OPERATIONAL CONSIDERATIONS

Level of care
- Level of care is dictated by patient clinical condition, resources, and goals of care.
- Low threshold for ICU admission/transfer; consider risk factors for worse disease (age >60, hypoxemia/dyspnea, comorbidities).
- Establish goals of care (i.e., code status, ICU support) early, which may dictate available modes of oxygen delivery and disposition.
- Consider Palliative Care consultation early.

Room Placement
- Refer to UW Medicine Policy
- Negative pressure room if high risk for aerosol generation, if available.
- Cohorting patients with proven COVID-19 acceptable in accord with surge plan.
- Droplet + contact precautions for non-critically ill patients.

Staffing
- Refer to UW Medicine Policy
- Minimize number of clinical staff who enter patient room. Consider log of staff on unit.
- No medical students; consider appropriateness of resident/fellow involvement.
- Check in on staff about their wellness.

Personal Protective Equipment (PPE)
- Refer to UW Medicine Policy

Patient Visitors
- Visitors currently restricted; see UW Medicine Policy. Consider communication with telephone or video.

Physical Therapy
- Therapist to assess patient as per current standards. Recommendations for therapy should account for limiting healthcare worker (HCW) exposure / PPE utilization. No ambulation outside room.

Patient Transport
• Refer to UW Medicine Policy
• Necessity should be confirmed by attending physician prior to transport.
• Non-intubated patients should wear a face mask during transport.
• Intubated patients should be transported on the ventilator (no bag mask ventilation).
• Avoid transporting patient on non-invasive ventilation or face mask oxygen.

Clothing and Equipment
• Use only disposable stethoscopes.
• Do not bring personal items (e.g., stethoscope, pager, phone, jewelry) into room.
• Clean communication devices (e.g., phone, pager) often with germicidal wipes.
• Wear hospital scrubs only and change to clean/street clothes before departure.
• Wipe with Sani-wipes all equipment that enters room (e.g., ultrasound, Glidescope, etc.) per UW Medicine Policy

CLINICAL EVALUATION

Risk Stratification
• Document age, comorbidities (cardiac, pulmonary, hepatic, renal, immunologic, etc.), pre-hospital location, baseline functional status, smoking status, suspected exposure, goals of care.

Laboratory Testing
• COVID-19 and other respiratory virus testing per UW Medicine Policy
• Admission labs:
  o CBC with differential (absolute lymphocyte count), CRP, LDH, CK, DIC panel (includes D-dimer), ferritin, IL-6 level, troponin, BNP.
  o Consider repeating inflammatory markers (CRP, ferritin, IL-6, D-dimer, LDH) at serial intervals (e.g., q3 days) if concern for cytokine release syndrome
• Telemetry is recommended in ICU patients.
• Minimize and batch lab testing to minimize HCW exposure risk.
• Consider endotracheal aspirate (preferred) or mini-BAL to obtain lower respiratory tract sample if needed to assess for bacterial infection.

Imaging and Diagnostic Testing
• Consider utility of diagnostic studies in context of personnel exposure, travel, and potential for equipment contamination.
• Ensure careful cleaning of equipment (e.g., ultrasound) brought into room with purple top Sani-Wipes per Infection Control guidelines.
• Chest radiographs can be obtained through glass panes in doors in some settings.
• Consider POCUS for serial imaging of lungs, cardiac function and other bedside diagnostic studies.
  o Stored images may be reviewed by Cardiology/Radiology
• Routine CT scans unnecessary. If CT necessary, coordinate with other travel (e.g., from ED to ICU).
  o CT imaging highly unlikely to change management unless alternative diagnosis suspected (e.g., PE).
  o CT imaging may identify findings to guide repeat testing for SARS-CoV-2.

Bedside Procedures
• Bundle procedures to minimize PPE (e.g., intubation, central venous catheter or arterial catheter placement)
• Residents/fellows may participate in procedures with appropriate supervision and if PPE trained
• Conduct pre-procedure huddle / checklist before entering room. Consider adequate supplies, coagulation status, consent, personnel, positioning, equipment

**Bronchoscopy**

• Recommend strongly against aerosol-generating diagnostic procedures, particularly bronchoscopy, unless specific clinical question that cannot otherwise be answered. Personnel should be in appropriate airborne PPE.
• Fellows should not participate in bronchoscopies on PUI or patients with proven COVID-19.
• For [rare] instances when bronchoscopy needed, use disposable bronchoscope, if available.

**Non-Invasive Ventilatory and Oxygen Support**

• Consider early intubation rather than HFNC/NIPPV if unlikely to avoid intubation and consistent with goals of care. (1) HFNC/NIPPV may not prevent intubation; (2) initial NIPPV may yield worse outcomes; and (3) open systems may increase droplet dispersion (risk to HCW) with poorly fitting interface.
• **HFNC may be used if flow ≤ 30 L/min:** reevaluate within 1-2 hours for clinical improvement. Lack of clinical improvement should prompt consideration of intubation if consistent with goals of care and resources available. Patients who are “Do Not Intubate” may trial increased F1O2/flow and consider transition to comfort measures if failing. **Must be in appropriate isolation (negative pressure room, airborne/droplet PPE, PAPR preferred).**
• If NIPPV utilized (e.g., COPD exacerbation, OHS/OSA), use closed expiratory circuit mask/device with HEPA filter and ensure good mask seal with appropriate isolation (negative pressure room, airborne/droplet PPE, PAPR preferred).
• Proceed with early intubation if deteriorating respiratory, hemodynamic, or mental status to avoid emergent procedure.

**Endotracheal Intubation (personnel, location, PPE)**

• **See UW Medicine Anesthesia and Airway Care of the COVID-19 guideline**
• Intubation by the most experienced operator (will vary by hospital).
• Perform intubation in negative pressure room, if possible. If going to operating room, intubate in negative pressure room first before transport to operating room.
• Minimize the number of staff in the room but consider having a qualified backup physician nearby (outside room) for support.
• Preferred PPE: PAPR with shroud, gown, and gloves that extend over gown cuffs.

**Endotracheal Intubation (preparation)**

• Perform pre-intubation timeout. Identify 1st to 4th intubation equipment.
• **Avoid bag valve mask, HFNC, and NIPPV.**
  - If BVM unavoidable, use small tidal volumes, two-person technique to achieve tight mask seal, and ensure HEPA filter in place.
  - If NIPPV felt to be indicated (e.g., COPD exacerbation), ensure good mask seal and viral filter. Use in airborne precautions. Discuss with RT & RN to ensure situational awareness for all staff.
  - If HFNC used, recommend flow rates < 30 L/min. Use in airborne precautions.
• Maximize pre-oxygenation with nasal cannula, simple face mask, or non-rebreather.
• Recommend apneic oxygenation with 6L/min nasal cannula only if needed.

**Endotracheal Intubation (equipment)**
- Prefer video laryngoscopy as added distance from oropharynx and better visualization through PAPR hood.
- Keep backup equipment and extra supplies outside the room.
- Ensure bag valve mask & ventilator have appropriate HEPA filter placed on endotracheal tube proximal to sidestream capnography adapter.
- Ensure cleaning/transport protocol followed for reusable dirty equipment.

**Endotracheal Intubation**
- Use RSI procedure to avoid aerosol generating bag-mask ventilation if possible.

**Mechanical Ventilator Management**
- Initiate lung protective/low-tidal volume ventilation for ARDS.
- Consider high-PEEP strategy for severe ARDS if oxygenation inadequate with standard PEEP ladder and hemodynamically tolerated.
- Use existing lung-protective ventilation or hypoxemia protocols

**Other Respiratory Care**
- Avoid mechanical insufflation-exsufflation or chest physiotherapy if possible
- Aggressive suctioning may be required as thick secretions leading to endotracheal tube obstruction are common

**Proning**
- Consider early proning for patients with P_aO_2/F_iO_2 ratio <150.
- Incorporate staff exposure in risk/benefit ratio. Huddle outside room before proning.
- Use existing institutional proning protocol.
- Consider placing arterial line prior to proning.

**Neuromuscular Blockade**
- Routine neuromuscular blockade has not shown benefit in ARDS. Individual patients with severe/refractory hypoxemia, hypercarbia, or dyssynchrony may benefit from non-depolarizing paralytic.

**Sedation**
- Ensure adequate sedation with RASS goal 0 to -2 to reduce anxiety and ventilator dysynchrony requiring increased RN interactions.

**Cardiovascular Support and Fluid Management**
- Obtain baseline 12-lead ECG.
- Consider conservative fluid management strategy.
- Vasopressor-dependent shock is not uncommon.
- Cardiomyopathy has been reported – screening recommendations and predictive characteristics are in development. Consider TTE/POCUS, CK, troponin and telemetry. May respond to dobutamine.

Version 1.0 Update: 3/24/2020
**ECMO**
- Apply [UW Medicine ECMO Guideline](#) patient selection criteria. Consider staff exposure, between-unit transfer, and availability of negative pressure rooms.
- Perform cannulation and ECMO in negative pressure room.
- External facility transfers for ECMO to be discussed with on-call ECMO physician and Medical Director.

**Cardiac Arrest**
- Have goals of care discussion early in admission.
  - Consider informed assent approach for DNAR based on severity of illness, premorbid status, and resource availability.
  - Consider unilateral DNAR for patients with refractory shock or worsening despite maximal support.
  - Note high likelihood of delay in CPR due to PPE donning may reduce efficacy.
- See [UW Code Blue – COVID Guideline](#)

**Palliative Care and End of Life**
- Consider early Palliative Care involvement in ICU admissions. See [UW Medicine Policy](#).
- Consider video visitation for family members.
- Death certificate should note:
  - Primary cause (e.g. ARDS, pneumonia, respiratory failure)
  - Second line: COVID-19
- List comorbidities in Medical Issues not directly related to death (e.g., diabetes, CHF, frailty)

**PHARMACOLOGIC TREATMENT**

See [UW Infectious Disease COVID Treatment Guidelines](#)

**ID Consultation**
- Consult Infectious Disease based on resource availability.

**Treatment of Bacterial Pneumonia**
- Imaging appearance, symptoms, or exam findings consistent with bacterial PNA should be treated for CAP/HAP. Recommend obtaining cultures prior to antibiotics.
- Consider stopping empiric antibiotics after 48-72 hours if no suggestive culture data or low clinical concern.

**Anti-inflammatory Therapy**
- **Systemic Corticosteroids**
  - Not recommended for treatment of COVID-19 due to risk of prolonged viral shedding and possible harm.
  - Consider for patients with COPD or asthma in exacerbation.
  - Clinician discretion for refractory hypotension
- **Tocilizumab**
  - Consider in consultation with Infectious Disease. Check inflammatory markers (IL-6, CRP, ferritin)

Version 1.0 Update: 3/24/2020
Based on limited experience, may be most helpful in patients with moderate-severe cytokine release syndrome phenotype (Grade 2 or higher based on score)

**Anti-Viral Therapy**

- **Remdesivir**
  - Contact ID/Pharmacy to discuss trial enrollment or expanded access program.

- **Hydroxychloroquine**
  - Consider/clinician judgment in consultation with Infectious Disease for confirmed disease
  - Treatment duration is 5 days; monitor QTc.

- **Lopinavir/Ritonavir**
  - Consider/clinician judgment in consultation with Infectious Disease.
  - Recent negative prospective trial and low availability reduce enthusiasm for use.

- **IVIG**
  - Consider/clinician judgment in consultation with Infectious Disease.

**References**

- UW Medicine COVID OneDrive (internal site): [https://one.uwmedicine.org/coronavirus](https://one.uwmedicine.org/coronavirus)