in fiber, polyphenol-rich vegetables, and omega-3 fatty acid rich foods have been suggested to have anti-inflammatory and fatigue reducing effects, although further confirmatory research is needed. Mast cell activation syndrome with histamine release has also been suggested to play a role in PASC-related fatigue. It is proposed that some individuals may not tolerate histamine present in foods thought to be a result of reducing activity of the enzyme thiamine oxidase, which breaks down histamine leading to an increased amount of histamine in the body and histamine intolerance. Symptoms include headache, asthma, runny or blocked nose, low blood pressure, irregular heartbeats, hives, itching, diarrhea, flushing, and other conditions that are similar to those reported by individuals with PASC.

Although, there are no current scientific studies supporting the benefit of low histamine diet, often consisting of limited cheese, fruits, seafood, nuts, and other foods in PASC, anecdotal reports have suggested improvements in some individuals. It is worth noting that challenges following low histamine diets have also been reported. Some dietary recommendations have been made for individuals with ME/CFS, and similar diet recommendations may be beneficial for PASC-related fatigue. These include eating little but often, every 3 to 4 hours, eating foods with low glycemic index, such as more complex carbohydrates in order to support stable energy levels and eating a balanced diet including fruit, vegetable, fish, meat, dairy, nuts, beans, and legumes. There is currently not sufficient evidence to support the use of specific nutritional supplements to help CFS including multivitamins, B vitamins, magnesium, essential fatty acids, carnitine, or coenzyme Q10.

Fatigue related to autoimmune dysfunction in individuals with PASC, specifically postural orthostatic tachycardia syndrome, also known as POTS, can be partially addressed with adequate water and salt intake. Small and frequent meals are better tolerated, and diets with high fiber and complex carbohydrates may help reduce blood glucose spikes and lessen POTS symptoms. Fatigue due to muscle atrophy in the context of weight loss is reported in PASC and can be improved with appropriate caloric and protein intake. Next slide, please.

As noted earlier, a wide differential for central contributing factors to PASC-related fatigue should be considered. The differential may be affected by the severity or -- of initial illness and those critically ill being at risk for post-intensive care syndrome, also known as PICS. Potentially -- a potential contribution to PICS-related fatigue include circadian rhythm disorders, critical illness polyneuropathy and myopathy, mood disorders, sleep disorders, and autoimmune

disorders. Pregnant women, racial ethnic minority individuals, and other vulnerable populations may be at high risk for serious COVID-19 related illness and subsequent PICS. It is also important to treat in collaboration with appropriate specialists all underlying medical conditions which may be contributing to fatigue. Next slide please.

Within the collaborative, there was no consensus on the use of supplements or medications to treat PASC-related fatigue. Some PASC collaborative clinics do not use pharmacologic agents, whereas others use agents with conservative management has been tried and comorbid conditions have been addressed. Patients often express interest and desire for medication, herbal remedies, and supplements. It is important to specifically ask patients about all products that they may be using in order to provide appropriate counseling. The publication has more details on the pharmacological therapies and supplements some PASC collaborative clinics are using. Next slide, please.

The use of acupuncture has also been reported by collaborative patient representative members to improve fatigue. Although, there has not been direct evidence to support its use in PASC-related fatigue. There is some preliminary low quality evidence that supports its use in ME/CFS. In conclusion, there is still a lot of unknowns related to the treatment of PASC.

As the collaborative moves forward and shares information, we are seeing patients get better, although the timeline varies and for some recovery is slow. Clinicians should continue to monitor the impact of treatment on the level of function and on their patients. I will now turn it over to Dr. Monica Verduzco Gutierrez.

Thank you. Next slide. I'm Monica Verduzco Gutierrez from UT Health in San Antonio. In the context of PASC, it is important to focus on health equity, health disparities, and social determinants of health. Clinicians are encouraged to consider the integration of health equity considerations with the evaluation and treatment of individuals with PASC fatigue.

The World Health Organization defines health equity as the absence of unfair and avoidable or remediable differences in health among population groups, defined socially, economically, demographically, or geographically. The CDC states that health equity is achieved when every person has the opportunity to attain his or her full health potential and no one is at a disadvantage from achieving this potential because of social position or other determined -- socially determined circumstances. The collaborative develops seven health equity considerations and examples in PASC fatigue. The seven categories, which are pictured here, are justice involved, which describes people who are involved in some manner with various aspects of the criminal justice system, particularly those who are incarcerated in correctional facilities and detention centers. And they have a unique vulnerability to healthcare inequity that is often overlooked.

Next is biologic sex. Physiologic and biologic sex differences should be considered for both the diagnosis and treatment of PASC-related fatigue. Gender, people across the gender spectrum also have unique health issues.

Next is religion. Religion-based practices deserve special consideration during healthcare evaluation.

Immigration, immigration related issues may pose numerous barriers to health and healthcare for many individuals. Disability, healthcare and society in general makes assumptions, fosters unconscious bias that includes stereotypes towards people with disabilities. The consequences lead to devaluation and disparate treatment of people with disabilities. And racial ethnic minority groups, Black, indigenous, and people of color communities have been especially impacted by the global pandemic. As a result, these groups have worse outcomes after COVID-19 infection, including hospitalizations, morbidity, and mortality.

For each of these categories, the collaborative considered what is known about each category and clinical considerations and treatments of individuals presenting with PASC fatigue. To promote high quality care in individuals with PASC, we need to ensure resources are equitably available for those affected to maintain physical and mental health. Examples of resources include access to information, written and/or oral in a language that the individually easily understands, or adapted for someone with a disability, access to goods and services, affordable and timely testing and care, and medical mental healthcare that is tailored to meet the individual needs of people, especially those from marginalized communities. When policies, programs, and systems that support health are equitable, poor health outcomes can be reduced. Health disparities can be prevented, and the whole of society benefits.

We will now provide several examples of health equity considerations in PASC when evaluating patients for fatigue. These examples are derived from a table that is included in the appendix of our manuscript to provide additional information for clinicians who are treating patients for PASC-related fatigue. This is not intended to be a comprehensive list, but rather to provide clinical examples as they relate to health equity, health disparities, and social determinants of health. The literature demonstrates that all marginalized groups face socioeconomic barriers and access to care barriers. Though these may or may not be barriers for a specific individual patient. People with intersectional identities often face enhanced level of bias and discrimination. Next slide.

One category which overlaps with others is racial and ethnic minority groups. BIPOC communities have been especially impacted by the global pandemic. As a result, these groups have worse outcomes after COVID-19 infection, including hospitalizations, morbidity, and mortality.

And we know that social determinants of health, societal factors, and structural racism have disproportionate effects on underserved communities, under invested communities. In this example, we describe clinical considerations for racial and ethnic minority groups. PASC-related fatigue is multifactorial, with its effects compounded for individuals already under the burden of racial and ethnic disparities and injustice. We recommend standardized treatment and management protocols that may help decrease implicit bias towards patients from racial and ethnic minority groups. In treating fatigue antiracist awareness of the above issues may require a multidisciplinary approach to healthcare, including but not limited to addressing low cost healthcare, food-housing insecurity, health literacy with access to low cost information, access to transportation, and aiding in or obtaining or maintaining employment.

Where appropriate, consider providing documentation to support food vouchers, housing assistance, transportation and vehicle parking passes, temporary workplace accommodations, and neighborhood support networks. Local and national advocacy is needed to address ongoing systemic inequities. Next slide, please.

Here is another example from our table where we look at considerations in the category of biologic sex. One example of physiologic and biologic sex differences that is considered is pregnant women who have -- frequently have pregnancy-related fatigue, and they may be at higher risk for more severe COVID-19 infections and symptoms, particularly women who have certain comorbidities and other characteristics.

The clinical considerations in this case is that pregnant women who are status post-COVID-19 infections may experience pregnancy-related fatigue in addition to PASC-related fatigue. Furthermore, we need to consider the risks and benefits of medications and other interventions to assess the effects on both the mother and the fetus. Also, when prescribing exercise for these patients, it may be -- they may be impacted by symptoms such as excessive vomiting and weight loss in the first trimester, or later towards the end of pregnancy, a large girth and back pain or preeclampsia that can impair their exercise ability. Next slide.

This is a specific example of how diversity, equity, and inclusion content is integrated into the fatigue consensus guidance statement. The highlighted portion is extracted from the manuscript. Symptoms of fatigue may be reported more commonly in female adults and in older age groups. COVID-19 symptoms may be more severe in pregnant women and pregnancy itself, and the postpartum period is a well-known cause of fatigue because of a host of biologic and behavioral factors.

In addition, people who identify with racial or ethnic minority groups may have a baseline level of chronic fatigue due to weathering that should be considered in the assessment and treatment approach. Overall, to address inequities in care delivery, we recommend assessment and treatment approaches that incorporate telemedicine, including phone calls and virtual visits, as they can be helpful for ongoing follow up and might lessen the burden on individuals with limited energy from PASC, who -- or who have other concerns about in-person visits, such as the cost of travel, parking, and facility fee charges.

Virtual visits expanded rapidly during the pandemic and have been noted to be useful in closing access gaps for various populations, such as ethnic and racial minority groups, rural communities, and the elderly. We cannot stress enough that individuals should be connected to appropriate social services when available, including assistance for other hardships and resources on disability and reasonable accommodations for work or school and connections to PASC support groups. Next slide.

In conclusion, PASC-related fatigue affects individuals physically, emotionally, and cognitively. Individuals with PASC-related fatigue can experience severe disability and frustration. The pathophysiology causing fatigue after COVID-19 still warrants ongoing, detailed research to better understand this constellation of symptoms, while acknowledging the cause of fatigue is likely multifactorial and may be specific to the individual. The goal of this PASC collaborative

consensus guidance statement is to create a coordinated and systematic approach to the evaluation and treatment of patients presenting with PASC. The recommendations represent a consensus of a large, national, multi-disciplinary collaborative of centers focused on the treatment of individuals with PASC. The recommendations are based on the most current available data, extrapolation from evidence and similar conditions, and the combined clinical experience of treating thousands of patients with PASC-related fatigue. Final slide, please.

Please visit the AAPM&R website at [www.aapmr.org/longcovid](http://www.aapmr.org/longcovid) to access the publication. Thank you.

Thank you very much. Next slide, please.

Presenters, thank you for providing our audience with this timely information. We will now go into our Q&A session. Please remember that to ask a question using Zoom, click the Q&A button at the bottom of your screen then type your question. Please note that we receive many more questions than we can answer during our webinar.

Our first question asks, what kind of tools do you recommend based on your experience to assess the level of function for our patients?

Hi. So, this is Ben Abramoff. I would say that there's really no one tool. And if you ask the different PASC collaborators what tools they use, it really varies institution by institution. I think the important thing here is to ask patients about their function.

It can be as simple as asking, are they able to perform their day-to-day activities? Are they able to do IABs? One thing to note, in the fairly near future, we're in the process of kind of getting a group together. The PASC collaborative is going to come up with some recommendations in terms of what screening tools we recommend, but we're not at that point quite yet.

Thank you very much. Our next question asks, how can we as clinicians help collect more information since this is such a new area and so much has to be learned? And along those same lines, is there an ICD10 code that we can use to facilitate your data extraction?

Hi, this is Dr. Maureen Miller from CDC. Thank you for that question. Certainly, for public health surveillance and research purposes in addition to clinical practice, it is really critical to start collecting this information. And since you mentioned the ICD10 coding question, there is a new ICD10 code available as of October 1st in the United States. It is U09.9 for post-COVID conditions unspecified.

I have to say, I can't necessarily speak to your specific institution about when that will be available in your EHR and what sort of standards they'll use, but just know that it is out there. For anything proceeding that, people have been coding for sequelae of other specified infectious and parasitic disease. But again, just please consult with your institution about what's going on, but there is that new ICD10 code available.

If the clinicians want to add anything feel free.

Great, thank you so much. Next question I have to ask is for our presenters who shared their experience. Are you aware in your experience of any post-mortem findings related to PASC fatigue patients?

Hi. This is Ben again. I am not aware of patients who are kind of in this more long-term, post-COVID state with any autopsy results suggesting any type of neurologic changes. Now, the other presenters might have a different idea, but just to kind of answer the overall question, which I think you know, this is getting at what is causing this fatigue. I think that is a really important question, and one that as a research community, we need to answer.

I think we don't have an answer to that question yet. There's a lot of theories out there, whether it's autoimmune, persistent viral infection. Is it post-inflammatory? Is it due to changes in red blood cells, auto-antibodies? So, there's a lot of questions, and not many answers on this topic. And I think one thing, in my experience, given the wide variation of symptoms, it's probably not going to be the same answer for everyone. A patient who's critically ill in the ICU and having persistent fatigue I think there's a good chance may look different than the patient with -- who is mildly ill and just not getting over their initial infection.

And I think one of the things we have to do is kind of try to cluster these patients a little bit better as we're kind of analyzing that. So, I don't think there's a really great answer, and it might be more than one thing for a different person too. So, somebody might be having inflammation, but they may also be having insomnia, anxiety, depression, so all these things might be contributing. So, I don't think we have an answer to that question yet.

Yes. This is Joe Herrera. I agree with Dr. Abramoff. I think we're very early in trying to gain an understanding and also develop a treatment plan for a number of our PASC patients. So, I am not aware of any post-mortem type of studies where we have had to look at that as of yet, not yet anyway.

Thank you very much. Our next question asks, and his is along the lines of health equity considerations, can you share any experience in your practice where -- since you made the realization that patients being able to virtually connect with their providers is so important in ensuring health equity, can you share your experience on how your practice or your healthcare system overcame tech disparities? So, people -- ensuring that people have the ability to connect, so they had the virtual option available?

Yes, I'm happy to discuss that. That's -- Monica Gutierrez here. I have done the majority of my visits for patients with post-COVID conditions via telemedicine. And a lot of the work happens before I even get to see the patient on telemedicine, and that means I have to have a team that's able to work with the patient, get on the phone with them, help them figure out the system that we use, and have them practice and make sure that they can sign on. And that they can hear, and that they have the resources they need for the exact time that we have the appointment.

So, it does take some prework before the initial visit to ensure that they can have access to this care.

Thank you very much. Our next question asks, you mentioned a few diet options and considerations. Should a diet consult be used from the onset of post-COVID symptoms?

Thank you for the question. So, we at the Mount Sinai post-COVID Center, we do have a nutritionist in house that does help with any diet recommendations. We have been looking at some of the different diets that were mentioned. I wish I could give you some data that would help guide us as to what's the right answer. We -- I think, again, we're still very early on with that.

So -- but I think it's a good idea, especially if you're looking to do a low histamine or a low inflammatory type of diet, having a nutritionist on board is a great idea.

Thank you very much. In your experience, are you able to comment on the possibility of individuals who were asymptomatic and still developed post-COVID symptoms?

So, that's a question that I think is still being answered. There's certainly been a few studies that have suggested that as a possibility. I think it's very challenging question, particularly given how frequent COVID is. That if you think about the, you know, the millions of Americans who have had COVID, certainly some will have new symptoms coming up following their COVID infection. So, I think there's been -- in the studies that I've seen, been some pretty significant limitations in being able to say that with certainty.

Certainly, there's interesting early studies that suggest it might be possible, but I think more work needs to be done in a prospective manner to really understand that question with the control groups to compare these patients to.

Thank you for that. And in the time we have, we have time for one last question. And the question asks, that during the presentations you mentioned that guidelines for PASC-related cognitive rehabilitation will be available in the near future. Do you have any idea of approximately when such guidance will be available and where can clinicians find it?

So, it's currently under review by -- peer review by the PM&R journal, which will be published, and we're -- in which the article will be published, the manuscript. And furthermore, on the AAPM&R website, in the COVID -- post long COVID section, there will be information once that's available. I don't have a timeline. It's in the -- it's in the journal's hands right now.

This is Maureen Miller from CDC with one quick addendum to that. Dr. Abramoff is correct about this AAPM&R guidance in the works. But CDC has also worked with experts in the fields such as the psychiatry community and patient groups and others to develop what's known as the CDC Interim Guidance. It was updated in June of last year.

So, if you go to the CDC website and look for COVID-19 information, there is an area of the website that discusses post-COVID conditions. Thank you.

Thank you both. I want to thank everyone who joined us today with a special thank you to our presenters for sharing their time and expertise. Next slide, please.

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