**Post-COVID-19 Program at UTHA Order Sets and Templates**

**PASC Fatigue**

*Postviral fatigue syndrome (M62.81: Muscle weakness (generalized); G93.31: Postviral fatigue syndrome)*

Discussed that this is the most common symptom of PASC, reviewed pertinent labs and imaging with no evidence of end-organ damage (e.g. heart failure, pulmonary fibrosis, anemia) or medications contributing to these symptoms.

- Referral to Physical Therapy for supervised and graduated return to activity as tolerated. Counseled patient that post-exertional malaise is common and energy conservation strategies using 4P Strategy (Planning, Pacing, Prioritizing, and Positioning)

- Counseled on sleep hygiene, healthy dietary pattern, and hydration to promote wellness and reduce inflammation

- Discussed prescription medications that treat mood disorders but also may increase energy such as fluoxetine, bupropion, or nortriptyline. Patient elects not to start new medication at this visit.

- Educated patient that stimulants (e.g. modafinil or Adderall) are not recommended until therapeutic trial of other medications has been completed, and in refractory cases only.

- Discussed that there is preliminary evidence to suggest benefit of hyperbaric oxygen (40 sessions at 2.0 ATA) or EECP (35 sessions) for relief of fatigue and neurocognitive symptoms. This data is promising but trials are small and these modalities are not always covered by insurance, so although they may be helpful the recommendation is tempered by concern for out of pocket costs and frequency of the intervention

- Obtain basic workup to rule out other conditions that may be contributing to fatigue below

* PHYSICAL THERAPIST REFERRAL
* CBC W/AUTO DIFF WITH PLATELETS
* COMPREHENSIVE METABOLIC PANEL + E-GFR
* TSH REFLEX TO FREE T4
* SEDIMENTATION RATE
* C-REACTIVE PROTEIN
* ANA AUTOIMMUNE PANEL REFLEX TO FARR
* VITAMIN D, 25 OH
* VITAMIN B1
* VITAMIN B-6
* NEUTROPHIL CYTOPLASMIC AB WITH MPO AND PR3
* HEMOGLOBIN A1C
* IRON, SERUM
* FERRITIN
* CK, TOTAL
* CORTISOL, A.M. SPECIMEN
* IMMUNOGLOBULINS, IGA, IGG, IGM

**PASC Neurocognitive Dysfunction**

*Neurocognitive disorder (R41.9: Unspecified symptoms and signs involving cognitive functions and awareness; R41.840: Attention and concentration deficit)*

- Discussed that cognitive symptoms are common in PASC, including deficits in concentration/attention, word retrieval, working memory, and executive function. Counseled that these "brain fog" symptoms are closely related to fatigue and mental or emotional exertion can cause post-exertional malaise. Recommended energy management strategies including 4Ps, avoidance of over-exertion with cognitive tasks, and resting that includes avoidance of sensory input when necessary.

- Patient has normal neurological evaluation without any focal deficit, so do not recommend neuroimaging at this time.

- Recommend structured and titrated return to activity, increased social interaction, and enjoyable brain activities (crossword puzzles, sudoku, reading, etc) as tolerated to aide in cognitive rehabilitation. Reviewed accommodation techniques to overcome deficits in concentration/inattention including list-making, intentionally encoding memories, and avoidance of distractions

- Counseled on sleep hygiene

- Referral to Comprehensive Memory Clinic (imaging/MRI to be ordered by their clinic following assessment)

- Obtain workup for reversal causes of cognitive impairment below

* NEUROPSYCHOLOGIST REFERRAL
* VITAMIN B 12 AND FOLIC ACID
* METHYLMALONIC ACID
* RPR REFLEX TO TP-PA
* HIV 1/2 4TH GEN, RFLX CONF
* NEUROLOGIC PHYSICAL THERAPIST REFERRAL
* SPEECH LANGUAGE PATHOLOGIST REFERRAL
* HOMOCYSTEINE

**Post-COVID Dyspnea and Cough**

*Dyspnea (R06.00: Dyspnea, unspecified)*

Patient had mild-moderate illness without hypoxemia, with SpO2 > 92% with ambulation in the office today. Discussed that at this time development of lung disease appears to be associated with severity of acute COVID-19 with high rates of abnormalities in patients who had critical illness. For patients who did not require hospitalization, dyspnea is common but identifiable lung pathology on traditional testing is rare. Therefore, dyspnea is likely multifactorial and may be associated with fatigue and dysautonomia. Recent research of PASC patients who had mild-moderate initial illness undergoing CPET showed normal cardiopulmonary function but decreased peripheral oxygen extraction, suggesting microcirculatory or mitochondrial dysfunction, and that hyperventilation/tachycardia is a compensatory mechanism.

- Given normal SpO2, no contraindications for supervised rehabilitation and graduated return to activity

- Workup with baseline labs (CBC, CMP, TSH, BNP, D-Dimer), CXR, and PFTs. Will obtain HRCT Chest if CXR or PFTs are abnormal.

- OTC cough suppressants (tessalon perles, guifenasin/dextromethorphan) for symptomatic relief of cough. Counseled patient that pharmacologic therapies (inhaled bronchodilators or corticosteroids) are not routinely recommended for dyspnea in absence of objective pulmonary dysfunction

- Low concern for cardiac dyspnea based on history and physical, so no indication for TTE or stress testing at this time

* PFT, COMPLETE
* CBC W/AUTO DIFF WITH PLATELETS
* COMPREHENSIVE METABOLIC PANEL + E-GFR
* TSH REFLEX TO FREE T4
* CHEST, 2 VIEWS
* US, ECHOCARDIOGRAM, TRANSTHORACIC, COMPLETE
* BNP (B-TYPE NATRIURETIC PEPTIDE), SERUM OR PLASMA
* D-DIMER
* PULMONOLOGIST REFERRAL

**PASC Mental Health Comorbidities**

*Mixed anxiety and depressive disorder (F41.8: Other specified anxiety disorders)*

Patient with elevated PHQ-9 and GAD-7 on initial visit screening. Of note the literature on long-COVID describes high rates of concomitant anxiety, depression, and PTSD.  
-Discussed with patient that symptoms of fatigue and neurocognitive impairment are common in PASC, likely combination of physical symptomatology exacerbated by social isolation, stress, and anxiety of pandemic. It is also hypothesized that new or worsening anxiety may be related to the neuroinflammatory effects of PASC. Counseled that we recommend engagement in MH services in addition to addressing physical symptoms as part of holistic care of this disease

-Discussed antidepressant pharmacology options with patient, for post-COVID fatigue we prefer more activating medications like fluoxetine, bupropion, or nortriptyline

-After shared decision making will continue \_\_\_\_. Pharmacy referral to Samantha Vogel for help with medication titration

-Met with LCSW in clinic today for brief evaluation and intervention, referral placed

-No health-related social needs identified

* SOCIAL WORKER REFERRAL
* PHARMACIST REFERRAL

**PASC Palpitations, Postural Orthostatic Tachycardia Syndrome (POTS)**

*(R00.2: Palpitations; R06.02: Shortness of breath)*

Patient with POTS based on self-reported history and by orthostatic vitals today. Discussed that cardiovascular symptoms in PASC are highly variable and potentially multifactorial including the heart, peripheral/central vasculature, and autonomic nervous system. Counseled that severe initial COVID-19 infections requiring hospitalization have high rates of cardiac complication like MI or RV dysfunction, but patient had mild to moderate outpatient illness, so is at low risk for structural cardiac abnormality.

- Given cardiac risk factors and/or history of severe disease requiring hospitalization will refer to cardiology Dr. Shanti Nulu along with TTE with LV strain to r/o structural heart disease

- Baseline EKG in clinic today, interpretation:

- For POTS recommend initial trial of non-pharmacological management of volume expansion and re-conditioning: increasing water intake to 3L daily and increased dietary salt, compression stockings and abdominal binders, graduated exercise with PT and teaching of physical counterpressure maneuvers such as leg crossing

- Gave patient handout of POTS Exercise Program from Children’s Hospital of Philadelphia (self-directed rehabilitation program focusing on supine reconditioning gradually building to upright exercises)

- Recommend caution with SSRIs, SNRIs, or other noradernergic medications as these can exacerbate symptoms

- If no improvement in symptoms with time or non-pharmacologic management above, will pursue further dysautonomia workup with tilt table testing and to detect hyperadrenergic vs. neuropathic phenotype prior to trial of pharmacologic management

* US, ECHOCARDIOGRAM, TRANSTHORACIC, COMPLETE
* CARDIOLOGIST REFERRAL
* ELECTROCARDIOGRAM

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| **PASC Dysautonomia and Mast Cell Activation Syndrome (MCAS)**  *(G90.9: Disorder of the autonomic nervous system, unspecified; G62.89: Other specified polyneuropathies)*  Dysautonomia including sensory neuropathy, orthostasis/POTS, GI dysmotility, and temperature dysregulation have been widely reported in PASC, with emerging evidence of small fiber neuropathy following COVID-19 without other etiology.  -Strong clinical concern for dysautonomia and small fiber neuropathy.  -Will obtain workup for autoimmune or neuroinflammatory etiologies and evaluation of immune system for consideration of IVIG eligibility.   * PARANEOPLASTIC PANEL, WITH REFLEX, SERUM * ANA AUTOIMMUNE PANEL REFLEX TO FARR * NEUTROPHIL CYTOPLASMIC AB WITH MPO AND PR3 * MYOCARDIAL ANTIBODY * ANTIPHOSPHOLIPID ANTIBODY PANEL * CBC W/ AUTO DIFF * COMPREHENSIVE METABOLIC PANEL + E-GFR * TSH REFLEX TO FREE T4 * IMMUNOGLOBULINS, IGA, IGG, IGM * TOTAL T AND B CELL COUNT * EPSTEIN-BARR VIRUS (EBV) IGG + IGM PANEL, SERUM * VITAMIN D, 25-HYDROXY, TOTAL, SERUM * NEUROLOGIST REFERRAL * PUNCH BIOPSY FOR SMALL FIBER NERVE BIOPSY (PROCEDURE)   **Anosmia secondary to COVID-19 infection**  *(R43.0 Anosmia. R43.8 other disturbances of smell and taste)*  Current hypothesis is that chronic anosmia is not caused by destruction of olfactory neurons by COVID-19 infection, that instead there is injury to supporting neuroepithelial structures and microvasculature. This therefore explains excellent prognosis described in literature where >95% of patients have recovered sense of smell/taste at 1yr.  - Recommend self-directed olfactory training using a smell kit and 20min daily of intentionally smelling/focusing on unique fragrances. Patient was given information for website Abscent.org where directions on smell training and creating a smell kit can be found  - No imaging or further workup necessary  - Nasal corticosteroids may be helpful in severe cases in addition to olfactory training, so will prescribe mometasone furoate 100mcg BID x4wks (this is the best studied regimen, but patient counseled they can substitute fluticasone/beclemethasone if that is a cheaper OTC alternative) |