Post-Acute Sequelae of COVID-19 (PASC): What Can Be Done in and after the ICU to Lower the Risk of "Long COVID"?

COVID-19 Resources

Welcome to the Webcast!

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The Society of Critical Care Medicine (SCCM) and the American Association for Respiratory Care (AARC) partnered to produce this webinar on COVID-19.
Credit for Respiratory Therapists

This course has been approved for 1.0 CRCE by the American Association for Respiratory Care (AARC). Course # 185349000.

Control Panel
Polling Question

Which of the following is true of post-acute COVID-19 symptoms and sequelae?
A. They are mainly attributed to deconditioning.
B. They are frequently associated with abnormalities in pulmonary function testing (PFT).
C. They may occur following acute disease of any severity.
D. They are associated with underlying pulmonary comorbidities.
Discussion Question

How common are post-COVID-19 symptoms?


Persistent symptoms in 87% at 30 days

- None (13%)
- 1 to 2 (32%)
- 3 or more (55%)
COVID-19 post-discharge symptoms prevalence (%)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>ICU patients</th>
<th>Ward patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>70%</td>
<td>60%</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>60%</td>
<td>50%</td>
</tr>
<tr>
<td>PTSD symptoms</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td>Anxiety/depression</td>
<td>40%</td>
<td>30%</td>
</tr>
<tr>
<td>Concentration problems</td>
<td>30%</td>
<td>20%</td>
</tr>
<tr>
<td>Pain</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Voice change</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Cough</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Memory problems</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Continence problems</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>


**Discussion Question**

What types of symptoms are reported?
Discussion Question

What is the impact of post-COVID-19 infection?


**Table 2: 60-Day Outcomes Among 1230 Survivors of COVID-19 Hospitalization, 48% of Whom Completed the Telephone Survey**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital mortality within 30 days</td>
<td>1.8%</td>
</tr>
<tr>
<td>Unplanned readmission within 30 days</td>
<td>14.2%</td>
</tr>
<tr>
<td>Readmission for COVID-19 related to index hospitalization</td>
<td>10.6%</td>
</tr>
<tr>
<td>Death related to COVID-19 hospitalization</td>
<td>4.6%</td>
</tr>
<tr>
<td>Number of hospitalizations</td>
<td>31</td>
</tr>
<tr>
<td>Number of intensive care unit admissions</td>
<td>12</td>
</tr>
<tr>
<td>Time to return to baseline COVID-19 symptoms:</td>
<td>77 (IQR: 49-145) days</td>
</tr>
<tr>
<td>Return to work or school after index hospitalization</td>
<td>77 (IQR: 49-145) days</td>
</tr>
<tr>
<td>Return to normal activities after index hospitalization</td>
<td>77 (IQR: 49-145) days</td>
</tr>
<tr>
<td>Needs on long-term care</td>
<td>36</td>
</tr>
<tr>
<td>Needs on home care</td>
<td>21</td>
</tr>
<tr>
<td>Needed daily assistance</td>
<td>27</td>
</tr>
<tr>
<td>Needed counseling</td>
<td>12</td>
</tr>
<tr>
<td>Needed home health services</td>
<td>16</td>
</tr>
<tr>
<td>Needed respiratory equipment</td>
<td>14</td>
</tr>
<tr>
<td>Needed physical therapy</td>
<td>7</td>
</tr>
<tr>
<td>Needed occupational therapy</td>
<td>6</td>
</tr>
<tr>
<td>Needed speech therapy</td>
<td>4</td>
</tr>
<tr>
<td>Needed psychiatric care</td>
<td>4</td>
</tr>
<tr>
<td>Not able to work</td>
<td>35</td>
</tr>
<tr>
<td>Not able to walk</td>
<td>35</td>
</tr>
<tr>
<td>Not able to self-administer medications</td>
<td>32</td>
</tr>
<tr>
<td>Not able to wash hands</td>
<td>30</td>
</tr>
<tr>
<td>Not able to perform daily activities</td>
<td>28</td>
</tr>
</tbody>
</table>

COVID-19 Resources


Discussion Question

What can be done to prevent post-acute sequelae of COVID-19 (PASC) in the ICU?

ICU Pain, Agitation, and Delirium Guidelines: ICU Liberation (A-F) Bundle Checklist

A. Assess, prevent, and manage pain
B. Both spontaneous awakening trials (SATs) and spontaneous breathing trials (SBTs)
C. Choice of sedation
D. Delirium: Assess, prevent, and manage
E. Early mobility and exercise
F. Family engagement and empowerment
Caring for Critically Ill Patients With the ABCDEF Bundle: Results of the ICU Liberation Collaborative in Over 15,000 Adults

Study Design
Prospective, multicenter, cohort study from a national quality improvement project

Population
15,266 adults with at least 1 ICU day

Measurements
• Association between ABCDEF bundle compliance and outcomes

Lower Likelihood of Seven Outcomes

1. Hospital death \( \text{adjusted HR, 0.32; CI, 0.17–0.62} \)
2. Next-day mechanical ventilation \( \text{AOR, 0.28; CI, 0.22–0.36} \)
3. Coma \( \text{AOR, 0.35; CI, 0.22–0.56} \)
4. Delirium \( \text{AOR, 0.60; CI, 0.49–0.72} \)
5. Physical restraints \( \text{AOR, 0.37; CI, 0.30–0.46} \)
6. ICU readmission \( \text{AOR, 0.54; CI, 0.37–0.79} \)
7. Discharge to a facility \( \text{AOR, 0.64; CI, 0.51–0.80} \)

Consistent dose-response (all \( P < 0.002 \))

Case Study

A 55-year-old previously healthy man was hospitalized with SARS-CoV-2 after presenting with hypoxemia and pulmonary infiltrates. He required high-flow nasal cannula but did not require intubation. He received antiviral therapy and corticosteroids. Clinical status improved although he required 2L/m oxygen at discharge. He presented to the post-COVID-19 clinic with improving but persistent dyspnea and daily palpitations. His PFTs, including room air exercise and pulse oximetry, were normal, although repeat CT subsequently showed some minimal residual fibrosis. ECG was unremarkable and Holter monitor demonstrated only sinus tachycardia. He enrolled in a structured rehabilitation program and made slow, steady progress. After 6 months he had returned to functional baseline. However, at follow-up he reported impaired memory and the inability to multitask. A small business owner, he was no longer able to balance the books or recall the names of longstanding clients. He reported increased depression and anxiety related to ongoing symptoms and financial pressures. Neurologic imaging was unrevealing. Symptoms improved with initiation of antidepressants and cognitive behavior therapy, but he has not yet returned to baseline.

Discussion Question

For patients with persistent dyspnea, how common are persistent radiographic findings or PFT abnormalities?
Discussion Question

Besides cardiopulmonary complications, what are other areas of concern?
Discussion Question

How is assessment and treatment of pain different in patients with COVID-19?
Pain Assessments May Be Compromised in Patients With COVID-19

• Nurses should coordinate with other bedside clinicians providing bedside care to obtain nonverbal pain assessments.
• In the absence of pain assessments, pain should be assumed to be present and should be treated.
• Some Critical-Care Observation Tool (CPOT) domains may be assessable from outside the patient room.

Risk Factors for Pain May Be Different in Patients With COVID-19

• Bedside procedures are painful and require additional analgesia.
• Opioid tachyphylaxis occurs as soon as 2 days after opioid infusion initiation.
• Painful neuropathies due to peripheral nerve invasion of the virus and prolonged immobility.
High-Dose, Long-Term Opioid Infusions Are Common in Patients With COVID-19

- Discard concerns about post-hospital opioid use disorder.
- Use high initial opioid dosing in patients on chronic opioids.
- Use a scheduled laxative protocol on all patients on opioid infusion.
- Remember to reduce or discontinue opioid infusion rates before performing SBTs.


Discussion Question

How can we optimize SATs and SBTs in patients with COVID-19?
Sedation Assessments May Be Compromised in Patients With COVID-19

- Coordinate bedside activities with sedation assessments.
- Nurses should coordinate with other bedside clinicians providing bedside care to obtain sedation assessments.
- Bispectral index monitoring may be helpful in patients on continuous neuromuscular blockers (NMB).


Severe Hypoxic Respiratory Failure May Require Deep Sedation

- Establish new sedation goal daily.
- Optimize ventilator settings before making medication changes.
- Not all patients with acute respiratory distress syndrome (ARDS) require deep sedation.
- Perform SATs even if patient will not pass SBT.
- Non-nurses can help support SAT efforts.
- Use sedation protocols.
- Midazolam infusions hang around a long time.
- Perform SBT safety screen regardless of perceived SBT success.

**Discussion Question**

How is the use of sedation different in patients who have COVID-19?

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**Analgesic and Sedative Drug Interactions in Patients With COVID-19**

- Hypertriglyceridemia may occur due to cytokine storm mimicking hemophagocytic lymphohistiocytosis.
- Monitor patients for propofol infusion syndrome.
  - Check daily creatine kinase and hold propofol if ≥ 1000 U/L.
- Monitor QTc in patients on methadone or antipsychotics.
- IV acetaminophen/paracetamol can cause hypotension.
- NSAIDs should be avoided.

Increase Risk for Opioid and Sedative Withdrawal in Patients With COVID-19

• Enteral administration of long-acting opioids (methadone) and sedatives (diazepam) may decrease withdrawal as analgesic and sedative doses are reduced.
• Enteral absorption may not be reliable until gut is functional.

Frequent Use of Continuous NMBs in Patients With COVID-19

• Use intermittent boluses first.
• A paralytic holiday should occur daily until ventilator dyssynchrony or patient movement has occurred.
Discussion Question

How do you recommend preventing and treating delirium to prevent PASC in patients with COVID-19?

Delirium Screening Will Be Reduced in Patients With COVID-19

- Delirium should be assumed to be present in the absence of assessment results.
- Prioritize delirium screening in periods of greatest wakefulness.
- Other bedside clinicians can be trained to perform the Confusion Assessment Method for the ICU (CAM-ICU) or Intensive Care Delirium Screening Checklist (ICDSC) if nurse cannot.
- Ask patients if fearful and communicating.

Challenge of Recognizing and Reducing Potential Modifiable Risk Factors for Delirium

- New delirium may indicate worsening sepsis, a new acute neurologic injury, or the need for fluids or electrolytes.
- Reduce light and noise to promote sleep.
- Drug-associated delirium is often dose related.
  - Reduce steroid and benzodiazepine doses if possible.

Discussion Question

Which medications have been associated with increased risk of ICU delirium?
COVID-19 Delirium Management: Dr. DRE

- Disease remediation
  - Remember new sepsis, chronic obstructive pulmonary disease, and congestive heart failure
- Drug removal
  - SATs
  - Avoid benzodiazepines, as able
- Environment
  - Mobilization in room, sleep, family on electronic device, hearing aids, eyeglasses, noise reduction

Polling Question

Can patients with COVID-19 achieve early mobility?
A. Yes
B. No
Case Study

A 65-year-old man is admitted to the COVID-19 ICU with a previous medical history of hypertension, diabetes mellitus, and obesity. He is currently receiving BiPAP.

• What are some ways to involve the family?
• If he were sedated, what could be done to involve the family?
• What are some other nonpharmacologic interventions that could be incorporated into his care to help him think of family?

Polling Question

Which of the following medications may be inappropriately continued in post-COVID-19 patients after hospital discharge?
A. Antipsychotics
B. Proton pump inhibitors
C. Opioids
D. All of the above
Discussion Question

What are the points to cover before discharging post-COVID-19 patients?

The Dirty Dozen: 12 Points to Cover Prior to COVID Dispo

- Home Meds Restarted?
- Should new ICU meds be stopped?
- What is the anticoag plan?
- Who fields q’s prior to 1st follow up?
- Exercise Plan to recondition
- What follow up is most key?
- Removal Plan for tubes/lines/filters
- Written tubes/lines recap
- Teach common readmit issues
- Have PT/OT evaluated?
- Can they pay for what they need?
- Expect post-ICU syndrome

#CoVisuals

Source: Dr. TJ Iwashyna @iwashyna
@CAHarrisMD
Case Study

A 47-year-old woman with a history of morbid obesity was hospitalized from April 2020 to June 2020 for ARDS from COVID-19 complicated by severe ventilator-associated barotrauma (pneumothorax, pneumomediastinum, pneumoperitoneum, subcutaneous emphysema) requiring significant ICU supportive care by extracorporeal membrane oxygenation (ECMO) and tracheostomy. Her ICU stay was complicated by septic shock, acute kidney injury (AKI), delirium, post-ICU anxiety (and probable posttraumatic stress disorder). Other complications and diagnoses at hospital discharge include worsening depression (she had some depression at baseline), ileus, AKI transitioned on hemodialysis, post-COVID-19-possible venous thromboembolism (discharged on rivaroxaban), hypertension, and hyperglycemia with possible diabetes (discharged on insulin). She was eventually discharged to a long-term acute care facility and finally discharged home from there after 3 months. She was only on cetirizine before hospital admission and her discharge medications are:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose and Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>acetaminophen</td>
<td>1,000 mg, Oral, EVERY 8 HOURS PRN</td>
</tr>
<tr>
<td>albuterol</td>
<td>90 mcg/actuation HFA inhaler, 4 puffs, Inhalation, 4 TIMES DAILY PRN</td>
</tr>
<tr>
<td>B complex-vitamin C-folic acid</td>
<td>0.8 mg tablet, 1 tablet, Oral, DAILY</td>
</tr>
<tr>
<td>bisacodyl</td>
<td>10 mg, Rectal, DAILY PRN</td>
</tr>
<tr>
<td>cetirizine</td>
<td>5 mg, Oral, DAILY</td>
</tr>
<tr>
<td>chlorhexidine gluconate</td>
<td>0.12 % mouthwash, 15 mL, Swish &amp; Spit, 2 TIMES DAILY</td>
</tr>
<tr>
<td>docusate sodium</td>
<td>100 mg, Oral, DAILY</td>
</tr>
<tr>
<td>famotidine</td>
<td>20 mg, Oral, DAILY</td>
</tr>
<tr>
<td>ferrous sulfate</td>
<td>325 mg, Oral, 3 TIMES DAILY</td>
</tr>
<tr>
<td>fluticasone</td>
<td>50 mcg/actuation nasal spray, 2 sprays, Each Nostril, 2 TIMES DAILY</td>
</tr>
<tr>
<td>furosemide</td>
<td>40 mg, Oral, 2 TIMES DAILY</td>
</tr>
<tr>
<td>insulin glargine</td>
<td>40 units, SubQ, DAILY</td>
</tr>
<tr>
<td>LORazepam</td>
<td>0.5 mg, Oral, EVERY 12 HOURS PRN</td>
</tr>
<tr>
<td>melatonin</td>
<td>6 mg, Oral, AT BEDTIME PRN</td>
</tr>
<tr>
<td>metoprolol tartrate</td>
<td>75 mg, Oral, 2 TIMES DAILY</td>
</tr>
<tr>
<td>QUEtiapine</td>
<td>75 mg, Oral, AT BEDTIME</td>
</tr>
<tr>
<td>rivaroxaban</td>
<td>20 mg, Oral, DAILY</td>
</tr>
<tr>
<td>pantoprazole</td>
<td>40 mg, Oral, DAILY</td>
</tr>
<tr>
<td>sodium chloride</td>
<td>0.65 % nasal spray, 2 sprays, Each Nostril, 3 TIMES DAILY PRN</td>
</tr>
<tr>
<td>traZODone</td>
<td>50 mg, Oral, AT BEDTIME</td>
</tr>
</tbody>
</table>
Questions and Answers

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Thank You!

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