The following is based on experimental data and meant to offer guidance for COVID-19 clinical decision making and does not replace clinical judgment.

Refer to COVID checklist in the Covid Cerner Powerplan and on Med Staff Office Website

Consider COVID-19 in patients with:
- Fever
- Cough, Shortness of breath (SOB)
- Sore Throat, Loss of smell/taste
- Myalgias, Fatigue
- High risk international or US travel/exposure

CLINICAL SIGNS/SYMPTOMS
- Fever in >75% of hospitalized cases at some point.
  - Almost 50% afebrile on admission
- Cough 60-80% dry/productive
- SOB 20-40%
- URI (HA, sore throat, rhinorrhea 4%)
- GI symptoms (diarrhea, nausea/vomiting) in <10%
  - Can be seen prior to respiratory symptoms
- Early symptoms: loss of taste and smell

LABS
- CBC with diff, CMP, procalcitonin, Ferritin, CPK, CRP, LDH, ESR, D-Dimer, +/- Troponin
- Look for leukopenia, lymphopenia, and transaminitis

LABS AND BIOMARKERS
- Median WBC 4.7, leukopenia in 30-45%
- Lymphopenia (absolute lymphocyte count <0.8)
- Platelets normal (slight decrease in 35%)
- AST/ALT increase in 4-22%
- CRP increase in 61-86%, ESR increase in up to 85%
- LDH >245 units/L
- Hgb decrease in 41-50%, Albumin decrease in 50-98%
- Procalcitonin: ≥ 0.5 in 5% overall, (14% if severe, 24% if ICU)
- Ferritin >300 ug/L
- D Dimer >1000ng/ml

MICROBIOLOGY
- Co-infection rates with other viruses and bacteria are unknown and reports vary.

IMAGING/OTHER
- CXR abnormal in 60% (77% if severe)
- Chest CT abnormal in 86% (95% if severe)
- Unilateral findings on CXR or CT in 14-25% (more so if mild or early)
- Most common: Ground glass opacities, patchy consolidations >50%, peripheral distribution >50%
- Nodules, cystic changes, effusions in <10%

IMAGING/OTHER
- Portable CXR. AVOID unnecessary CT imaging.
- Point of Care Ultrasound (POCUS)
- EKG for concern for myocardial involvement
The following is based on experimental data and meant to offer guidance for COVID-19 clinical decision making and does not replace clinical judgment.

**Table 1: Risk Factors For Severe COVID-19 Disease**

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Vital Signs</th>
<th>Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;65</td>
<td>Respiratory Rate &gt;24 breaths/min</td>
<td>Admission absolute lymphocyte count &lt;0.8</td>
</tr>
<tr>
<td>Pre-existing pulmonary disease</td>
<td>Heart rate &gt; 125 beats/min</td>
<td>CRP &gt;100 mg/L</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>Sp02 &lt;90% on room air</td>
<td>LDH &gt;245 units/L</td>
</tr>
<tr>
<td>Diabetes with A1c &gt;7.6%</td>
<td></td>
<td>CPK &gt; twice upper limit of normal</td>
</tr>
<tr>
<td>History of hypertension or cardiovascular disease</td>
<td></td>
<td>Elevated troponin</td>
</tr>
<tr>
<td>Obesity</td>
<td></td>
<td>Ferritin &gt;300 ug/L</td>
</tr>
<tr>
<td>Use of biologics</td>
<td></td>
<td>D-dimer &gt;1000 ng/ml <em>elevated D-dimer does NOT always correlate to having Pulmonary Embolism so Do NOT get CT based on D dimer alone</em></td>
</tr>
<tr>
<td>History of transplant or other immunosuppression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients with HIV (regardless of CD4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adapted from Version 1 3/17/20 Massachusetts General Hospital COVID-19 Treatment Guidance

**Table 2: Suggested Experimental Treatment Algorithm Based On Clinical Severity. Refer to table 3 Medication chart.**

All Experimental and off label use of treatments should be done in the setting of a Clinical Trial, or if not available, then local or collaborative registries to systematically evaluate the efficacy and safety of drugs to contribute to the knowledge base.

<table>
<thead>
<tr>
<th>Clinical Situation</th>
<th>Recommendation*</th>
<th>Notes/Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>All hospitalized patients</td>
<td>Statins: Continue if already prescribed. Consider starting a statin if no contraindication and for those who have a guideline indication.</td>
<td>Cardiovascular disease is a major risk factor for disease severity. If CPK&gt; 500 unit/L, consider not starting a statin. Avoid Statins if ALT &gt;3x upper limit of normal.</td>
</tr>
<tr>
<td>Mild disease with Sp02 &gt;90%, Upper respiratory tract infection (URTI), no risk factors</td>
<td>Supportive Care</td>
<td>See Table 1 for Risk Factors</td>
</tr>
<tr>
<td>Mild disease with Sp02 &gt;90% with risk factors for severe disease</td>
<td>Supportive care with very close monitoring.</td>
<td></td>
</tr>
</tbody>
</table>

Continued next page ➔
The following is based on experimental data and meant to offer guidance for COVID-19 clinical decision making and does not replace clinical judgment.

### Clinical Situation

<table>
<thead>
<tr>
<th>Clinical Situation</th>
<th>Recommendation</th>
<th>Notes/Considerations</th>
</tr>
</thead>
</table>
| Moderate or severe disease                                                       | **With guidance with Infectious Disease:**  
  Hydroxychloroquine (Plaquenil)  
  In severe cases, may consider higher dose of hydroxychloroquine  
  May use chloroquine  
  if early in treatment course may consider Lopinavir/ritonavir (Kaletra) 400/100mg PO BID x 10-14 days  
  Consider Remdesivir (RDV) through compassionate use or clinical trial if available. | Check EKG prior to initiation given risk of QT prolongation. Risk increased in patients on other QT-prolonging agents.  
  Keep Potassium>4, Magnesium>2 if concern for QT prolongation.  
  For Hydroxychloroquine: assess for drug-drug interactions (e.g. azoles, anticoagulants, anti-epileptics).  
  For protease inhibitors (e.g. Kaletra and darunavir): the main side effect is gastrointestinal intolerance.  
  Monitor liver function. Safe in pregnancy.                                                                 |
| For patients with severe disease and/or evidence of cytokine release syndrome     | With ID approval, tocilizumab can be considered  
  With ID approval, convalescent plasma can be considered |                                                                                                           |
| For certain refractory or progressively worsening patients in the ICU            | With ID approval, interferon can be considered.                                                                                      | Can be combined with hydroxychloroquine, chloroquine, or Lopinavir/ritonavir                          |
| For patients with IgG<400                                                        | With ID approval, consider IVIG at standard dose of 1gm/kg daily x 2 doses                                                          | IVIG has been suggested to have anti-inflammatory or immunomodulatory effects. However, there is little rationale for this use. |

### OTHER CONTROVERSIAL MEDICATION

| Renin angiotensin system blockers (ACE and ARBS)                                  | The virus that causes COVID-19 uses the angiotensin-converting enzyme (ACE) 2 receptor to enter cells.  
  Hypothetical harm: can increase the expression of ACE2, there is concern that these medications may facilitate viral entry into cells.  
  Hypothetical benefit: may have protective effect against lung damage or may have paradoxical effect in terms of virus binding. | Currently, there is no clinical or epidemiological data to support this.                                      |
| NSAIDS                                                                           | Avoid in hospitalized patients.                                                                                                        | Controversial.                                                                                           |
| Steroids                                                                         | See next table                                                                                                                        |                                                                                                           |

Adapted from Version 1 3/17/20 Massachusetts General Hospital COVID-19 Treatment Guidance
Table 3: Experimental/Restricted Medication Chart for COVID-19 positive patients in no specific order.

**ALL DOSES OF MEDICATIONS ARE RESTRICTED AND REQUIRE ID APPROVAL AND REQUIRE INFORMED CONSENT**

All Experimental and off label use of treatments should be done in the setting of a Clinical Trial, or if not available, then local or collaborative registries to systematically evaluate the efficacy and safety of drugs to contribute to the knowledge base.

<table>
<thead>
<tr>
<th>DRUG NAME</th>
<th>PROPOSED MECHANISM</th>
<th>BEST CANDIDATE</th>
<th>ADVERSE REACTIONS</th>
<th>DOSING GUIDELINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroxychloroquine</td>
<td>Blocks viral entry into cells. Impairs viral replication.</td>
<td>Patients with severe symptoms</td>
<td>QT prolongation</td>
<td>400 mg PO bid X 1 day then 200 mg PO bid X 4 days</td>
</tr>
<tr>
<td>(Plaquenil)</td>
<td></td>
<td></td>
<td>Nausea/vomiting</td>
<td>(Give with food to avoid GI upset)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hypoglycemia</td>
<td><strong>Higher doses may be recommended based on ID recommendations.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ocular toxicity</td>
<td><strong>Monitor QT interval and electrolytes</strong></td>
</tr>
<tr>
<td></td>
<td>Immuno-modulator.</td>
<td></td>
<td>Headache</td>
<td></td>
</tr>
<tr>
<td>Chloroquine</td>
<td>Blocks viral entry into cells. Impairs viral replication.</td>
<td>Patients with severe symptoms</td>
<td>QT prolongation</td>
<td><strong>No longer recommended to give simultaneously with Azithromycin</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nausea/vomiting</td>
<td>Wt &gt; 50 kg: 500 mg PO BID X 7-10 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hypoglycemia</td>
<td>Wt &lt; 50 kg: 500 mg PO BID X 2 days then 500 mg PO daily X 5-8 days</td>
</tr>
<tr>
<td></td>
<td>Immuno-modulator.</td>
<td></td>
<td>Ocular toxicity</td>
<td>(Give with food to avoid GI upset)</td>
</tr>
<tr>
<td>Lopinavir-Ritonavir</td>
<td>Protease inhibitor.</td>
<td>Patients with severe symptoms</td>
<td>Nausea/vomiting</td>
<td>400 mg/100 mg PO BID for 10 days</td>
</tr>
<tr>
<td>(Kaletra)</td>
<td></td>
<td></td>
<td>Headache</td>
<td>(Tablets: 200 mg/50 mg )</td>
</tr>
<tr>
<td>Tablets and liquid</td>
<td></td>
<td></td>
<td>Hyperglycemia</td>
<td>(Liquid: 400 mg/100 mg per 5 mL)</td>
</tr>
<tr>
<td></td>
<td>Tablets: cannot be crushed.</td>
<td></td>
<td>QT prolongation</td>
<td><strong>Several drug interactions-consult pharmacy</strong></td>
</tr>
<tr>
<td></td>
<td>Liquid: avoid in pregnancy and must be given with food.</td>
<td></td>
<td>Hepatotoxicity</td>
<td><strong>Avoid use of Atorvastatin (increased levels)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Pravastatin preferred</strong></td>
</tr>
</tbody>
</table>
The following is based on experimental data and meant to offer guidance for COVID-19 clinical decision making and does not replace clinical judgment.

Version 3 4/23/2020

**Table 3: Experimental/Restricted Medication Chart for COVID-19 positive patients in no specific order.**

*ALL DOSES OF MEDICATIONS ARE RESTRICTED AND REQUIRE ID APPROVAL AND REQUIRE INFORMED CONSENT*

All Experimental and off label use of treatments should be done in the setting of a Clinical Trial, or if not available, then local or collaborative registries to systematically evaluate the efficacy and safety of drugs to contribute to the knowledge base.

<table>
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<tr>
<th>DRUG NAME</th>
<th>PROPOSED MECHANISM</th>
<th>BEST CANDIDATE</th>
<th>ADVERSE REACTIONS</th>
<th>DOSING GUIDELINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remdesivir</td>
<td>Blocks RNA dependent polymerase</td>
<td>Patients with severe symptoms only through compassionate use in pregnancy and pediatric patients, or clinical trials if available</td>
<td>Increased liver enzymes Potential for drug-drug interactions.</td>
<td>200 mg IV on day 1 then 100 mg IV daily X 10 days (or per protocol)</td>
</tr>
<tr>
<td>Tocilizumab (Actemra)</td>
<td>IL-6 inhibitor reduces IL-6 production which is a key cytokine produced in COVID-19 infections. No antiviral activity</td>
<td>Patients with severe/critical illness with rapidly worsening respiratory gas exchange and excessive inflammatory - Order quantiferon prior to administration if possible. If positive weigh risks/benefits.</td>
<td>GI perforation Anaphylaxis Hepatic failure Tuberculosis reactivation</td>
<td>400 mg IV X1 May consider an additional dose 8-12 hours later if continued clinical decompensation</td>
</tr>
<tr>
<td>Convalescent Plasma</td>
<td>Presumed mechanism is that antibodies develop in patients who have previously been infected and can now recover COVID-19 and can now donate their immunoglobulin-containing plasma which may suppress viremia</td>
<td>Patients with severe symptoms Pending availability Needs emergency IND from FDA or approval through Mayo Clinic Registry</td>
<td>Fever Allergic reaction including serum sickness Transfusion-related acute lung injury (TRALI) Transfusion associated circulatory overload (TACO)</td>
<td>Mayo Clinic Registry recommends 1 unit of plasma. May consider 2 units of plasma based on specific patient needs, as seen in JAMA article</td>
</tr>
</tbody>
</table>
The following is based on experimental data and meant to offer guidance for COVID-19 clinical decision making and does not replace clinical judgment.

Table 3: Experimental/Restricted Medication Chart for COVID-19 positive patients in no specific order.

**ALL DOSES OF MEDICATIONS ARE RESTRICTED AND REQUIRE ID APPROVAL AND REQUIRE INFORMED CONSENT**

<table>
<thead>
<tr>
<th>DRUG NAME</th>
<th>PROPOSED MECHANISM</th>
<th>BEST CANDIDATE/ PRECAUTIONS</th>
<th>DOSING GUIDELINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methylprednisolone</td>
<td>Reduces inflammation</td>
<td>Conflicting Data:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Do NOT give:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Concern for increase duration of viral shedding (SARS 2004)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o No impact on mortality (MERS, SARS)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o WHO Recommends against.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Lancet article based on SARS/MERS/influenza does not recommend use.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>DO give:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Wu et al 3/13/20 JAMA: yes use, 40-80 mg IV methylprednisolone daily x 3-6 days. Finally, among the patients with ARDS, of those who received methylprednisolone treatment, 23 of 50 (46.0%) patients died, while of those who did not receive methylprednisolone treatment, 21 of 34 (61.8%) died. The administration of methylprednisolone appears to have reduced the risk of death in patients with ARDS (HR, 0.38; 95% CI, 0.20-0.72; ( P = .003 ))</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusions:**
- Should not be used routinely.
- If patients are extremely sick and in ARDS, steroids may be considered.

Please refer to specialty specific documents on Medical Staff Office website ([http://hospitals.vchca.org/medical-staff-services](http://hospitals.vchca.org/medical-staff-services)).
When to consult Infectious Disease for confirmed or highly-suspected cases

- High suspicion for COVID-19 with negative initial testing and acute respiratory failure
- Positive COVID-19 test in transplant or AIDS/immunocompromised patients
- Positive COVID-19 test in pregnant patients or pediatric (if available)
- Approval of restricted medications is not necessarily a consult.
- Anytime you have additional clinical concerns

Emergency Department, Hospitalist and Critical Care Management

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Aerosolizing procedures: avoid if possible | - Procedures: Intubation, extubation, bronchoscopy, upper endoscopy, colonoscopy, CPR  
- Respiratory therapy treatments: nebulizer treatments, CPAP/BiPap, Metaneb, EZ Pap, high flow nasal cannula (HFNC) > 15 liters per minute, sputum induction (do not induce sputum for COVID), chest physiotherapy, Venturi mask with cool aerosol humidification, Oxymask, cough assist  
- Ventilator-related: oscillatory ventilation, open suction of tracheostomy, tracheostomy change, manual ventilation (i.e. manual bag-valve mask ventilation prior to intubation), disconnecting patient from the ventilator, open suctioning of endotracheal tube, ventilator circuit manipulation  
- NOT considered high risk for aerosolization: closed suctioning from ET tube  
- NP swab and NG tube placement are to be performed with patient's mouth covered with surgical mask and provider in full PPE with N95*  
  - Room may be cleaned 10 minutes after performing NP swab or NG tube placement |
| Oxygen therapy | - Flow rate that is nebulizing is controversial  
  - Depends on oxygen delivery method and flow rate and if patient also wears a surgical mask  
    - Massachusetts General Hospital guideline on aerosolizing procedures states that HFNC > 15 liters/minute is aerosolizing and Venturi mask with cool humidification is aerosolizing  
    - Safe Airway Society of Australia/New Zealand recommends no non-rebreather pre-oxygenation and no nasal cannula during intubation for aerosolizing risk of both procedures  
- Non-rebreather (NRB) may be used but higher flow rates have more chance of aerosolization (consider low flow rates ~ 6 liters per minute if possible, via NRB); NRB considered a bridge to intubation |
| High Flow Nasal Cannula (HFNC) | - HFNC has high potential to aerosolize, but may be considered if the following criteria are ALL met:  
  - Patient must be in a negative pressure room, and all staff entering the room must have full PPE*  
  - The patient should have a surgical mask on at all times to reduce aerosolization, particularly for the duration of time needed for a full air exchange (45 minutes negative pressure room, 3.5 hours at VCMC or 1.5 hours at SPH) prior to staff entering the room  
    - Flow 15 liters per minute or less, for theoretical decreased risk of aerosolization  
  - Should be abandoned if the patient is progressively not improving (short trials only)  
  - P:F < 200 portends higher risk of HFNC failure per Wang et al study from Wuhan China |

* Full PPE = bouffant cap, eye protection, N95 with face shield over mask so N95 can be reused, gown and gloves; do not place surgical mask over N95 per CDC recommendations
### Therapy Notes

#### Adjunctive Respiratory Therapy Modalities

- **Incentive Spirometer:** All patients should be encouraged to use incentive spirometer 10x/ hour while awake

- **Self-Proning:** If any hypoxia, strongly promote self-proning for hypoxic patients (“adult tummy time”)
  - Initial trial period of one hour on stomach supported by pillows
  - Encourage patient to adopt prone position as much as tolerated on able when in bed
    - Goal is more time prone than supine

- **Nebulizers vs. MDIs:** non-intubated patients: use MDIs—nebulizer is aerosol generating and should be avoided
  - intubated patients: utilize nebulizers via in-line Aerogen device (does not aerosolize)

- **EZ Pap:** also likely aerosolizes, but may be considered if the following criteria are ALL met:
  - Patient requires pulmonary toilet in order to prevent respiratory deterioration and less-invasive methods (i.e. Incentive Spirometer) have been ineffective
  - Patient is cooperative with all aspects of the treatment
  - Must be in negative pressure room if using, all staff in full PPE*
    - Mouthpiece is used with a good seal and good understanding to minimize aerosolization
  - Use only for lung expansion; the nebulizer portion of the treatment is to be avoided
    - if wheeze present, consider MDIs separately
  - Utilize flow rates of 6 liters or less to minimize aerosolization
  - If employing EZPap, consider putting in-line viral filter

- **Metanebs:** aerosolize and should be avoided in COVID suspected or confirmed infected.

#### Non-invasive positive pressure ventilation (NIPPV): BiPap / CPAP

- Generally, should avoid—inevitable leak around mask \(\rightarrow\) aerosolization. Case-by-case with ICU consult.
  - If using NIPPV, must use non-invasive mode on Servo-i ventilator (dedicated exhalation limb that can be filtered) and not V-60 (no exhalation limb, exhalation out the mask \(\rightarrow\) aerosolization)
  - Must be in negative pressure room if using, all staff in full PPE*

- CPAP favored over Bipap if choosing to use NIPPV: less likely to aerosolize and high BiPap failure rate

#### Decision to intubate

- **Strongly recommend ICU Consultation for O2 requirement of more than 4-6 liters of oxygen per minute**

- **Encourage early self-proning as described above in Adjunctive Respiratory Therapy Modalities**

- **Consider trial of high flow nasal cannula vs. CPAP in negative pressure room (or negative pressure tent or COVID ward if negative pressure room unavailable) with very close monitoring (i.e. q 15 minutes) to assess for response**
  - Favorable response: improved hypoxia, decreased respiratory rate, improvement in accessory muscle use
    - “Happy hypoxic”: continue close monitoring for any deterioration
  - Unfavorable response: refractory hypoxia, increased work of breathing, nasal flaring, abdominal breathing, ill-appearing \(\rightarrow\) consider early intubation
  - May choose to first intubate ill-appearing patients with high work of breathing and high inflammatory markers instead of HFNC or CPAP trial

- **Intubation under semi-elective conditions much preferred to emergent intubation**

---

*Full PPE = bouffant cap, eye protection, N95 with face shield over mask so N95 can be reused, gown and gloves; do not place surgical mask over N95 per CDC recommendations*
<table>
<thead>
<tr>
<th>Therapy</th>
<th>Notes</th>
</tr>
</thead>
</table>
| **Intubation** | • High risk for aerosolization. Negative pressure room required if available, door closed if unavailable  
• Full PPE* and double-glove  
• Least amount of people in room. Most experienced conductor. Least amount of attempts.  
• Video laryngoscopy preferred. Disposable laryngoscope if needing direct laryngoscopy.  
• Viral filter to BVM and exhalation port of ventilator  
• Pre-oxygenate with non-rebreather (NRB): lower flow rates less likely to aerosolize  
• Avoid bagging: Option #1: Facemask to ventilator set to CPAP; Option #2 Passive bag valve mask (BVM) with viral filter, PEEP valve, O2 flow—avoid actual bagging when patient not yet intubated if possible  
• Rapid Sequence Intubation (RSI) preferred; ensure that patient is fully paralyzed and cannot cough  
• Avoid unnecessary ETT confirmatory procedures. Calculate predicted ETT depth (MDCalc) or consider standard depths (~23inches male, ~21inches females). Ensure black line of ETT distal to cords  
• Inflate cuff, ensure viral filter on bag valve mask (BVM) before bagging/ connecting to ventilator |
| **Post-Intubation Respiratory / Critical Care Management** | • Before disconnecting ETT: sedate & paralyze patient → pause ventilator  
  o Optional: Clamp ETT (plastic clamp preferred; if metal clamp, place lots of tape around the metal that will come in contact with the tube to reduce risk tube damage)  
• Closed circuit suction, Lukens trap to collect sputum for testing (COVID sputum to Public Health more sensitive)  
• Consider waiting 45min for CXR to allow for adequate air exchanges and reduce aerosolized particles  
• Ventilator management depends on “phenotype” of ARDS  
  o **L Type** (Low elastance, normal compliance): consider 8mL/kg PBW for TV, start lower PEEP (~10 cm H2O), high FiO2, keep Plateau pressure <30cmH2O  
  o **H Type** (High elastance, low compliance): Follow ARDSnet lung protective protocol: high PEEP, low TV 6-8mL/kg PBW, Plateau pressure <30 cm H2O, keep PaO2>55mmHg; SpO2 88-92%; Consider early APRV (Airway Pressure Release Ventilation: high mean airway pressures) for H Type  
• Prone positioning has been shown to help if no improvement after 12-24hr  
  o Recommend prone positioning 12-16 hours per day if it is initiated  
• Consider placing lines right after intubation to conserve PPE, reduce exposures  
• Consider high incidence of myocardial suppression/shock  
• D-Dimer elevation early considered measure of disease severity; consider avoiding early CT pulmonary angiogram for both fluid load and renal considerations  
  o Consider possible increased risk of late pulmonary embolism (27% incidence in a Dutch ICU study of 184 ventilated ICU patients, lower incidence reported elsewhere); recommendations from American Society of Hematology: [https://www.hematology.org/covid-19/covid-19-and-vte-anticoagulation](https://www.hematology.org/covid-19/covid-19-and-vte-anticoagulation)  
• Conservative fluid strategy strongly recommended |

* Full PPE = bouffant cap, eye protection, N95 with face shield over mask so N95 can be reused, gown and gloves; do not place surgical mask over N95 per CDC recommendations
Emergency Department, Hospitalist and Critical Care Management (continued)

| Miscellaneous Critical Care Management | • Intubated patients are on ventilator prolonged time (>10 days) with high incidence of late deterioration  
• Consider early discussion regarding DNR status for shock, ARDS, intubated patients  
• Early Palliative Care Consult  
• Code blue considerations  
  o Minimize number of staff entering the room to only essential  
  o Consider placing ETT prior to chest compressions to avoid aerosolization  
  o Consider plastic drape over patient’s face to minimize aerosolization during code if not yet intubated |
| --- | --- |
| Environmental | • Considered mostly droplet precautions other than high risk situations (see to top of table on page 7 for aerosol generating procedures)  
• Maintain airborne precautions: intubated patients (in case of accidental disconnection, filter changes, etc.)  
• Surface survival times: 72 hours plastics, 48 hours steel, 24 hours cardboard, 4 hours copper |

* Full PPE = bouffant cap, eye protection, N95 with face shield over mask so N95 can be reused, gown and gloves; do not place surgical mask over N95 per CDC recommendations

References:
3. Effective Treatment of Severe COVID-19 Patients with Tocilizumab, Chinese article from "Respiratory and Critical Care Medicine" 2020. [https://www.ashp.org/Pharmacy-Practice/Resource-Centers/Coronavirus](https://www.ashp.org/Pharmacy-Practice/Resource-Centers/Coronavirus)
5. UW Medicine Interim Treatment Guidelines for SARS-CoV-2 Infection/COVID 19 Version 1.3 3/17/20
6. UCSF Inpatient Adult COVID 19 Interim Management Guidelines V.1 3/19/20
9. FDA Hydroxychloroquine Fact Sheet: [https://www.fda.gov/media/136538/download](https://www.fda.gov/media/136538/download)
10. FDA Chloroquine Fact Sheet: [https://www.fda.gov/media/136536/download](https://www.fda.gov/media/136536/download)
12. Massachusetts General Hospital Guideline on aerosol generating procedures and prone positioning
13. Additional references listed on the following documents:  
   a. Google Drive ([https://drive.google.com/drive/folders/1CIZAQpl_s8_mHlhKlQtm5Hn7KIXTdtG](https://drive.google.com/drive/folders/1CIZAQpl_s8_mHlhKlQtm5Hn7KIXTdtG))  
   b. Google Doc ([https://docs.google.com/document/d/149cSAUSj6VAOYj8vRLEXzyV1VHhQ9Gl8cdGmcFAU/edit](https://docs.google.com/document/d/149cSAUSj6VAOYj8vRLEXzyV1VHhQ9Gl8cdGmcFAU/edit))