Purpose	To provide guidance on the clinical evaluation and management of suspected and confirmed hospitalized COVID-19 patients.
Scope	NYC Health and Hospitals
Clinical Evaluation and Management	**Regarding the most updated COVID-19 Clinical Guidance** • **IDSA/CDC COVID-19 Real-Time Learning (RTL) Network** **Regarding ADMISSION TESTING and DIAGNOSTICS** Initial testing for all suspected COVID-19 patients to be admitted should include CBC, BMP, LFTs, EKG, and portable CXR. Also consider checking for influenza virus depending on season. Daily inpatient inflammatory markers and daily troponin/EKG are unnecessary unless change in clinical condition or critically-ill. • **Routine inpatient testing (Up To Date)** Blood/sputum cultures are unnecessary unless patient has risk for MRSA/Pseudomonas or is classified as severe CAP. • **Diagnosis & Txt of Adults with CAP (IDSA/ATS)** Avoid CT imaging for the diagnosis of COVID-19. • **CT/XR for Suspected COVID-19 (Amer. College of Radiology)** **Viral Genotyping** Viral genotyping is being performed at the community level at the Pandemic Response Lab (PRL). Batches are being sent from inpatients at rotating facilities to help inform community prevalence of different genotypes. However, results for individual distinct patients are not available at this time.

Regarding THERAPEUTICS

NIH Summary Recommendations for Hospitalized COVID-19 Patients

Figure 2. Therapeutic Management of Hospitalized Adults With COVID-19 Based on Disease Severity

DISEASE SEVERITY	PANEL'S RECOMMENDATIONS
Hospitalized but Does Not Require Supplemental Oxygen	The Panel **recommends against** the use of **dexamethasone (AIIa)** or other **corticosteroids (AIII)**.[a] There is insufficient evidence to recommend either for or against the routine use of remdesivir. For patients who are at high risk of disease progression, the use of remdesivir may be appropriate.
Hospitalized and Requires Supplemental Oxygen	Use one of the following options: • **Remdesivir**[b,c] (e.g., for patients who require minimal supplemental oxygen) **(BIIa)** • **Dexamethasone**[d] **plus remdesivir**[b,c] (e.g., for patients who require increasing amounts of supplemental oxygen) **(BIII)** • **Dexamethasone**[d] (when combination therapy with remdesivir cannot be used or is not available) **(BI)**
Hospitalized and Requires Oxygen Delivery Through a High-Flow Device or Noninvasive Ventilation	Use one of the following options: • **Dexamethasone**[d] **(AI)** • **Dexamethasone**[d] **plus remdesivir**[b,c] **(BIII)** For patients who were recently hospitalized[e] with rapidly increasing oxygen needs and systemic inflammation: • Add either **baricitinib**[f,g] **(BIIa)** or **tocilizumab**[f,h] **(BIIa)** to one of the two options above
Hospitalized and Requires IMV or ECMO	For most patients: • **Dexamethasone**[d,i] **(AI)** For patients who are within 24 hours of admission to the ICU: • **Dexamethasone**[d,i] **plus tocilizumab**[f,h] **(BIIa)**

Rating of Recommendations: A = Strong; B = Moderate; C = Optional
Rating of Evidence: I = One or more randomized trials without major limitations; IIa = Other randomized trials or subgroup analyses of randomized trials; IIb = Nonrandomized trials or observational cohort studies; III = Expert opinion

[a] Patients who are receiving dexamethasone or another corticosteroid for other indications should continue therapy for their underlying conditions as directed by their health care provider.
[b] The dose for remdesivir is 200 mg IV for one dose, followed by remdesivir 100 mg IV once daily for 4 days or until hospital discharge (unless the patient is in a health care setting that can provide acute care that is similar to inpatient hospital care). Treatment duration may be extended to up to 10 days if there is no substantial clinical improvement by Day 5.
[c] For patients who are receiving remdesivir but progress to requiring oxygen through a high-flow device, noninvasive ventilation, IMV, or ECMO, remdesivir should be continued until the treatment course is completed.
[d] The dose for dexamethasone is 6 mg IV or PO once daily for 10 days or until hospital discharge. If dexamethasone is not available, equivalent doses of other corticosteroids (e.g., prednisone, methylprednisolone, hydrocortisone) may be used. See the Corticosteroids section for more information.
[e] For example, within 3 days of hospital admission. See the Interleukin-6 Inhibitors section for more information.
[f] As there are no studies that directly compare using baricitinib and tocilizumab as treatments for COVID-19, the Panel has insufficient evidence to recommend one drug over the other. Treatment decisions should be based on local guidance, drug availability, and patient comorbidities.
[g] The dose for baricitinib is 4 mg PO once daily for 14 days or until hospital discharge (refer to Table 4c for dose modifications for patients with renal impairment). Baricitinib should be used in combination with steroids (with or without remdesivir). The combination of baricitinib plus tocilizumab has not been studied, and the Panel **recommends against** the use of this combination, except in a clinical trial **(AIII)**.
[h] The dose for tocilizumab is 8 mg/kg of actual body weight (up to 800 mg) administered as a single IV dose. The combination of tocilizumab plus baricitinib has not been studied, and the use of this combination should be avoided outside of a clinical trial. See the Interleukin-6 Inhibitors section for more information.
[i] The combination of **dexamethasone plus remdesivir** may be considered for patients who have recently been intubated **(CIII)**. The Panel **recommends against** the use of remdesivir monotherapy in these patients.

Key: ECMO = extracorporeal membrane oxygenation; ICU = intensive care unit; IMV = invasive mechanical ventilation; IV = intravenous; the Panel = the COVID-19 Treatment Guidelines Panel; PO = orally

Regarding GLUCOCORTICOIDS

It is recommended to give dexamethasone to all hospitalized COVID-19 patients requiring any level of supplemental oxygen, including NC, HFNC, NIPPV, and invasive mechanical ventilation. It is not recommended to give dexamethasone to COVID-19 patients (hospitalized or otherwise) who do not require supplemental oxygen. If dexamethasone is unavailable, it is reasonable to use other glucocorticoids at an equivalent dose.

- Dexamethasone 6mg IV or PO qday x 10 days
- **SUMMARY/RECOMMENDATIONS (IDSA)**
- **SUMMARY/RECOMMENDATIONS (NIH)**
- **Dexamethasone for COVID-19 (Up to Date)**

Regarding ANTIVIRALS and EMERGING THERAPIES

Remdesivir

A recent Cochrane review found remdesivir had little or no impact on all-cause mortality up to 28 days in hospitalized patients. There is contradictory evidence regarding if remdesivir reduces time to clinical improvement. The IDSA and NIH recommend the use of remdesivir in hospitalized patients with severe COVID-19 (SpO_2<94%, or requiring supplemental O_2 or ventilation). Greater clinical benefit may be found in those requiring supplemental O_2 than in those requiring mechanical ventilation. There has not been demonstrated benefit or harm to giving to patients not requiring supplemental O_2 or with SpO_2>94%.

- Remdesivir 200mg Day 1, 100mg Days 2-5
- **SUMMARY/RECOMMENDATIONS (IDSA)**
- **SUMMARY/RECOMMENDATIONS (NIH)**
- **SUMMARY/RECOMMENDATIONS (WHO)**
- **Remdesivir (IDSA/CDC RTL Network)**

IL-6 Inhibitors

Tocilizumab is conditionally recommended for recently hospitalized patients with severe or critical COVID-19 who experience a rapid respiratory decline and now require HFNC, NIV, or mechanical ventilation. Any administration should be paired in combination with systemic glucocorticoids.

- **SUMMARY/RECOMMENDATIONS (IDSA)**
- **SUMMARY/RECOMMENDATIONS (NIH)**
- **SUMMARY/RECOMMENDATIONS (WHO)**
- **IL-6 Inhibitors (IDSA/CDC RTL Network)**

Kinase Inhibitors

It is reasonable to administer Baricitinib to hospitalized patients with severe COVID-19 if they do not require invasive mechanical ventilation or cannot receive systemic glucocorticoids.

- Baricitinib 4mg IV qday for 14 days or until discharge
- **SUMMARY/RECOMMENDATIONS (IDSA)**
- **SUMMARY/RECOMMENDATIONS (NIH)**
- **Kinase Inhibitors (IDSA/CDC RTL Network)**

Monoclonal Antibody (mAb) Treatment

It is reasonable to administer mAb treatment to hospitalized patients with mild-moderate COVID-19 if they are hospitalized for a reason other than COVID-19 and meet the EUA high-risk criteria. Evidence does not support the routine administration to patients hospitalized due to COVID-19 and this treatment should otherwise be limited to the outpatient setting.

- **SUMMARY/RECOMMENDATIONS (IDSA)**
- **SUMMARY/RECOMMENDATIONS (NIH)**
- **Monoclonal Ab Treatment (IDSA/CDC RTL Network)**

Ivermectin

There is conflicting evidence regarding the routine administration of ivermectin to hospitalized patients with COVID-19. Both the IDSA and WHO do not support giving ivermectin outside of clinical trials, while the NIH states that there is insufficient evidence to recommend for or against the use of ivermectin in the treatment of hospitalized patients with COVID-19. Any administration should be done in consultation with ID.

- **SUMMARY/RECOMMENDATIONS (IDSA)**
- **SUMMARY/RECOMMENDATIONS (NIH)**
- **SUMMARY/RECOMMENDATIONS (WHO)**

Lopinavir-Ritonavir

Evidence does not support the routine administration of lopinavir-ritonavir (Kaletra) to hospitalized patients with COVID-19.

- **SUMMARY/RECOMMENDATIONS (WHO)**
- **SUMMARY/RECOMMENDATIONS (NIH)**

Convalescent Plasma

Evidence does not support the routine administration of convalescent plasma to hospitalized patients with COVID-19 outside of a clinical trial. The FDA has granted EUA use in hospitalized patients. Usual Consent for blood products is required and ID should be consulted for additional recommendations.

- **Convalescent Plasma (IDSA/CDC RTL Network)**

Hydroxychloroquine

Evidence does not support the routine use of hydroxychloroquine to hospitalized patients with COVID-19. The FDA has withdrawn EUA status. In addition, co-administration with remdesivir may result in reduced antiviral activity of remdesivir.

Use may be considered in specific patients, in consultation with ID, or as part of a clinical trial if available.

The addition of azithromycin to hydroxychloroquine may increase toxicity, and is also not recommended.

- **Hydroxychloroquine (IDSA/CDC RTL Network)**

Regarding ANTIBIOTICS

It is reasonable to empirically treat **critically-ill** suspected COVID-19 patients for CAP. Consider holding or de-escalating abx in patients without leukocytosis, focal infiltrates or procalcitonin >2 (if available).

- Combination therapy: (Ceftriaxone 1-2gqday OR Ampicillin/sulbactam 1.5-3g q6h) AND (Azithromycin 500mg qday OR Doxycycline 100mg bid)
- Monotherapy: Levofloxacin 750mg qday
- **Empiric Treatment in COVID-19 patients (Up To Date)**
- **Diagnosis & Txt of Adults with CAP (IDSA/ATS)**

Consider broadening coverage to include treatment for hospital-associated infections in patients with MRSA/Pseudomonas risks and/or "severe" pneumonia

- Vancomycin 15mg/kg q12h AND (Cefepime 2g q8h OR Piperacillin/tazobactam 4.5g q6h OR Ceftazidime2g q8h)

Consider limiting course if appropriate blood and sputum cultures unrevealing and no improvement

- **Diagnosis & Txt of Adults with CAP (IDSA/ATS)**

Regarding ANTICOAGULATION

It is reasonable to treat all suspected and confirmed hospitalized COVID-19 patients with VTE prophylaxis per standard of care for other hospitalized adults. If there is high clinical suspicion for VTE, it is reasonable to empirically treat this condition until the diagnosis can be ruled out, after a risk/benefit analysis. Empiric therapeutic anticoagulation in the absence of suspected or confirmed VTE is controversial. There is conflicting evidence on which patient population is likely to benefit, and complications appear more common in critically ill patients. If this treatment is employed, it is likely of most benefit among

hospitalized patients, early in the course of disease, with high inflammatory markers.

- Enoxaparin is recommended unless contraindicated, as it has been shown to reduce risk of VTE in COVID-19 and may have anti-inflammatory properties
- **SUMMARY/RECOMMENDATIONS (NIH)**
- **Thrombosis Guidelines (IDSA/CDC RTL Network)**
- **Full-dose anticoagulation (Up To Date)**

Regarding CRITICAL CARE

- **SUMMARY/RECOMMENDATIONS (NIH)**
- **SUMMARY/RECOMMENDATIONS (SCCM)**
- **SUMMARY/RECOMMENDATIONS (Up to Date)**
- **SUMMARY/RECOMMENDATIONS (WHO)**

Respiratory Support in Non-intubated patients

High flow nasal cannula (HFNC) is recommended over NIPPV in patients with persistent hypoxia despite conventional O2 therapy. If HFNC is not available and there are no indications for endotracheal intubation, NIPPV is reasonable.

Consider a trial of awake proning in patients with persistent hypoxemia not requiring endotracheal intubation, but not as a rescue therapy to prevent endotracheal intubation. However, if patients remain dyspneic on HFNC, endotracheal intubation and invasive mechanical ventilation is indicated.

- **Oxygenation and Ventilation (NIH)**
- **Non-intubated patients (Up To Date)**

Intubation and Ventilator Management

COVID-19 patients with persistent hypoxemia or dyspnea refractory to HFNC and NIPPV should be considered for endotracheal intubation and invasive mechanical ventilation. Intubation should occur in an airborne isolation room with negative pressure if possible. The minimal number of staff should be present and they should be donned in N95s, gowns, gloves, and eye protection at a minimum. Consider PAPRs and CAPRs for the airway team if available. Avoid "intubation boxes" as these have been shown to increase delays in intubation and create breaches in PPE. Preoxygenate patients with low flow O2 (10-15lpm) via NRB or NC and avoid BVM if possible. During intubation, use high dose NMBA (rocuronium 1.5mg/kg or succinylcholine 2mg/kg IV) to reduce coughing. Intubation should be performed by the most experienced provider using video laryngoscopy if available. If a rescue device is needed, use a

supraglottic device with HEPA filter attached to bag ventilation. Once successful intubation is confirmed, all providers should immediately doff their PPE.

- **Timing/Precautions (Up To Date)**
- **Intubation Guidelines (Up To Date)**

Initial ventilator settings post-intubation should be based on underlying pathology and pt-specific characteristics, but ARDS should be considered in many COVID-19 patients. In these cases, use lung protective settings with an emphasis on low tidal volume ventilation targeting 6ml/kg PBW with PEEP based on ARDSnet data.

- **Ventilator Management of ARDS (Up To Date)**

Indications for ECMO

Respiratory (Venous-Venous) ECMO should be considered in patients with severe hypoxemia or refractory hypercarbia who do not respond to conventional ARDS management. Patients should be discussed with the ECMO referral center (Bellevue Hospital MICU Attending) for candidacy.
Initial screening criteria for VV-ECMO are:

- PaO2:FiO2 < 150
- Intubation < 10 days
- or refractory hypercarbia.

There are few absolute contraindications, including age >80, significant acute organ failure other than cardiopulmonary or renal, active malignancy, or unknown neurological status.
If the patient is deemed a potential candidate for ECMO, the patients should be at the ECMO center for further management. Initial ventilatory settings after initiation of ECMO should include full lung rest.

Regarding PEDIATRICS

There is insufficient evidence regarding specific treatment in hospitalized pediatric COVID-19 patients, therefore panel recommendations have been drawn from adult safety data

Remdesivir is recommended by the NIH for:
-hospitalized children over 12 years old with risk factors for severe disease and increasing need for supplemental oxygen
-hospitalized children over 16 years old with an increasing need for supplemental oxygen, regardless of risk factors.

Dexamethasone is recommended by the NIH for:
-hospitalized children who require HFNC, NIV, invasive mechanical ventilation, or ECMO.

	• **Pediatric Considerations (NIH)** • **Management in Children (Up To Date)**
References	See above

Prepared by:	Richard James Salway/Amit Uppal	Sr Director, EM/Director of Crit Care	10/18/2021
	Name/Signature	Title	Date
Approved by:	Machelle Allen Machelle Allen MD	CMO/SVP	10/19/21
	Name/Signature	Title	Date