UVM Project ECHO: Post-Acute Sequelae of SARS-CoV-2 Infection (PASC)

October 22, 2021

Course Director: Mark Pasanen, MD

ECHO Director: Elizabeth Cote

Series Faculty: David Kaminsky, MD
Katherine Menson, DO
RECORDING OF SESSION TO BEGIN
Typical Agenda

- Introductions
- Objectives
- Didactic Presentation (20-30 min)
- Case presentation
  - Clarifying questions
  - Participants – then faculty panel
- Discussion
- Recommendations
- Summary
- Closing Announcements
- Completion of evaluations
Learning objectives for this ECHO series include the ability to:

<table>
<thead>
<tr>
<th>Recognize</th>
<th>Implement</th>
<th>Assist</th>
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</thead>
<tbody>
<tr>
<td>Recognize the broad range of chronic symptoms after SARS-CoV-2 infection</td>
<td>Implement diagnostic and treatment strategies for varied presentations</td>
<td>Assist patients in the development of comprehensive, multi-disciplinary care plans</td>
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</tbody>
</table>
CME Disclosures

University of Vermont (UVM) Office of Continuing Medical and Interprofessional Education (CMIE) is approved as a provider of Continuing Medical Education (CME) by the ACCME. UVM designates this internet live activity for a maximum of 1 AMA PRA Category 1 Credits. Participants should claim only the credit commensurate with the extent of their participation in the activity.

Interest Disclosures:

• As an organization accredited by the ACCME to sponsor continuing medical education activities, UVMCMIE is required to disclose any real or apparent conflicts of interest (COI) that any speakers may have related to the content of their presentations.
Post-COVID: Chronic Cardiopulmonary Symptoms

David A. Kaminsky, MD

Professor of Medicine
Pulmonary and Critical Care
University of Vermont Medical Center and Larner College of Medicine

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No conflicts to disclose.
Session Objectives:

- Review Typical Post-COVID Symptoms
- Focus on Cardiopulmonary Symptoms
Case

Case information removed for web posting.

What next?
Persistent Symptoms after COVID-19

**Figure. COVID-19-Related Symptoms**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Acute COVID-19 phase</th>
<th>Post-COVID-19 follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>80%</td>
<td>50%</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>Joint pain</td>
<td>60%</td>
<td>20%</td>
</tr>
<tr>
<td>Chest pain</td>
<td>50%</td>
<td>10%</td>
</tr>
<tr>
<td>Cough</td>
<td>40%</td>
<td>5%</td>
</tr>
<tr>
<td>Anosmia</td>
<td>30%</td>
<td>1%</td>
</tr>
<tr>
<td>Sickle cell fever</td>
<td>20%</td>
<td>1%</td>
</tr>
<tr>
<td>Rhinitis</td>
<td>10%</td>
<td>1%</td>
</tr>
<tr>
<td>Red eyes</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Dysgeusia</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Headache</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Sputum production</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Lack of appetite</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Sore throat</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Vertigo</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Myalgia</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

The figure shows percentages of patients presenting with specific coronavirus disease 2019 (COVID-19)-related symptoms during the acute phase of the disease (left) and at the time of the follow-up visit (right).

*Carfi, JAMA 2020*

**COVID-19’S LASTING MISERY**

Months after infection with SARS-CoV-2, some people are still battling fatigue, lung damage and an array of other symptoms. By Michael Marshall

Lung scans from a 50-year-old show that damage from COVID-19 (red) can improve with time — but many patients have lasting symptoms.

*Marshall, Nature 2020*
Natural History of COVID-19

Nalbandian, Nature Med April 2021

Marshall, Nature June 2021
Prevalence of Long-Term Effects of COVID-19

Possible Mechanisms
- Endovascular dysfunction
- Microthrombosis
- Neuroinflammation
- Carotid body dysfunction
- Oxidative stress
- Mitochondrial dysfunction
- Beta-2 adrenergic receptor dysfunction

Lopez-Leon, Sci Reports 2021
177 patients with COVID surveyed between 3-9 months after symptom onset: 30% had persistent symptoms.
Effects of COVID-19 on Lung Function

3-month, 6-month, 9-month, and 12-month respiratory outcomes in patients following COVID-19-related hospitalisation: a prospective study


N=83
Evaluation of Respiratory Symptoms in PASC

- Pulmonary function tests: spirometry, lung volumes, DLCO
- Exercise testing: 6-minute walk, CPET
- Laboratory: CBC (Hgb), TSH, EKG
- Imaging: CXR, Chest CT
- Consultation: Pulmonary
- Slow physical therapy/rehab
Evaluation of Cardiac Symptoms in PASC

- CXR, EKG
- Laboratory: troponin, NT-pBNP
- Exercise testing
- Imaging: Echo, MRI
- Consultation with Cardiology
- Slow physical therapy/rehab
  - Rx for POTS/orthostatic hypotension (midodrine, fludrocortisone, high salt diet, compression stockings, etc.)

Stahlberg, Am J Med 2021
Post-exertional malaise

Experience from Mt. Sinai suggests exercise intolerance should be treated cautiously

H Davis. EClinical Medicine. July 2021
Evaluation of Thrombotic Complications in PASC

- Evaluate for DVT/PE, MI, CVA
- Anticoagulation (VKA or LMWH preferred)
- Re-evaluation at 3 months with DVT study, d-dimer
- Arterial thrombosis: life-long anticoagulation
- Consultation: Hematology

**Prophylaxis**

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**Thrombo-prophylaxis for COVID-19 patients**

1. **COVID-19 illness: Severity?**
   - **MILD**
     - Outpatient treatment with close follow-up
     - *OR*
     - Early discharge with close follow-up

2. **ACUTE ILLNESS**
   - Prophylaxis over intermediate intensity or therapeutic intensity anticoagulant (Risk of bleeding)
   - LMWH over UFH and DOACs
   - Dosage incorporates creatinine clearance & age
   - Against basing intensity on D-dimer levels

3. **CRITICAL***
   - Pregnancy
     - Mild-Moderate:
       - Home-based
       - Ambulation
       - Anti-embolic stockings
     - Requiring Hospitalization:
       - LMWH
       - Assess risk of bleed

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*Risk assessment models to predict risk of thrombosis in critically ill patients not yet validated

Kreidieh, Clin Appl Thromb Hemostasis 2021
Outpatient Treatment DVT/PE in Patients with Long COVID

Prevention, Diagnosis, and Treatment of VTE in Patients With Coronavirus Disease 2019
CHEST Guideline and Expert Panel Report

13. For outpatient COVID-19 patients with proximal DVT or PE and no drug-to-drug interactions, we recommend apixaban, dabigatran, rivaroxaban or edoxaban. Initial parenteral anticoagulation is needed before dabigatran and edoxaban. For patients who are not treated with a DOAC, we suggest vitamin K antagonists over LMWH (for patient convenience and comfort). Parenteral anticoagulation needs to be overlapped with vitamin K antagonists.

21. In patients with COVID-19 and recurrent VTE despite anticoagulation with therapeutic weight adjusted LMWH (and documented compliance), we suggest increasing the dose of LMWH by 25% to 30%.

22. In patients with COVID-19 and recurrent VTE despite anticoagulation with apixaban, dabigatran, rivaroxaban or edoxaban (and documented compliance), or vitamin K antagonist therapy (in the therapeutic range) we suggest switching treatment to therapeutic weight-adjusted LMWH.
UVM Health Network COVID-19 Recovery Program

Patients

Primary Care
Diagnostic/Treatment Algorithm
Site-Based Physician Leader

Rehab Services
OT/PT/SLP/RT

Medical Specialty Consultation:
Cardiology
Pulmonology
Neurology
Rheumatology
Pulmonary Rehab

Multidisciplinary Discussion

Social Work Case Management

Chronic COVID Support Group
<table>
<thead>
<tr>
<th>SYMPTOMS THAT PATIENT IS REPORTING</th>
<th>IF PATIENT CALLS, ACTION THAT SHOULD BE TAKEN BY RN STAFF</th>
<th>PROVIDER ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiac:</strong> New chest pain or CHF symptoms (orthopnea, PND, DOE)</td>
<td>- Triage as per protocol for chest pain. Assess for acute vs chronic symptoms. Notify provider per protocol (high priority).</td>
<td>- Consider emergent work up for myocarditis/myocardial infarction - Consider urgent cardiology referral vs ER evaluation</td>
</tr>
<tr>
<td><strong>Neuro:</strong> New neurologic or acute neurologic event</td>
<td>- Suspect acute CVA?—send patient to ER. - Triage symptoms for acute vs. chronic. - Send to provider as high priority.</td>
<td>- If acute (\rightarrow) ER - If subacute, consider referral to neurology.</td>
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<tr>
<td><strong>Pulmonary:</strong> New or worsening breathlessness or persistent SpO2&lt;92%</td>
<td>- Triage and send to provider as high priority</td>
<td>- Work up for PE or pneumonia - Consider referral to Pulmonary</td>
</tr>
<tr>
<td><strong>Pulmonary:</strong> Shortness of breath with resuming activities (poor exercise tolerance)</td>
<td>- Triage for acute symptoms - Schedule in person visit (assuming isolation is complete)</td>
<td>- Consider if there is need for acute work up. - If no acute issues, refer to Physical Therapy for guidance on resumption of activity</td>
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<tr>
<td><strong>Cardiology:</strong> Elevated HR with rest/exercise, orthostatic changes</td>
<td>- Triage for acute symptoms - Schedule in person visit (assuming isolation is complete)</td>
<td>- Consider if need for acute work up - Consider referral to PT</td>
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Management continued…

<table>
<thead>
<tr>
<th></th>
<th>Management</th>
<th>Referral Options</th>
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<tbody>
<tr>
<td><strong>Neuro:</strong></td>
<td>persistent headache, paresthesia, impaired balance,</td>
<td>- Triage for “red flag” symptoms per protocol</td>
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<tr>
<td></td>
<td></td>
<td>- Consider referral to Neurology</td>
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<tr>
<td></td>
<td></td>
<td>- Consider referral to PT</td>
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<tr>
<td><strong>Neuro:</strong></td>
<td>brain “fog”, organizational issues</td>
<td>- assess for acute issue</td>
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<td></td>
<td></td>
<td>- refer to OT/SLP as indicated (see table below)</td>
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<tr>
<td><strong>Musculo-skeletal:</strong></td>
<td>persistent muscle weakness, myalgias, joint pain</td>
<td>- Evaluate for “red flags” (red/hot joint)</td>
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<td></td>
<td></td>
<td>- Referral to Rheumatology for more severe symptoms</td>
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<td></td>
<td></td>
<td>- Referral to PT for mild-moderate symptoms.</td>
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<tr>
<td><strong>Gastro-intestinal:</strong></td>
<td>persistent diarrhea</td>
<td>- Evaluate for “red flags” (&gt;10 stools/day, blood in stool)</td>
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<td></td>
<td></td>
<td>- Evaluate for common causes (C Diff if recent antibiotics)</td>
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<td></td>
<td>- Consider referral to GI</td>
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<tr>
<td><strong>Psychological:</strong></td>
<td>sleep disturbance, anxiety, depression, isolation, PTSD-like symptoms</td>
<td>- Assess for safety/acuity</td>
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<td></td>
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<td>- schedule visit with PCP office (telehealth or in person)</td>
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<td>- Consider need for medication</td>
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<td>- Refer to Primary Care Medical Home Care Management to get connected with resources/counseling.</td>
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Red Flags and Yellow Flags for Rehab Therapy

**RED FLAGS:**

STOP treatment. Contact referring provider and/or initiate emergency services

- Cardiovascular: Unexplained chest pain, new tachycardia, dizziness
- Pulmonary symptoms: Sudden shortness of breath, chest pain, anxious, dizziness, palpitations, pneumonia, new severe breathlessness or worsening breathlessness, SpO2 < 92%
- New neurovascular or acute neurologic event
- New or worsening impairments in physical, cognitive or mental health status arising after critical illness and persisting beyond acute care hospitalization.

**YELLOW FLAGS:**

- Struggling with low mood, anxiety, post traumatic stress disorder, sleep (i.e. Counseling)
- Patient feeling overwhelmed needing assistance with managing resources, agencies, health coach (i.e. Community Health Consult otherwise known as medical home)
- Need for additional therapy disciplines based on provider guide and patient presentation
Summary

Message:

• Primary Care is the foundation of care for patients with prolonged COVID symptoms

• Comprehensive assessment in Primary Care can help educate patients and get them the resources and specialist evaluations needed

• Consider basic evaluation of common cardiac, respiratory, and thrombotic issues associated with long COVID
COVID-19 Patient Advocacy and Research

COVID ADVOCACY EXCHANGE

PATIENT-LED RESEARCH COLLABORATIVE

Patient Advocate Foundation

BODY POLITIC
COVID-19 SUPPORT GROUP

Empathize • Organize • Mobilize

The University of Vermont
LARNER COLLEGE OF MEDICINE
OFFICE OF PRIMARY CARE & AHEC PROGRAM
Questions and Discussion from the group....
RECORDING TO BE STOPPED FOR CASE PRESENTATION
Case Presentation Format

1. Case presentation by a participant (a real-world case, from the field)
   Then
2. Clarifying questions about the case from group to case presenter
   Then
3. Ideas, suggestions, recommendations from participants
   Then
4. Ideas, suggestions, recommendations from ECHO faculty team
   Then
5. Additional discussion (All)
   Then
6. Summary of case discussion by course director
Wrap Up/Where we’ve been ....

<table>
<thead>
<tr>
<th>DATES</th>
<th>DIDACTIC TOPICS (in addition to case review)</th>
</tr>
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<tbody>
<tr>
<td>September 10</td>
<td>Introduction to PASC (Long COVID)</td>
</tr>
<tr>
<td></td>
<td>· Definition</td>
</tr>
<tr>
<td></td>
<td>· Incidence</td>
</tr>
<tr>
<td></td>
<td>· Potential etiologies</td>
</tr>
<tr>
<td>September 24</td>
<td>Chronic generalized symptoms</td>
</tr>
<tr>
<td></td>
<td>· Fatigue</td>
</tr>
<tr>
<td></td>
<td>· Chronic pain</td>
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<tr>
<td></td>
<td>· Loss of taste/smell</td>
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<td></td>
<td>· Depression and anxiety</td>
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<tr>
<td>October 8</td>
<td>Chronic neurologic symptoms</td>
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<tr>
<td></td>
<td>· Brain fog, decreased memory</td>
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<tr>
<td></td>
<td>· Headaches</td>
</tr>
<tr>
<td></td>
<td>· Sleep Disruption</td>
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<tr>
<td>October 22</td>
<td>Chronic cardio-pulmonary symptoms</td>
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<tr>
<td></td>
<td>· Cough and/or Dyspnea</td>
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<tr>
<td></td>
<td>· Chest Pain</td>
</tr>
<tr>
<td></td>
<td>· Venous thromboembolism</td>
</tr>
</tbody>
</table>
Conclusions

• Thanks to all of our faculty
  • Katherine Menson, DO
  • David Kaminsky, MD
  • Suzanne Lawrence, DPT
  • Ashley Couture, MS, CCC-SLP

• Thanks to ALL OF YOU!!!
  • And special thanks to our case presenters!

• Slides are posted at www.vtahec.org

• Please complete evaluations, and once submitted, CE information will be emailed to you.

• Please contact us with any questions or suggestions
  • Mark.Pasanen@uvmhealth.org
  • Elizabeth.Cote@uvm.edu