UCSF Inpatient Adult COVID-19 Interim Management Guidelines

Purpose

The intent of this guideline is to provide a framework for clinical management of individuals with COVID-19. Infection prevention and specimen collection instructions are outside the scope of this guideline and can be found in the Additional Resources section.

Guidelines are intended to assist with clinical decision-making for common situations but cannot replace personalized evaluation and management decisions based on individual patient factors.

The document covers off-label use of medications based on the best evidence currently available.

Given the rapid evolution of the current COVID-19 pandemic, this will be a living document that is likely to change over time.

Additional references

The UCSF Hospital Epidemiology and Infection Prevention website includes comprehensive guidance and links to the institutional control plan, algorithms for initial evaluation of patients, instructions on specimen collection, signage for isolation, and much more information. This website should be referenced as the source of the most updated information about the UCSF COVID-19 response.

General principles

During the pandemic, remember these principles:

- Order diagnostic studies only when clinically indicated. Remember that each test may expose additional personnel to potential infection, remove exam rooms from circulation, and utilize additional personal protective equipment.
- Supply chain issues will impact every aspect of clinical care, from lab testing to medications to blood products to personal protective equipment. Practice evidence-based medicine and order only testing and medications that are truly necessary.
- Clean your hands and utilize personal protective equipment as recommended by Hospital Epidemiology and Infection Prevention.

PPE conservation

- Direct contact with the patient in the room should only occur if the provider will perform a direct physical exam or in-room procedure that will provide clinical information to impact patient assessment and clinical care in the next 24-48 hours.
- If deemed necessary, only one member (the clinical decision maker) should perform the in-person encounter with suspected or confirmed COVID-19 patients. No other team members should enter the room unless needed to assist with a procedure.
• **Telephone, e-consultation, and video consultations** should be used if direct contact is not essential. Further information can be found here: [https://telehealth.ucsf.edu/inpatient-consultations](https://telehealth.ucsf.edu/inpatient-consultations)

• Bundle care activities to limit the number of entries into the room.

• Limit the number of individuals in the room to essential staff for aerosol-generating procedures.

• The most experienced individuals should preferentially perform necessary procedures.

• Ensure all supplies needed for an exam or procedure are available prior to donning PPE and entering the room.

### Diagnostic testing

#### COVID-19 RNA testing

- **Indications:**
  - Test any inpatient or patient pending admission with signs/symptoms compatible with COVID-19, including respiratory illness, new cough, fever, dyspnea, or flu-like illness.
  - Test asymptomatic patients meeting the following definitions:
    - Imminent BMT or SOT, if logistics of turnaround time allow
    - Coming from congregate living situation, such as a SNF
    - Unable to provide history of symptoms and no collateral available

- **Type of test:**
  - The three priority testing approaches include:
    1. Flocked swab Nasopharyngeal (NP) plus Oropharyngeal (OP)
    2. Flocked swab Mid-Turbinate plus OP
    3. Synthetic swab Mid-Turbinate plus OP
  - Use whichever swab of these three options is available at your location; these three techniques should be considered equivalent. The thickness of the swab will determine whether the NP or Mid-Turbinate site is sampled in conjunction with OP

- **Repeat testing indications:**
  - Positive initial results: Test certain patients with known infection prior to discharge and/or to inform PPE and isolation decisions. Hospital Epidemiology and Infection Prevention and/or Infectious Diseases will guide decision-making for re-testing.
  - Negative initial results: Consider in patients where the clinical suspicion remains high for COVID-19, particularly if mechanically ventilated. Approval required from COVID-ID or Infectious Diseases attending.

#### COVID-19 serology

- **Clinical indications:**
  - Confirmation of infection in a patient for whom there is high clinical suspicion but negative PCR testing if symptoms have been present for at least 7 days
  - Documentation of serological response prior to convalescent plasma donation
Utility for determining immunity remains uncertain
Seroprevalence studies

Laboratory testing

- Admission: obtain for all acute- and ICU-level care patients
  - CBC with differential, BMP, Mg, LFTs, CRP, ferritin, troponin, PT/INR, PTT, fibrinogen, D-dimer
  - Consider if clinically indicated:
    - BNP, CK, LDH, lactate, ABG
    - Procalcitonin (please use Decision Support Tool)
    - If concern for bacterial infection (prior to starting empiric antibiotics): blood cultures, sputum bacterial culture
    - Hepatitis B and C serologies if elevated liver biochemistries

- Routine Monitoring:
  - CBC with differential, BMP, Mg; these may not be required on a daily basis, consider decrease in frequency depending on clinical condition.
  - Trend LFTs Q24h-72h if significantly abnormal at baseline or receiving potentially hepatotoxic medications.
  - Trend D-dimer, PT/PTT, ferritin, CRP and fibrinogen Q48h-72h if abnormal baseline values

- Deterioration or failure to improve (acute or critical care):
  - Procalcitonin, CRP, ferritin, troponin, PT/INR, PTT, fibrinogen, D-dimer, ABG (if significant hypoxemia/O2 requirement)
  - Repeat blood and sputum cultures (tracheal aspirate if intubated)

- Do not obtain unless clinical suspicion for a specific diagnosis (e.g. HLH, propofol-induced hypertriglyceridemia)
  - Triglycerides, soluble IL-2-receptor-alpha, NK cell activity

- Do not obtain
  - IL-6

Microbiology

- Admission:
  - Respiratory viral panel if immunocompromised host or flu/RSV PCR if during flu season
  - Blood cultures (2 sets) and sputum bacterial culture if concern for bacterial infection/prior to starting empirical antibiotics if indicated

- Clinical deterioration:
  - Repeat sputum cultures if producing sputum (do not induce sputum)
  - Tracheal aspirate bacterial culture if intubated
Blood cultures (2 sets) - prior to starting or broadening antibiotics

Radiography:

- Chest radiography:
  - Roles of chest radiograph:
    - Baseline CXR in Emergency Department and Inpatients. Primarily used to exclude bacterial infection or other alternative diagnoses.
    - Monitoring of complications in inpatients (pneumothorax, atelectasis) at an interval deemed appropriate by the clinical team.
  - Key points
    - Neither sensitive nor specific for COVID-19 infection
    - Typical findings: patchy, bilateral, consolidation

- Chest CT:
  - Roles of chest CT
    - Limited role in diagnosis of COVID-19 as PCR is the test of choice.
    - Should only be performed if the results would change management.
    - Primary role of CT is the evaluation of superimposed processes such as pulmonary embolism or aortic dissection.
  - Key points
    - Typical CT findings relatively specific for COVID-19 in the appropriate clinical setting
    - Most suggestive findings: focal, patchy, bilateral, rounded or geographic areas of ground glass opacity and consolidation often in a peripheral distribution

When to consult ID for confirmed or highly-suspected cases:

- Discuss all patients with confirmed COVID-19 with the COVID-ID attending to determine the optimal way to access clinical trials and other treatments for each patient
- High suspicion for COVID-19 with negative initial testing and acute respiratory failure
- Positive test in solid-organ, bone-marrow transplant, or malignant hematology patients
- Positive test in pregnant patients
- Positive test and concern for secondary infections (i.e. bacterial or fungal pneumonia)

Therapeutic management

- The mainstay of treatment for COVID-19 is standard supportive therapy. Approach to treatment should be like other respiratory viral illnesses that can have severe manifestations.

Experimental therapies

Upper respiratory tract infections:
Most patients with confirmed upper respiratory tract infection from COVID-19 should not be offered experimental medications.

**Lower respiratory tract infections**

1. **Remdesivir**: Based on preliminary results from the NIH Adaptive Clinical Treatment Trial (ACTTI), remdesivir received Emergency Use Authorization from the Food and Drug Administration. Treatment should be administered to patients with severe infection, characterized by: SpO2≤ 94% RA on at least two occasions and/or requiring supplemental oxygen, mechanical ventilation, or extracorporeal membrane oxygenation. Participation in trials including this drug should be prioritized over other trials that may preclude ability to access remdesivir through trials.

   A. Exclusions:
      - ALT/AST > 5 times the upper limit of normal
      - Allergy
   
   B. Drug is available via clinical trials and through the FDA Emergency Use Authorization. If given through the EUA, provide the patient or patient representative this document: [https://www.fda.gov/media/137565/download](https://www.fda.gov/media/137565/download)

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<td>Important drug interactions</td>
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<td>Adverse effects</td>
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2. **Convalescent plasma**: Convalescent plasma should generally only be offered in the setting of a clinical trial. Outside of a trial, consider for expanded access use in the following patient populations:
   A. Severe respiratory failure
   B. Hospitalized patients with severe immunocompromise not expected to mount an antibody response, including recent stem-cell transplant or solid-organ transplant

3. **Steroids**: Dexamethasone 6 mg IV or PO qday x up to 10 days or equivalent while in the hospital. Administer PO if able to take oral medication.
A. Patients undergoing mechanical ventilation, non-invasive ventilation, or high-flow nasal cannula: Most patients should be treated with steroids

B. Patients on nasal cannula: Consider steroids in those with persistently low oxygen saturation and requiring substantial supplemental oxygen (e.g. ≥ 3-4L O2) or whose trajectory suggests increasing severity of disease

C. Patients who do not require supplemental oxygen should not get steroids for the indication of COVID-19

D. Factors to consider in determination of whether to withhold (or stop) steroids:
   - Uncontrolled invasive fungal infections
   - Uncontrolled hyperglycemia
   - Existing delirium
   - Other immunosuppressive medications
   - Pregnancy (dexamethasone crosses the placenta and should be discussed with OB/Maternal-Fetal Medicine before administration)

   Consult ID for patients with any of the above factors to discuss relative risk/benefit of steroid administration

4. Interferon: Preliminary data suggests there may be a potential role for this drug, but more information is needed from clinical trials. Should be given in the context of a clinical trial

5. Immunomodulating drugs: Should only be given in the context of a clinical trial

Medications/interventions to avoid

- Do not give other pharmaceutical treatments (e.g. tocilizumab, lopinavir/ritonavir, ribavirin) specifically for COVID-19 unless part of a clinical trial

Nonsteroidal anti-inflammatory drugs (NSAIDs)

- Concerns have been raised that NSAIDs may worsen COVID-19 disease. However, to date, there is no scientific evidence connecting the use of NSAIDS with worsening COVID-19 symptoms. Further evidence is needed to understand the safety of NSAIDS in the management of patients with COVID-19.

Renin-angiotensin system (RAS) blockers

Theoretical basis for concern: The virus that causes COVID-19 uses the angiotensin-converting enzyme (ACE) 2 receptor to enter cells. Because some ACE inhibitors and angiotensin receptor blockers (ARBs) can increase the expression of ACE2, there is concern that these medications may facilitate viral entry into cells. However, currently there is not clinical or epidemiological data to support this concern.
Patients diagnosed with COVID-19 who take ACE inhibitors or ARB medications generally should continue these medications.

For those with severe respiratory failure requiring mechanical ventilation, stopping ACE inhibitors or ARBs may be considered on a case-by-case basis in consultation with appropriate subspecialty service. (e.g. Nephrology, Cardiology, Advanced Heart Failure)

UCSF guidelines for prophylactic/therapeutic anticoagulation for inpatients with COVID-19

COVID-associated coagulopathy and venous thromboembolism risk

- Most common pattern of coagulopathy is elevated fibrinogen & D-dimer, indicative of inflammation
- Higher D-dimer and fibrinogen levels are associated with multi-organ dysfunction & worse prognosis
- Overt DIC is rare, with median onset 4 days into hospitalization
- Incidence of thrombosis in ICU patients may exceed 20%-40% even in patients on varying levels of prophylactic anticoagulation

Venous thromboembolism prophylaxis

<table>
<thead>
<tr>
<th>Standard prophylaxis dosing</th>
<th>Enoxaparin 40 mg SQ Qdaily</th>
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<tr>
<td>BMI/Weight &gt;40/&gt;120kg</td>
<td>Enoxaparin 40 mg SQ BID</td>
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<tr>
<td>CrCl 15-30mL/min</td>
<td>Enoxaparin 30 mg SQ Qdaily</td>
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<tr>
<td>CrCl &lt;15mL/min (or RRT)</td>
<td>UFH 5000 units SQ q8 hours</td>
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| Monitoring                  | Enoxaparin: If baseline elevated aPTT, obese, underweight, or CrCl<30, check peak anti-Xa level 4-6 hours after 3rd-4th dose to ensure appropriate dose (goal 0.2-0.5) |

Venous thromboembolism diagnostic evaluation and treatment

- D-dimer interpretation:
  - Elevated or rising D-dimer should not trigger evaluation or treatment for VTE unless other clinical signs/symptoms.
  - A D-dimer below the upper limit of normal can still be used to rule out VTE.

- If standard CTPE/DVT US/TTE cannot be obtained, reasonable to rely on diagnostic modalities that minimize risk of infectious spread, e.g.:
  - Provider-performed point of care U/S (POCUS) for DVT
  - Technician-performed DVT U/S (even if concern for PE)
  - Provider-performed POC TTE to assess for signs of right heart strain from PE

- Initiation of empiric, therapeutic anticoagulation without confirmed or high clinical suspicion of DVT/PE is controversial.
  - Our interpretation of current data is that risks outweigh benefits outside an RCT.
  - Same logic applies to empiric tPA for ARDS.
  - If persistent clotting of lines and/or worsening clinical course, therapeutic anticoagulation may be considered via multidisciplinary discussion.

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<tr>
<th>Therapeutic dosing</th>
<th>Enoxaparin 1mg/kg SQ BID</th>
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<tr>
<td>CrCl &gt;30mL/min</td>
<td>Enoxaparin 1mg/kg SQ BID</td>
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CrCl <30mL/min | UFH infusion
---|---
Monitoring | Check concurrent anti-Xa level and aPTT at baseline and during the initial 12 hours of the infusion to ensure correlation (therapeutic goal 0.3-0.7). Assuming values correlate, use aPTT for ongoing monitoring.
Duration | 3 months for provoked VTE unless ongoing indications

**Critical care management**

**Respiratory and ventilator management (see Respiratory Care Management detailed protocol)**

**Principles of Care:**

- Nebulizer therapy is an aerosol-generating procedure and should be avoided in COVID-19 patients unless there is a strong indication that it would be superior to MDI. Data suggests that metered-dose inhalers (MDIs) and nebulized medications have equal efficacy. Use MDIs instead of nebulized medications except:
  - ICU-level care required due to respiratory status
  - Requiring high-flow nasal cannula or non-rebreather mask
  - Inability to follow commands (e.g. altered mental status, severe cognitive impairment, etc.)
- Write an order for Respiratory Therapy to provide metered-dose inhaler teaching to your patient if using this device for the first time.
- Only essential providers in the room during intubation or other aerosol-generating procedures.* All providers must adhere to infection prevention guidelines. These procedures should be performed in an Airborne Infection Isolation Room (AIIR), if possible.
- During Code Blue response, limited PAPR availability may mean that those directly involved with airway management should be prioritized for PAPR and all others should use N-95 plus eye protection at a minimum (see COVID-19 Code Blue protocol).
- High Flow Nasal Oxygen (HFNO) can be considered for use in selected hypoxemic patients but caution with higher flows (e.g > 25 LPM). Definitive data regarding safety of HFNO are currently lacking but it should be considered an aerosol-generating procedure and airborne precautions are required.
- Non-invasive ventilation (NIV, e.g. CPAP or BiPAP) should be used only in selected patients with respiratory failure but it should be considered an aerosol-generating procedure and airborne precautions are required.
- Patients receiving either HFNO or NIV should be cared for in a monitored setting by personnel capable of performing endotracheal intubation. We recommend short trials of therapy (e.g 1 hour) with frequent clinical re-evaluation. Proceed directly to endotracheal intubation in patients with no evidence of improvement.
- Emergent intubations are to be avoided given the prolonged time to apply PPE and increased risk of infection to the person performing the intubation.

*Personal Protection Prior to Tracheal Intubation*

- Remember that YOUR personal protection is the priority.
Please review the material and use airborne/droplet/contact isolation precautions (PPE includes: PAPR, gown and gloves) when interacting with patients prior to aerosol-generating procedures. Remember to plan ahead as it takes time to apply all the barrier precautions.

Prior to intubation of the patient with suspected or confirmed COVID-19, review and practice donning and doffing gloves, gown and PAPR.

Leave personal items (stethoscope, jewelry, patient list, watch) outside the room.

Apply gown, gloves and PAPR before entering patient room. Person intubating should wear double gloves [+/- hair bouffant caps].

**Preparation for Intubation (ED, ICU or ward for emergent intubations)**

- Personnel inside the room:
  - Airway expert physician (ICU or ED or Anesthesia staff physician/clinical fellow/senior resident)
  - One Respiratory Therapist (RT) to assist with intubation and ventilation
  - One Registered Nurse (RN) to deliver medications
  - A second qualified MD to assist with airway and/or resuscitation
- Personnel outside of the room:
  - RN in PPE available to monitor PPE compliance, assist in case a provider has to leave the room, or obtain additional equipment or medications.
  - Physician or APP to assist with logistics/flow coordination.
  - RT to assist with emergency airway equipment and ventilator
- Equipment to prepare:
  - Manual resuscitation bag with appropriate filter placed between the mask and the bag (must be present in all rooms of patients with confirmed or suspected COVID-19)
  - Capnograph
  - Glidescope with blade
  - Endotracheal tubes (have back up)
  - Medications for induction, hemodynamic support and maintenance of sedation/analgesia

**Intubation procedures:**

- Only experienced providers should perform intubation.
- Plan for rapid sequence induction (RSI) and ensure skilled assistant is able to perform cricoid pressure. RSI may need to be modified if patient is unable to tolerate apnea due to hypoxemia. If manual ventilation is needed, small tidal volumes should be applied. Consider two-handed mask ventilation to ensure good mask seal.
- If possible, preoxygenate with 100% oxygen x 5 minutes and use RSI in order to avoid manual ventilation of patient’s lungs and potential aerosolization of virus from the airways.
- Consider video laryngoscopy as preferential airway equipment.
- Avoid awake fiberoptic intubation. If absolutely necessary, consider use of disposable fiberoptic scope.
• Use high efficiency hydrophobic filter between mask and Ambu bag. Ambu-bag is preferable because it is pre-packaged with filter. Jackson-Reese requires a separate filter and may take time to assemble.
• Once intubated, minimize circuit disconnects and use in-line suction.
• Ventilators and anesthesia machines should have filters on the expiratory and inspiratory circuits. Capnography tubing should be filtered.
• If patient requires transport to ICU, the use of a ventilator with inspiratory and expiratory filters are required (i.e. C3 and EnVe ONLY).
• Video laryngoscope tower (if applicable) and blade should be wiped down with disinfectant wipes before removing from the room. Blade should be placed in a biohazard bag and standard pre-cleaning procedure should be followed.

After Procedure:
• Careful attention to doffing procedure.
• Debrief with staff to identify any potential lessons for future procedures.
• Any concerns about contamination should be reported immediately to provider’s supervisor.

Extracorporeal membrane oxygenation (ECMO) considerations
• ECMO (VA or VV, as appropriate) will be considered per criteria established by Cardiac Surgery and Critical Care.

Tracheostomy considerations
• The optimal timing of tracheostomy in patients with ARDS and COVID-19 is unknown. The decision for tracheostomy will be made on a case-by-case basis. In most circumstances, patients should have two negative COVID-19 PCR tests prior to surgery.

Continuous Renal Replacement Therapy (CRRT)
• For patients with acute kidney injury (AKI), consider delaying CRRT until significant metabolic complications arise (K > 5.5 mmol/L refractory to medical therapy, bicarbonate < 15, arterial pH < 7.15) or significant positive fluid balance despite high-dose diuretics
• For ESRD patients, CRRT should be used to avoid markedly positive fluid balance, which may exacerbate hypoxemia

ACLS/Code Blue Response:

Principles:
• This document refers to Emergency and Code Response management for COVID-19 known and suspected adult patients for the in-patient setting. This document does not apply to out-patient response, the Emergency Departments or our Pediatric Hospitals.
• High-risk procedures performed on COVID-19 patients may expose staff to a high viral burden. During medical emergencies (respiratory distress, cardiopulmonary arrest) where high-risk
procedures are unavoidable, staff will follow the procedures outlined in this document in order to provide needed quality care for patients in a timely and efficient manner whilst ensuring appropriate protection for the health care team.

- The goal is to provide appropriate care for our patients by competent healthcare providers with the minimum number of staff and ensuring strict adherence to infection control measures.
  - Patients will be intubated by the most experienced airway provider (Critical Care Medicine Attendings, Anesthesia Attendings, Critical Care Medicine Anesthesia Fellows and Anesthesia CA-3 Residents).
  - Avoid use of house staff during Code Blue Resuscitations whenever possible.
  - No medical students or health professions students should enter the room.

- Healthcare providers should NEVER enter the rooms or patients with known or suspected COVID-19 patient without appropriate PPE.
- Minimize aerosol generating procedures: avoid/minimize hand-mask ventilation, avoid placement of oral airways or nasal airway devices. We will have a low threshold for endotracheal intubation for COVID-19 patients.
- Early defibrillation: if CPA is caused by arrhythmia- early defibrillation will reduce total time to CPR and may obviate need for airway manipulation.
- Healthcare providers should have a low threshold to call for help for COVID-19 patients if concern for worsening illness to avoid emergent intubations or code situations.

Identification & Preparation:

- Patient rooms with known or suspected COVID-19 will have rooms identified by “Novel Respiratory Isolation” or “Respiratory Illness Evaluation” sign. Donning and Doffing posters will be affixed to these rooms.
- For patients not in their room (off-unit for procedure/imaging/transport): they will be identified by sign on bed indicating “Novel Respiratory Isolation” or “Respiratory Illness Evaluation.”
- Code Activation will be by standard mechanisms. Code Team response will change based upon identification of COVID-19 patient by signage on door.
- On designated units: a COVID-19 PPE cart will be designated to that unit. For units not designated as COVID-19 units: the Code Team will carry a PPE for Code Backpack.
- Patients must have at least one working 20G peripheral IV in place at all times.
- Present on Unit: for any ward caring for a patient with known or suspected COVID-19 there must be present (and easily accessible):
  1. Manual resuscitation bag (AMBU) with appropriate mechanical HEPA filter placed between the mask and the bag
  2. Step-stool (for CPR)
  3. “Cheat sheet” on addendum code and emergency response for COVID-19
  4. Unit staff huddle to review procedure for Code Blue for COVID-19 patient during each shift (with review of procedures and Cheat Sheet) (see Emergency and Code Response Protocol)
- Inside the room:
  1. Non-rebreathing mask
2. Manual resuscitation bag (AMBU) with filter placed between mask and bag
3. Disposable stethoscope
4. Suction with Yankauer

- **Additions to regular Code Blue Response Team Huddles:**
  1. A master list of current COVID-19 census and location of patients will be reviewed
  2. Members of the Code Team will review change of roles/providers for COVID-19 patients

**Procedure:**

**Initiation of Code Blue**

- If you are inside the room and recognize a patient in distress:
  1. If you already have Novel Airborne PPE in place (N95 or PAPR) then: Activate a “Code Blue”
  2. If you only are wearing Contact & Droplet PPE then IMMEDIATELY leave the patient’s room and:
     - Don appropriate PPE and enter the room
     - Simultaneously ask someone to activate a “Code Blue”

- If you are outside the room and recognize a patient in distress:
  1. Don appropriate PPE and enter the room
  2. Simultaneously ask someone to activate a “Code Blue”
  3. A second RN will then don appropriate PPE and enter the room with stool.
  4. RN unit charge RN to don appropriate PPE, bring the code cart and be ready to support code team. Charge RN will also observe for breaches in protection
  5. Maintain at least one staff at unit nursing station to monitor for calls from patient’s room

**Initiation of Procedure: prior to Code Team arrival**

- If patient is in respiratory distress but has a pulse, then provide oxygen. Place NRB mask with filter in place (15 LPM oxygen flow)
- If the patient does NOT have a pulse:
  1. Place NRB oxygen mask on patient
  2. Start chest compressions (CPR): Bedside RN
  3. 2nd RN: applies defibrillator pads and connects to defibrillator
  4. Any healthcare provider who is licensed to defibrillate and who arrives at the code may defibrillate the patient if indicated (pulseless ventricular tachycardia (VT) or ventricular fibrillation (VF))

Refer *Emergency and Code Response Protocol* for further details related to Code Team actions and responsibilities.

**Perioperative considerations**
Elective surgeries should be deferred for patients with COVID-19 disease until the patient is determined to be outside of the infectious period.

Indications for emergency surgery mirror those for patients who do not have COVID-19.

Refer to HEIP guidance for appropriate PPE during intubation and throughout the procedure and details on disposition of the patient

## Special Populations/Clinical Guidelines

### Liver Disease/Cirrhosis and Post Liver Transplant Patients

**Background**

SARS-CoV-2 binds to and is internalized into target cells through angiotensin-converting enzyme 2 (ACE2), which acts as a functional receptor. ACE2 is present in biliary and liver epithelial cells; therefore, the liver is a potential target for infection. The incidence of elevated serum liver biochemistries in hospitalized patients with COVID-19 ranges from 14% to 53%. Liver injury occurs more commonly in severe COVID-19 cases than in mild cases, and rare cases of severe acute hepatitis have been described. Liver injury in mild COVID-19 cases is usually transient and does not require specific treatment. It will be difficult to differentiate whether increases in liver biochemistries are due to SARS-CoV-2 infection itself; its complications, including myositis (particularly with AST>ALT), cytokine release syndrome, ischemia/hypotension; or a drug-induced liver injury.

**Inpatient with COVID-19 without prior liver disease**

- Regular monitoring of liver biochemistries should be performed in all COVID-19 patients regardless of baseline values.
- Serologic testing for hepatitis B and C is warranted when assessing patients with COVID-19 and elevated liver biochemistries.
- To limit unnecessary transport of patients with COVID-19, ultrasound or other advanced imaging (e.g., MRI/MRCP) should be avoided unless there is a clinical suspicion for biliary obstruction or venous thrombosis.
- Consider other causes of elevated liver biochemistries, including myositis (particularly when AST>ALT), ischemia, and cytokine release syndrome.

**Inpatient with underlying cirrhosis**

Information is limited regarding the effects of SARS-CoV-2 in patients with chronic liver disease and cirrhosis.

- Consider evaluating patients with liver disease with new onset encephalopathy or other acute decompensation for COVID-19.
- Have a low threshold for aggressive airway management in COVID-19 patients with underlying pulmonary diseases such as hepatic hydrothorax, portopulmonary hypertension, or hepatopulmonary syndrome.
• Continue treatment for hepatitis B and hepatitis C if already on treatment.
• Proceed with HCC treatments rather than delaying them due to the pandemic.
• Perform a needs assessment prior to patient discharge to determine whether the patient can have follow-up encounters by phone or telemedicine.

Post liver transplant and on immunosuppression

The effects of immunosuppression on COVID-19 are not well established. Post-transplant immunosuppression was not a risk factor for mortality associated with SARS (2002-2003) or MERS (2012-present). It is too early to know if immunosuppressed patients are at greater risk for more severe COVID-19; however, posttransplant recipients aged >60 years old and immunosuppressed patients are more likely to acquire SARS-CoV-2 infection. Immunosuppression may prolong viral shedding in posttransplant patients with COVID-19.

Recommendations

• In immunosuppressed liver disease patients without COVID-19:
  o Do not make anticipatory adjustments to current immunosuppressive drugs or dosages.
• In immunosuppressed liver disease patients with COVID-19:
  o Consider minimizing the dosage of high-dose prednisone but maintain a sufficient dosage to avoid adrenal insufficiency.
  o Consider reducing azathioprine or mycophenolate dosages, especially in the setting of lymphopenia, fever, or worsening pneumonia attributed to COVID-19.
  o Consider reducing but not stopping daily calcineurin inhibitor dosage, especially in the setting of lymphopenia, fever, or worsening pulmonary status attributed to COVID-19.
• Initiate immunosuppressive therapy in patients with liver disease with or without COVID-19 who have strong indications for treatment (e.g., autoimmune hepatitis, graft rejection).

Mental Health and Psychiatric Care patients

Background

• Medically isolated ill COVID-19 patients are likely at high risk for mental health sequelae including depression, anxiety, panic attacks, psychomotor agitation, psychotic symptoms, delirium, and suicidality.
• The fundamental concerns are loss of control, uncertainty, fear, abandonment, loneliness, stigmatization as well as and fear/guilt about the effects of contagion, quarantine, and stigma on their families and friends.
• Sources of stress include social isolation, decreased sensory stimulation, and lack of access to standard coping strategies, such as spiritual or religious practices or exercising outdoors. These circumstances, along with missing work and other obligations, can trigger a powerful sense of losing control.
• Patients with history of anxiety disorders, particularly OCD, are at very high risk

Assessment
PHQ-9, GAD-7 should be administered within 3 days of admission and weekly thereafter

Two tier care

- Tier 1: Psychiatry should be consulted urgently on patients expressing SI/HI/Psychosis, or agitation. Psychiatry can also be consulted for other non-urgent significant psychiatric symptoms as usual
- Tier 2: Voluntary 1:1 mental health consults with consult-liaison psychologist are available on patient request or by recommendation of staff who identify significant concern for mental health sequelae
- Consider e-consult for medication or discharge follow-up questions
- All Psychiatry consults will be via video visit. Page Psychiatry consults at 415-443-1743 for both Tier one and Tier two visits.

Guidelines for Delirium Assessment and Treatment During COVID-19 Pandemic
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The UCSF Delirium Reduction Campaign includes an AWOL risk score at admission, NuDesc assessments by nursing at each shift and CAM-ICU in ICUs. Responses to COVID-19, including isolation procedures and visitor restrictions creates heightened risks for delirium in vulnerable patients, especially older adults. Patients who develop delirium have longer hospital stays and are less likely to be discharged home. Delirium prevention will decrease resource use, Increase bed availability and strengthen the hospital system.

Definition

Delirium is a state of acute confusion, marked by inattention and fluctuations. It is a marker of a change in condition which must be investigated and may be related to acute onset of a new diagnosis or an exacerbation of an existing diagnosis. Delirium may be a symptom of acute infection such as COVID19.

Usual Delirium Care Pathways to Reduce Incidence

- Assessing and adjusting medications with deliriogenic potential
- Assessing and Treating pain
- Frequent re-orientation: Re-orient patient with each interaction (day, place, surroundings, reason for hospitalization, immediate care plan)
- Normalize sleep/wake cycles:
- Provide plenty of ambient light/sunlight during day (e.g. open blinds and turn on lights)
- Keep the room dark and quiet at night (e.g. close blinds, turn off lights and TV)
- Schedule melatonin for sleep if needed

- Mobilization:
  - Out of bed to chair for all meals as able
  - Ambulation within room or active range-of-motion exercises for patients with limited mobility

- Minimizing tethers:
  - Removal of lines and catheters
  - Removal CPO and telemetry when appropriate
  - Discontinuation of Foley catheter as soon as possible
  - Minimized use of physical restraints

- Minimizing sensory deprivation by keeping patient’s eyeglasses within reach and providing portable amplifying devices and/or personal hearing aids
- Treating dehydration with oral fluids
- Treating constipation and maintaining usual bowel regimen
- Avoiding use of antipsychotics unless a danger to self or others

Enhanced delirium care pathways for COVID-19 affected patients

- Continuing usual care pathways
- Enhancing collaboration with nursing
- Overcoming complications of PPE barriers to communication (obscured face, features and identification)
  - Orienting the patient to roles of each individual involved in care
  - Speaking slowly, in low tones with assessment for understanding
  - Using video (visual) communication device for patients who reads lips
- Family/caregiver teleconferencing using video and audio communication devices (computers, tablets, iPads)
- Enhancing mobilization with use of instructional handouts for bed exercises/stretching
- Reviewing compassionate-visitor policy

Guidelines for Geriatrics Consultation during COVID-19 Pandemic (Todd.James@ucsf.edu)

Geriatric Medicine Consult Service:

- Management of older adult syndromes including Delirium, Mood disorders, Medication Review, Goals of care, Functional deficits, Sensory deficits, Caregiver and Caregiving support. In a surge situation we will work with palliative care to provide palliative services for older patients.
- Geriatrics Consult Pager: 415-443-8532
• **Staffing:** Attending Geriatrician or Geriatrics Specialist available for chart review, telephone, and video consultations

**Indications for a Geriatrics Consult that will not change:**

- Delirium prevention and treatment
- Assessment for cognitive and mood disorders
- Medication review
- Preservation of functional status
- Assessing and overcoming vision loss and hearing loss
- Clarifying goals of care
- Caregiver and caregiving support

**Indications for Geriatrics Consultation unique to patients with COVID-19 infection:**

- Assessment and intervention strategies for potentially negative impacts of isolation procedures
- Mitigation of heightened risks for Delirium
- Guidance for dementia with difficult behaviors
- Maintenance of functional independence and nutrition while in isolation
- Assessing polypharmacy and adverse drug events
- Strategies to increase contact with usual caregivers
- Palliative care questions if palliative care service is unavailable

**Geriatrics best practices for primary teams:**

- Initiate Delirium Precautions
- Conduct a medication reconciliation and assess for potentially inappropriate medications
- Obtain collateral information about functional & cognitive status from family & caregivers
- Create a discharge plan starting on the first day
- Update family & caregivers regularly by phone and find ways to keep patient in contact with family
- Ask caregivers if they have enough help at home
- Assess home health needs and community care resources

**Symptom management/Palliative care**

**Staffing:**

- Attending physicians will be available as usual
- Fellows may be involved in the care of the patients; rotating residents and medical students will not see patients with COVID-19 but may participate in video or telephone care
• Social workers and chaplain will not see COVID-19 infected patients in-person, but will be able to provide telephone/video consultations
• One chaplain will be available to visit with patients at PH on Fridays only
• Chaplains will be available for medical team support, well-being and emotional debrief.
• The PC CNS will be available for nurses’ education and support

Indications for a Palliative Care consult that will not change:
• Address challenging physical symptoms, psychosocial, spiritual and existential suffering in patients with a life-limiting or life-threatening illness
• In-person psychosocial, spiritual and existential support will be limited and provided by physicians within their level of expertise
• Urgent spiritual/religious needs at end-of-life such as Catholic priest visit will be triaged by the chaplains

Indications for Palliative Care Consultation unique to patients with COVID-19 infection
• The PC team will consult on all patients with COVID-19 in the ICU
• The PC team will meet with the medical director of the 15L RIU service on a daily basis to review PC needs of patients and which ones need consultation.
• The PC team is actively working with the ED providers regarding consultation and support for goals of care consultation.
• Emotional, spiritual and symptomatic support at the end of life for family/patient
• Ethical decision-making

Palliative Care best practices for primary teams:
• Perform a Goals of Care discussion within 48 hours of admission and offer age- and comorbidity-specific prognostic information at that time if not already discussed
• Use the comfort care order set for actively dying patients (consult PCS only if you have questions or need additional support)
• Outpatient hospice referrals will require coordination with Case Management and public health authorities. See “Discharge Considerations” below

Obstetric management

Background
At this time, little is known about the effects of COVID-19 on pregnant women.

Based on data and case examples from previous coronaviruses (SARS-CoV + MERS-CoV) and a small number of COVID-19 cases, it is believed that pregnant women may be at higher risk of severe illness, morbidity, or mortality. It is reasonable to predict that pregnant women might be at greater risk for severe illness, morbidity, or mortality compared with the general population. Pregnant women
experience immunologic and physiologic changes that make them furthermore susceptible to viral respiratory infections, including potentially COVID-19.

Adverse infant outcomes (eg, preterm birth) also have been reported among infants born to mothers positive for COVID-19 during pregnancy.

It is unclear if COVID-19 can cross through the transplacental route to the fetus.

**Antepartum/Intrapartum/Postpartum**

Limited data regarding risks associated with infection in the first and second trimesters exist. There are mixed data regarding the risk of congenital malformations in the setting of maternal fever. There are inadequate data on COVID-19 and the risk of miscarriage or congenital anomalies.

- During acute illness, fetal management should be similar to that provided to any critically ill pregnant woman. Maternal care/well-being should always take precedence. Pregnancy itself should not be a reason or indication to withhold any treatment or intervention that potential can help the mother.
- Fetal monitoring in the setting of severe illness should be considered only when delivery would not compromise maternal health or as another noninvasive measure of maternal status.
- A detailed midtrimester anatomy ultrasound examination following first-trimester maternal infection. For those experiencing illness later in pregnancy, it is reasonable to consider sonographic assessment of fetal growth in the third trimester.
- Timing of delivery should not be dictated by maternal COVID-19 infection.
- For women infected early in pregnancy who recover, no alteration to the usual timing of delivery is necessary.
- For women infected in the third trimester who recover, it is reasonable to attempt to postpone delivery (if no other medical indications arise) either until a negative testing result is obtained or quarantine status is lifted in an attempt to avoid transmission to the neonate.
- COVID-19 infection itself is not an indication for delivery.
- Health care practitioners should promptly notify infection control personnel at their facility of the anticipated arrival of a pregnant patient who has confirmed or suspected COVID-19.
- Infants born to mothers with confirmed COVID-19 should be considered to have possible infection. These infants should be isolated accordingly.
- Currently in pregnancy, no antiviral medications are approved for the treatment of COVID-19 by the US Food and Drug Administration. No vaccine currently exists for use in pregnancy.

**Ethical Considerations in the COVID-19 Response**

I. **Ethical Approach, Principles, and Framework to Guide COVID-19 Response:**

Public health emergencies may require consequential and ethically challenging decisions to be made in situations of extreme time pressure, limited resources, clinician strain, and broader social upheaval. In some emergencies, the magnitude of patient needs may vastly surpass the availability of critical resources, necessitating a transition from a focus on individuals to a focus on populations. In advance of
such situations, it is important to articulate anticipatory standards of medical care as a shared public health resource, guided by aims of transparency, recognition of the equal worth and dignity of each individual, and preservation of public trust.

In such emergencies, familiar principles of clinical ethics still govern general practice, although in extraordinary circumstances nuances of these principles may have different application\(^2\):

1. Respect for persons (autonomy):
   a. During a pandemic, public health mandates may justifiably impose constraints on individual patient autonomy (for example, placing a patient in isolation). When population-focused decisions are made with adverse consequences for individual patients’ liberty, privacy, or personal interests, such decisions and their justification should be communicated directly and mechanisms for appeal should be instituted when feasible.

2. Beneficence and Non-maleficence:
   a. During a pandemic, providers have to consider both the patient in front of them, as well as the population as a whole. This broader focus may require different decisions about resource allocation than would be made under usual circumstances. In all circumstances it is critical to continue offering patients necessary care including palliative care.

3. Justice
   a. The principle of justice necessitates stewarding resources during a time of scarcity and promoting equity. Allocation decisions should be applied as consistently as possible to everyone.
   b. Concepts of social worth and instrumental value are discussed in subsequent sections of this document. The history of medicine spans the heights of human dedication as well as unfortunate instances in which biomedical justifications have been offered for further disadvantaging members of stigmatized groups. This perspective necessitates special caution in evaluating protocols with disparate impact on already vulnerable populations.

Additionally, the following general principles apply:

1) There should be a clear commitment to **transparency** in the process of determining protocols, algorithms, and allocation of resources. Decisions on protocols and policies should be open for examination. While emergency conditions for planning may preclude direct public engagement and involvement in the development of such protocols and algorithms, these still should be justifiable and accountable to a broader public.

2) Appropriate pandemic response includes a **duty to plan**, which should aim to maximize resources and anticipate surge capacity (e.g., restricting elective and ambulatory procedures and minimizing transfers from other hospitals).

3) When possible, resource allocation decisions should aim to be uniform across institutions in a referral/geographic area and align with national standards.
4) Allocation decisions should be governed by non-biased guidelines created by those without a commitment to an individual patient.

5) Hospital leadership should assist with mitigating moral distress among providers involved in pandemic response.

Caring for the Caregiver

The Caring for the Caregiver Program is dedicated to providing support to faculty, staff and trainees experiencing emotional distress related to the clinical care of patients. In the midst of UCSF’s response to COVID-19, we recognize that everyone is under increased stress to provide the best care to patients and families. We also want to acknowledge that this may take a personal toll. Please contact caringforthecaregiver@ucsf.edu anytime to request support for yourself or a peer. We can also coordinate group debriefings.

Removal of isolation precautions in the hospital

Inpatients can come off isolation precautions while still in the hospital when the following criteria have been met:

1. At least 14 days from symptom onset
2. At least 72 hours fever-free without anti-pyretic and
3. Improving respiratory symptoms (e.g. cough, dyspnea) and
4. Two consecutive negative RNA swabs (nasopharyngeal/mid-nasal turbinate plus oropharyngeal) collected 24+ hours apart

Discharge Considerations

Discharge coordination for hospitalized patients with COVID-19 requires advanced planning and close coordination between multiple disciplines in the hospital, including clinicians, infection control, and case management. Coordination with local departments of public health is mandatory for all patients. When deciding on readiness for hospital discharge, all parties may also need to take into strong consideration health care system capacity, laboratory diagnostic resources, and the current epidemiologic situation.

Below are key considerations for discharge with a recognition that guidance will evolve as experiences and data for hospitalized COVID-19 patients increases. Creative discharge solutions may also be necessary when resources and health system capacities are limited.

- Department of Public Health and Infection Control Coordination
  - Hospital discharge planning staff must work closely with the patient’s local department of public health, hospital Infection Control, and/or Infectious Disease specialists to determine the safest and most feasible post-hospital location for the patient. Discharge planning and
coordination should start as early as possible in the patient’s hospital course once COVID-19 testing is positive.

- DPH COVID Discharge Hotline: 415-554-2830

**Against Medical Advice Process:**

- **All Patients**
  - Notify attending and DPH COVID-19 Containment Call Center 628-652-2810 if patient:
    - SEEMS to want to leave the hospital against medical advice
    - HAS left against medical advice; or
    - Declines Isolation and Quarantine
  - Complete **SFDPH COVID Case Report Form CMR 043020** on ALL COVID+/PUI patients; fax to number on form
- **Homeless patients**
  - Email DPH AMA recovery at covid19AMArecovery@sfdph.org (24/7, 7 days a week) and/or call 415-608-1515 (M-F 8am-8PM)
  - Include information:
    - name
    - date of birth
    - time they departed
    - whether they are a PUI or Covid Positive
    - Information about where they may have gone/phone number
  - DPH contact: Sarah Strieff RN 415-238-1485 or sarah.strieff@sfdph.org

**Symptom Monitoring and Return Precautions**

- Clinicians must provide explicit guidance and return precautions for the evaluation of concerning symptoms after discharge, specifically fever and/or symptoms of respiratory illness. Clinicians should also explicit clarify who COVID-19 patients must contact for questions or concerning symptoms after discharge (local departments of public health are typically responsible for coordination and management of post-discharge care).
- Clinicians should utilize prepared communication tools to help COVID-19 patients and their families with anticipatory guidance after discharge. It is strongly suggested that this education occur as early as possible in the patient’s hospital course and not merely immediately prior to the time discharge.

**Home Health Needs and Community Health Considerations**

- A complete assessment of the patient’s psychosocial environment – including identification of a home support system – is essential prior to discharge. In essence, the discharge process
must create a clear picture of the patient’s activities of daily living in order to understand what resources are needed to create a safe home environment after discharge. The appropriateness and safety of the patient’s discharge location is typically determined by the patient’s local department of public health. If a patient cannot safely return home, local departments of public health will guide the search for another suitable discharge destination (e.g. designated temporary housing in the community).

- Discharge coordination involves an assessment of the typical essential services for recovery after discharge (physical therapy, occupational therapy, and home nursing), and patients may also require home thermometers, oxygen, and other durable medical equipment. Depending on the patient’s home support system, discharge coordination may need to make arrangements for safely obtaining medications, grocery shopping, and other key activities of daily living.

- It is imperative that discharge efforts consider the patient’s household contacts, including the symptoms, testing status, and disease status of both household contacts and other individuals who are essential to the patient’s activities of daily living (e.g. home care givers). Patients are keen to know their infectious risk to household contacts and necessary precautions: the patient’s local department of public health will typically provide explicit guidance pertinent to the testing status of other household contacts and will make arrangements for a safe discharge location.

- Unique discharge coordination may be required if multiple family members are hospitalized simultaneously. Clinicians should seek to understand if the family members have similar or disparate disease trajectories, as this will help guide whether multiple discharge destinations are warranted.

- Discharge coordination must explicitly provide a safe method of transportation for patients from the hospital to the patient’s discharge destination.

- **Congregate and Vulnerable Populations**

  - Patients returning to congregate settings as post-discharge destinations (e.g. skilled nursing facilities) or for future medical care (e.g. hemodialysis centers) require unique considerations. Infection Control experts should provide guidance on lab testing requirements and symptom management that is necessary for patients to discharge to these locations.

  - Unique discharge coordination is warranted for vulnerable populations, including COVID-19 patients with homeless and unstable housing. Infection Control consultation is warranted. Close coordination with the department of public health to identify an alternate living situation is required and may require the mobilization of significant local resources.

  - Discharge considerations may change depending on unique insurance and/or governmental policies during emergency states (e.g. waiving requirements for skilled nursing facility placement).
SNF, LTAC, and Group Setting Discharges

Note: COVID-19-positive patients can be considered for hospital discharge to SNF, LTAC, and group setting when clinically-stable (this is determined by the treating providers); DPH has been notified and cleared the hospital discharge, and when certain isolation precautions are met

- Discharge criteria:
  - SNF discharges: You can discharge COVID-19+ patients to SNF (though not LTAC at this time) while still on isolation precautions* (droplet & contact) if the accepting SNF has adequate PPE supply/training and by meeting both criteria:
    1. At least 10 days after hospital admission and
    2. At least 72 hours fever-free without anti-pyretic
   Isolation precautions will be stopped at SNF/LTAC after 14 days since symptom onset
  
  - LTAC and Group Setting discharges: You must stop isolation precautions (droplet & contact) for COVID-19+ patients while hospitalized before transfer by meeting all 4 criteria:
    1. At least 14 days from symptom onset* (*do not consider sending repeat RNA swabs before)
    2. At least 72 hours fever-free without anti-pyretic and
    3. Improving respiratory symptoms (e.g. cough, dyspnea) and
    4. Two consecutive negative RNA swabs* (nasopharyngeal/mid-nasal turbinate and oropharyngeal) collected 24+ hours apart – you can discontinue isolation precautions, but please contact HEIP to help resolve any infection/isolation ‘flags’

- Discharge documentation. For both COVID-19-positive and COVID-19-negative patients document the following:
  - Advance care planning (including POLST if possible).
  - Testing: Must indicate last positive and (if applicable) negative test dates.
  - Symptoms: Must note estimated date of symptom onset and current symptoms (including trend) at time of discharge.
  - Precautions: Must indicate isolation precautions. Must also indicate estimated date of when isolation precautions and specific PPE use can be stopped based on symptoms.
  - Follow-Up: Must indicate if any imaging and/or specialty follow-up needed.
  - Medications: Must bundle Rx as best as possible to reduce # of administrations (e.g. same time for BID or TID Rx, convert Rx to daily when possible). Discontinue nebulized Rx.
  - COVID-19-Negative Patients (Investigated and Ruled-Out for COVID-19)
    - Testing: Must indicate negative test result date.
    - Imaging: Must provide rationale and treatment approach for any abnormal CXR and/or CT chest findings (e.g. why findings are not consistent with COVID-19).
  - No Clinical Concern for COVID-19
    - Testing: Must indicate why testing not indicated (note: negative test not required to accept patient at SNF if there was no clinical concern for COVID-19 during hospitalization).
Reviewed by representatives from:

- Anesthesia
- Cardiology
- Cardiothoracic Surgery
- Critical Care Medicine
- Emergency Medicine
- General Surgery
- Ethics
- Hospital Medicine
- Infectious Diseases
- Nursing
- Obstetrics
- Palliative Care Medicine
- Psychiatry
- Pulmonology
- Radiology
- Respiratory Care Services