



Post Acute Sequelae of COVID-19 (PASC)

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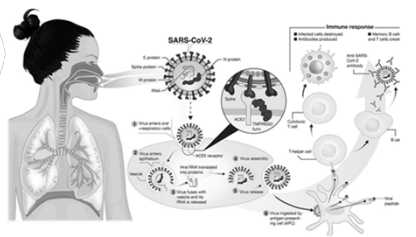
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Objectives

- Understand theoretical causes of PASC
- Recognize the symptoms of PASC
- Understand the various treatment approaches to PASC
- Call to ACTION regarding PASC/Fibromyalgia/Chronic fatigue syndrome

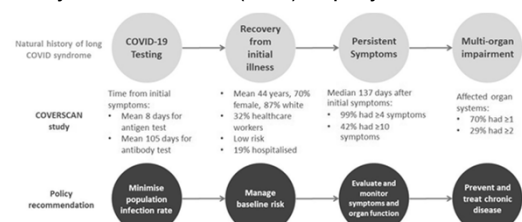
COVID-19 SARS-CoV-2

- > 177 million people infected
- Almost 4 million deaths
- 80% patients recover within 4 weeks
- < 15% require ICU stays which is over 6 weeks of medical care



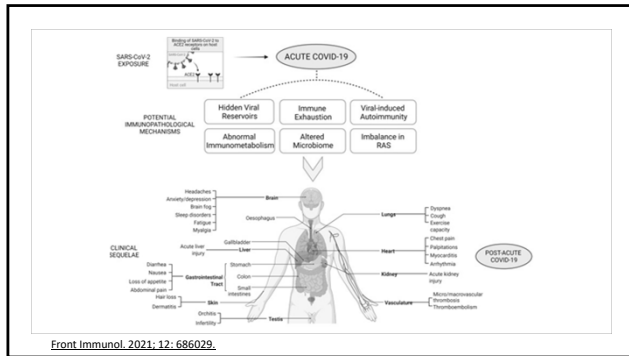
Cole D. Funk, Craig Laferriere, and Ali Ardakani Pharmacol. 11:937. Funk CD, Laferriere C and Ardakani A (2020)

Natural history of post-COVID-19 syndrome, the COVERSCAN study in low-risk individuals (N=201) and policy recommendations.



Andreas Demiris et al. *BMJ Open* 2021;11:e048391
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BMJ Open



Theories behind PASC

- Chronic COVID-19 associated immune exhaustion
 - Continuous release of senescence-associated secretory phenotype (SASP) from the residual senescent cells
- Altered microbiome
- Abnormal immunometabolism and mitochondrial dysfunction
 - T Cell exhaustion
- Viral induced autoimmunity
- Imbalance in the renin-angiotensin system

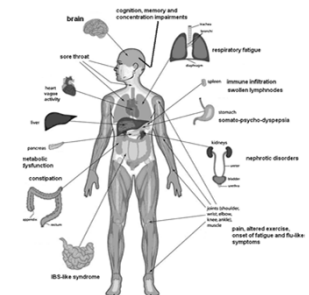
Front Immunol. 2021; 12: 686029.

Definition of PASC

- > 12 weeks of symptoms that cannot be explained by an alternative diagnosis
- Heterogenous multi-organ symptoms
- Similar to many other post-viral chronic syndromes

Rev Neurol. 2021 Jun 1

Organs affected in COVID long haul similar to chronic fatigue syndrome

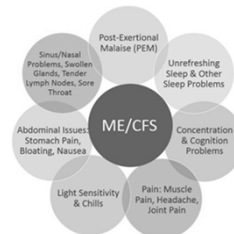


Geir Bjørklund et al. Biomedicine & Pharmacotherapy, 2019

Common Symptoms

- Myalgic encephalomyelitis/chronic fatigue
- Fibromyalgia
- Dysautonomia
- Anxiety/depression
- Sleep disturbances

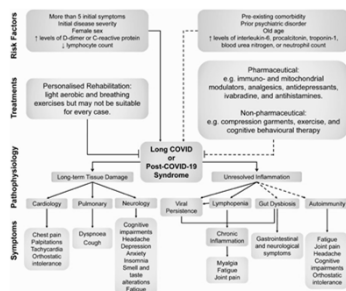
Myalgic Encephalomyelitis / Chronic Fatigue Syndrome



<https://solvecfs.org/about-the-disease/>

PASC Flow Chart

Yong. Infect Dis (Lond) 2021



Other Infections that Cause Similar Symptoms

- Lyme disease
- Epstein-bar virus (EBV)
- HIV
- Cytomegalia virus (CMV)
- Severe acute respiratory syndrome (SARS)
- Middle East respiratory syndrome (MERS)

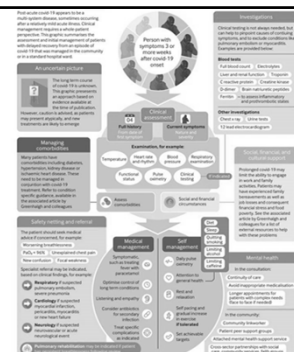
Multi-Disciplinary Treatment for PASC



Supporting patients
Coping skills
Rehab

BMJ Summary Long COVID in primary care: assessment and initial management of patients with continuing symptom

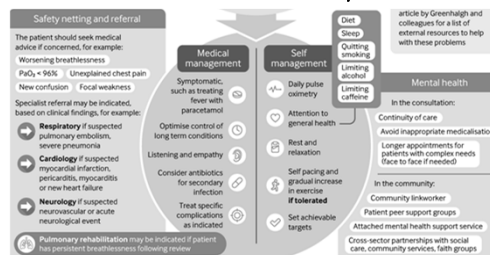
<https://www.bmj.com/content/370/bmj.m3026/infographic>



PASC Blood Tests Considerations in Primary Care

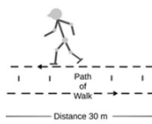
Investigations	
Clinical testing is not always needed, but can help to pinpoint causes of continuing symptoms, and to exclude conditions like pulmonary embolism or myocarditis. Examples are provided below.	
Blood tests	
Full blood count	Electrolytes
Liver and renal function	Troponin
C reactive protein	Creatine kinase
D-dimer	Brain natriuretic peptides
Ferritin	— to assess inflammatory and prothrombotic states
Other investigations	
Chest x ray	Urine tests
12 lead electrocardiogram	

Post-Acute Chronic COVID-19 Management Considerations in Primary Care



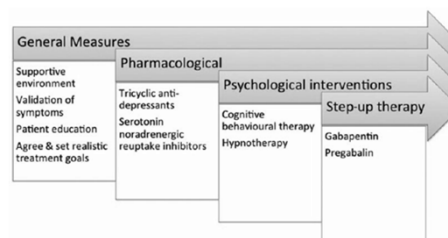
PASC-Dyspnea Treatments

- Pulse oximeter. SpO₂ >92% on RA.
- 6 minute walk test
- Imaging generally not necessary unless hypoxic
- Incidence of post-COVID-19 VTE in patients recovering from mild to moderate disease not known but probably not high risk
- Reassurance with recommendation for modest exercise, breathing techniques and adequate sleep. Recovery generally the rule, but time course prolonged (weeks to months)

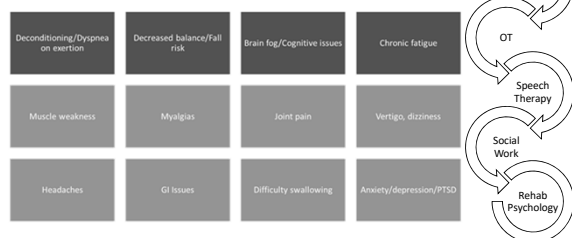


Chronic Abdominal Pain

STEP-UP APPROACH



Refer to Rehabilitation if unable to return to ADLs in COVID-19 Recovery Period



Approach to Therapeutics

- Risk: Benefit analysis
 - PT, Pulmonary Rehab, CBT
- Listen Intently
 - Validation of concerns
- Remain open to other diagnostic considerations
 - Avoid Anchor bias especially with prolonged symptoms
- Consider Palliative approach when appropriate

Call to Action

- Physicians need to recognize and validate patients symptoms
- We do not have a pill or an easy button
- Destigmatize that a person may not be the same after an infection
- Discuss lifestyle modifications focusing on exercise, diet
- Focus patients on what a new normal looks like
- Funding outcomes and trials for fatigue and chronic pain