September 2020 COVID Updates

SUNY-UHB

New York State Snapshot

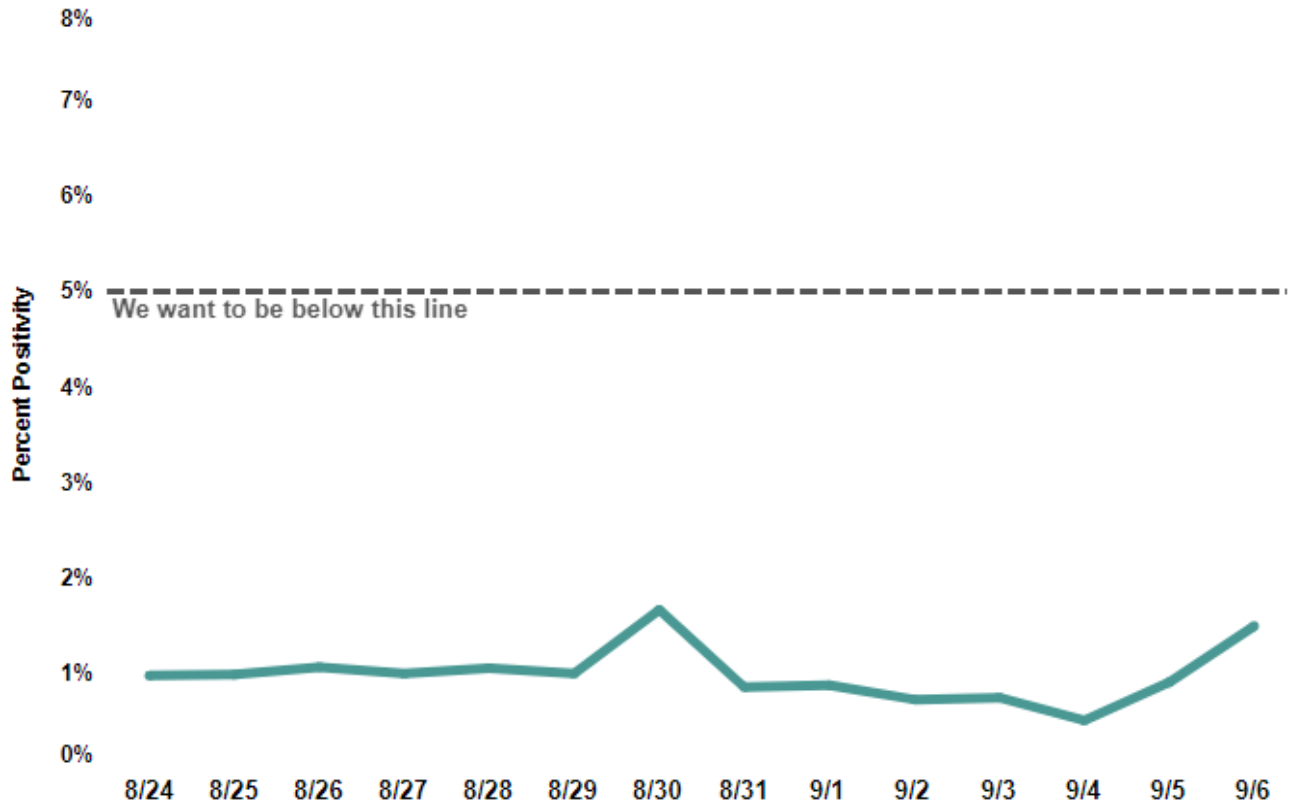
- Hospitalizations Drop 445
  - ICU Patients Drop to 109—New Low Since March 15
- 0.99 Percent COVID-19 Tests were Positive
  - 1 month with Infection Rate Below 1 Percent
- Confirms 656 Additional Coronavirus Cases in New York State
- Statewide Total to 434,756
- New Cases in 41 Counties
- Visitors from out of state
- Colleges (Cuomo: they will continue to be a problem)
- 108 colleges have reported more than 100 cases each.
- Several colleges are in NY, including Hofstra, Buffalo, SUNY Oneonta.

New York City Snapshot

- COVID Hospitalizations: 52 (15% positivity rate)
- New reported COVID-19 cases 7-day average: 227
- Percentage tested positive: **1.33%**

- Governor Cuomo has continued the declaration of the State Disaster Emergency effective March 7, 2020, as set forth in Executive Order 202. He has issued Executive Order No. 202.60: Continuing Temporary Suspension and Modification of Laws Relating to the Disaster Emergency which states that Executive Order 202 shall remain in effect until October 4, 2020.

Percent of NYC residents who test positive

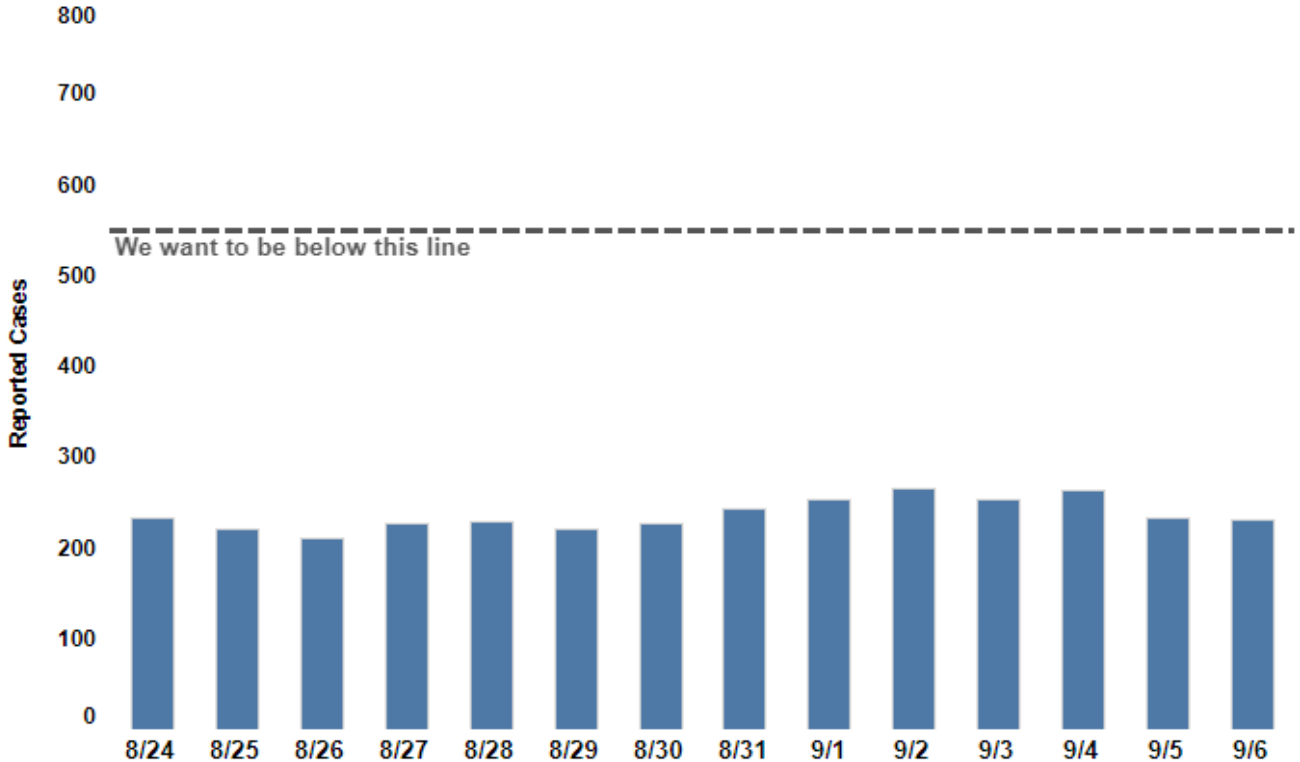


Milestone: This chart indicates when more NYC residents have a positive result for COVID-19.

Testing indicators may be reconsidered if testing supplies limit local ability to test for COVID-19.

https://www1.nyc.gov/site/doh/covid/covid-19-goals.page

Daily reported cases of COVID-19, seven-day average

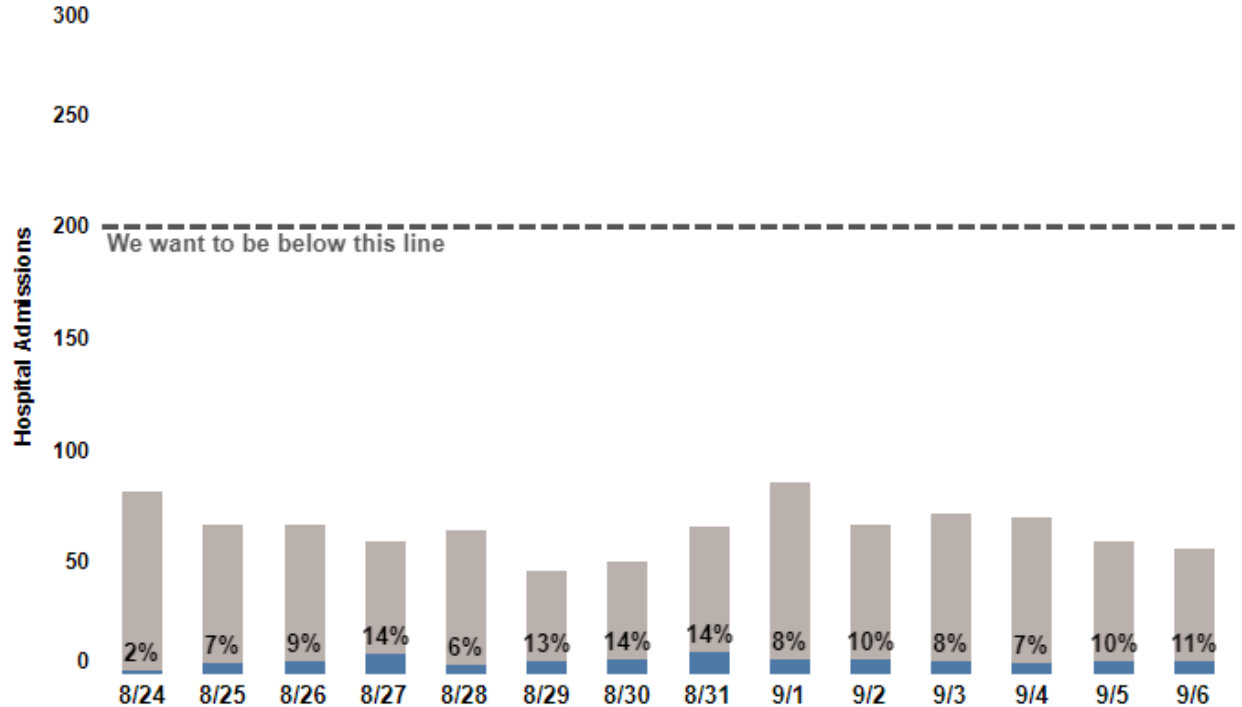


Milestone: This chart shows the seven-day average of newly reported COVID-19 cases each day. Due to delays in reporting, which can take as long as two weeks, recent data by diagnosis date are incomplete. New reported cases include some cases in which a specimen was collected on previous days and are being reported now for the first time.

NYC COVID-19 data include people who live in NYC or who live in another country but are being treated in NYC. The data do not include people who live in the United States outside of NYC. During the height of the outbreak in NYC, over 6,300 people were diagnosed with COVID-19 in a single day.

https://www1.nyc.gov/site/doh/covid/covid-19-goals.page

Daily number of people admitted to NYC hospitals for COVID-19-like illness, percent COVID-19 positive



Milestone: This chart shows that the daily number of people admitted to NYC hospitals for COVID-19-like illness is now consistently below our milestone of 200. The average number of people with these types of symptoms who are admitted to the hospital during this time of year is around 100.

The chart also shows the number of people who were admitted to the hospital with COVID-19-like illness and tested positive for COVID-19. During the height of the outbreak in NYC, three out of four of these hospital admissions tested positive for COVID-19.

These data include all hospital admissions from emergency department visits in NYC. The information is collected through electronic data transmitted hourly to the NYC Health Department. COVID-19-like illness is defined as clinical presentation of influenza-like illness or pneumonia. People who are admitted to a hospital and are laboratory-positive for COVID-19 might not be included in these data because: a) they do not present to an emergency department with the syndrome of COVID-19-like illness; or b) their hospital admission was not reported to our emergency department system.

https://www1.nyc.gov/site/doh/covid/covid-19-goals.page

New York City COVID-19 Data

Date	COVID-19 Cases	Hospitalizations	Deaths	Probable Deaths
8/25/20	228,788	56,967	19,029	4,637
9/1/20	230,490	57,136	19,060	4,693
9/8/20	**232,036**	**57,296**	**19,098**	**4,646**

Brooklyn COVID-19 HERDS Data - 9/06 View Snapshot					
Acute Care Hospitals	**HERDS - ConfirmedCoVID-19**	**HERDS - ConfirmedCoVID-19 - ICU**	**HERDS - Confirmed CoVID-19 -Intubated**	**HERDS - Available:Staffed**	**HERDS - Available: ICU**
Maimonides Medical Center (53)	10	8	8	174	20
Mount Sinai Brooklyn (93)	1	0	0	83	2
New York Community Hospital (92)	1	0	0	68	4
NYC H+H - Bellevue (02)	3	2	2	125	19
NYC H+H - Coney Island (42)	0	0	0	75	16
NYC H+H - Kings County (48)	**2**	**0**	**0**	**149**	**67**
NYC H+H - Woodhull (45)	0	0	0	122	19
NYP - Brooklyn Methodist Hospital (54)	4	0	0	122	4
NYU Langone - Brooklyn (51)	12	4	3	103	17
NYU Langone - Orthopedic Hospital	--	--	--	--	--
NYU Langone - Tisch Hospital (15)	9	6	4	241	56
One Brooklyn - Brookdale Hospital (41)	1	1	1	51	9
One Brooklyn - Interfaith M.C. (55)	0	0	0	81	3
One Brooklyn - Kingsbrook (47)	1	0	0	54	1
SUNY Downstate Medical Center (44)	**3**	**0**	**0**	**191**	**18**
The Brooklyn Hospital Center (95)	1	0	0	90	23
Wyckoff Heights Medical Center (58)	1	0	0	30	3
Summary (9/1/20 data)	**49 (41)**	**21 (15)**	**18 (13)**	**1759 (1279)**	**281 (186)**

New York State MIS-C (multi-system inflammatory syndrome in children)

Sept 1, 2020 (last update)- Confirmed MIS-C =252

(248 from 8/25) total deaths =5

94 % COVID-19 + (by diagnostic, antibody or both)

Age of Cases

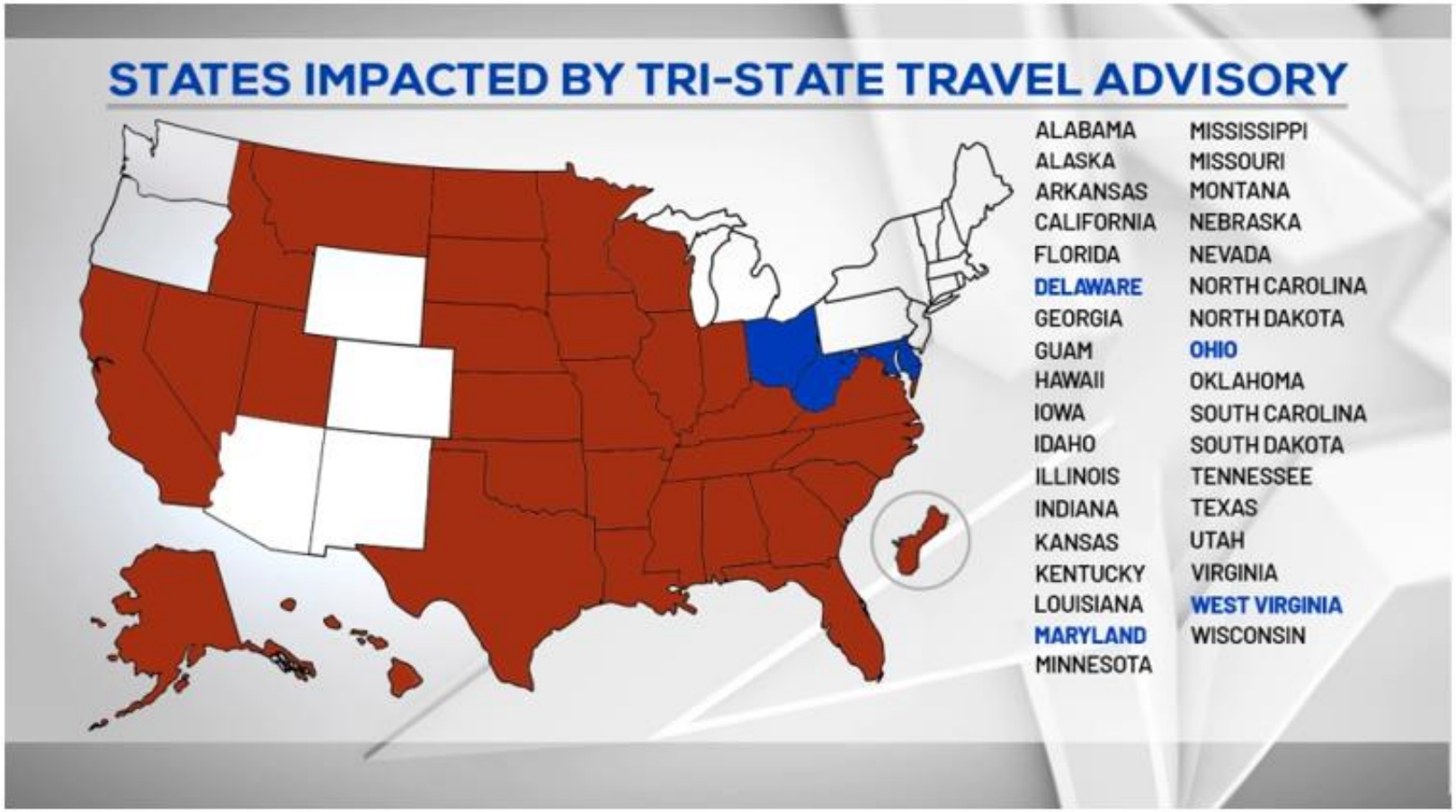
Age	Percent of Cases
<1	7%
1-4	25%
5-9	29%
10-14	25%
15-19	13%
20-21	3%

Race and Ethnicity of Cases

Race	Percent of Cases
White	21%
Black	31%
Other	19%
Asian	3%
Unknown	25%

9/8/2020 COVID-19 –**Tri-state travel advisory,** 35 states/ territories must quarantine.

- Delaware, Maryland, Ohio, West Virginia added
- Puerto Rico and U.S. Virgin Islands removed.



Returning to NYS after travel from the affected states **must quarantine for 14 days**

Essential staff must get tested **within 24-hours** of return to NY and have a Negative result **BEFORE** they are allowed to return to Work

***Rapid COVID-19 tests are NOT available to staff due to limited supplies**

"Exemptions for Essential Workers

Exceptions to the travel advisory are permitted for essential workers and are **limited** based on the duration of time in designated states, as well as the intended duration of time in New York. The Commissioner of Health may additionally grant an exemption to the travel advisory based upon extraordinary circumstances, which do not warrant quarantine, but may be subject to the terms and conditions applied to essential workers or terms and conditions otherwise imposed by the Commissioner in the interest of public health.

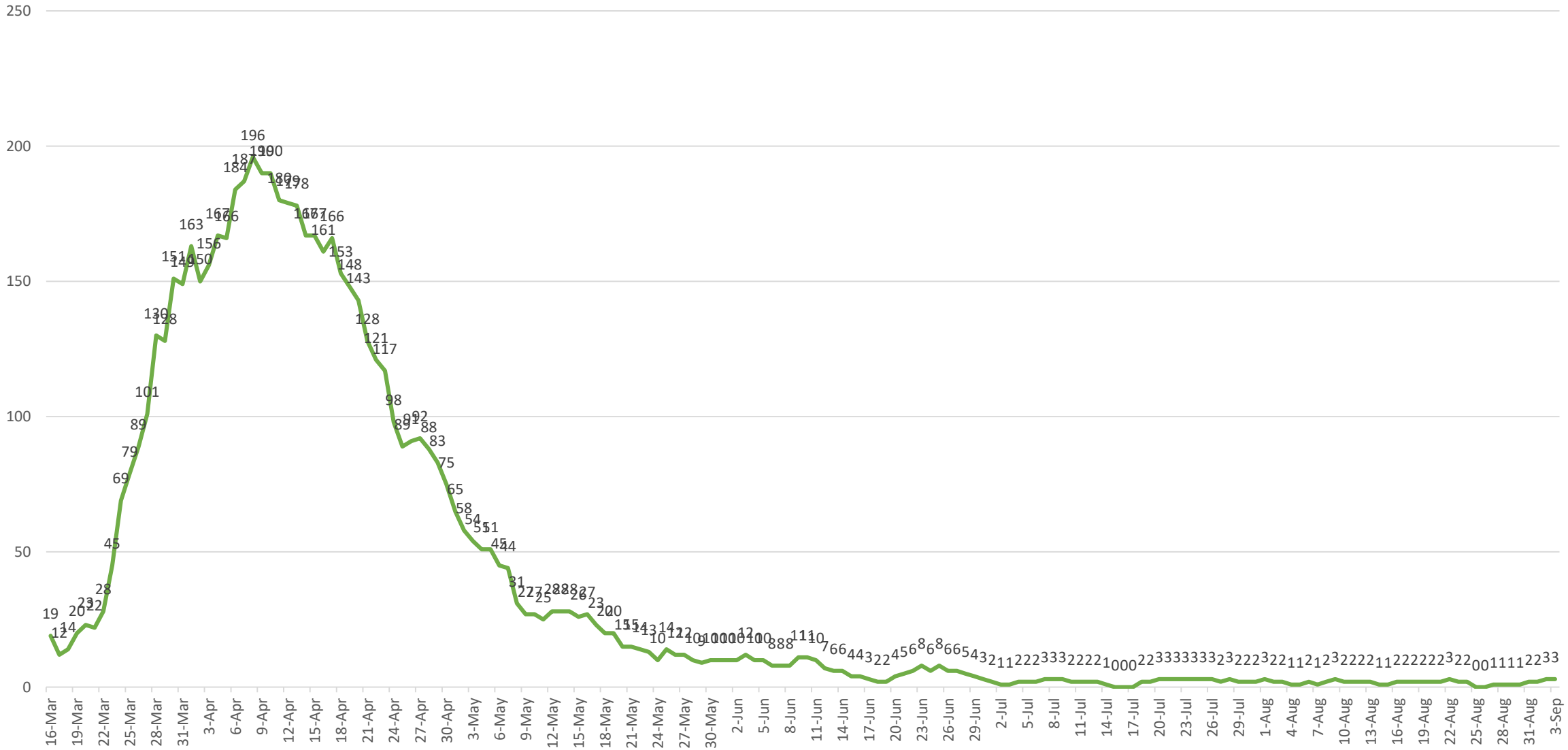
- Essential workers should seek **diagnostic testing for COVID-19 as soon as possible upon arrival (within 24 hours)** to ensure they are not positive.
- Essential workers should monitor temperature and signs of symptoms, wear a face covering when in public, maintain social distancing, clean and disinfect workspaces for a minimum of 14 days.
- Essential workers, to the extent possible, are required to avoid extended periods in public, contact with strangers, and large congregate settings for a period of, at least, 14 days."

UHB Snapshot

- COVID Hospitalizations: 3 currently inpatient SUNY
- Percentage New COVID tests positive: **1.5%**
  - New reported COVID-19 cases: 1-2 daily
  - Daily COVID tests (inpatient + outpatient): 20-60 /day
- Cumulative COVID tests at UHB since 03/20: 7,000
- 1 COVID Death since June 2020

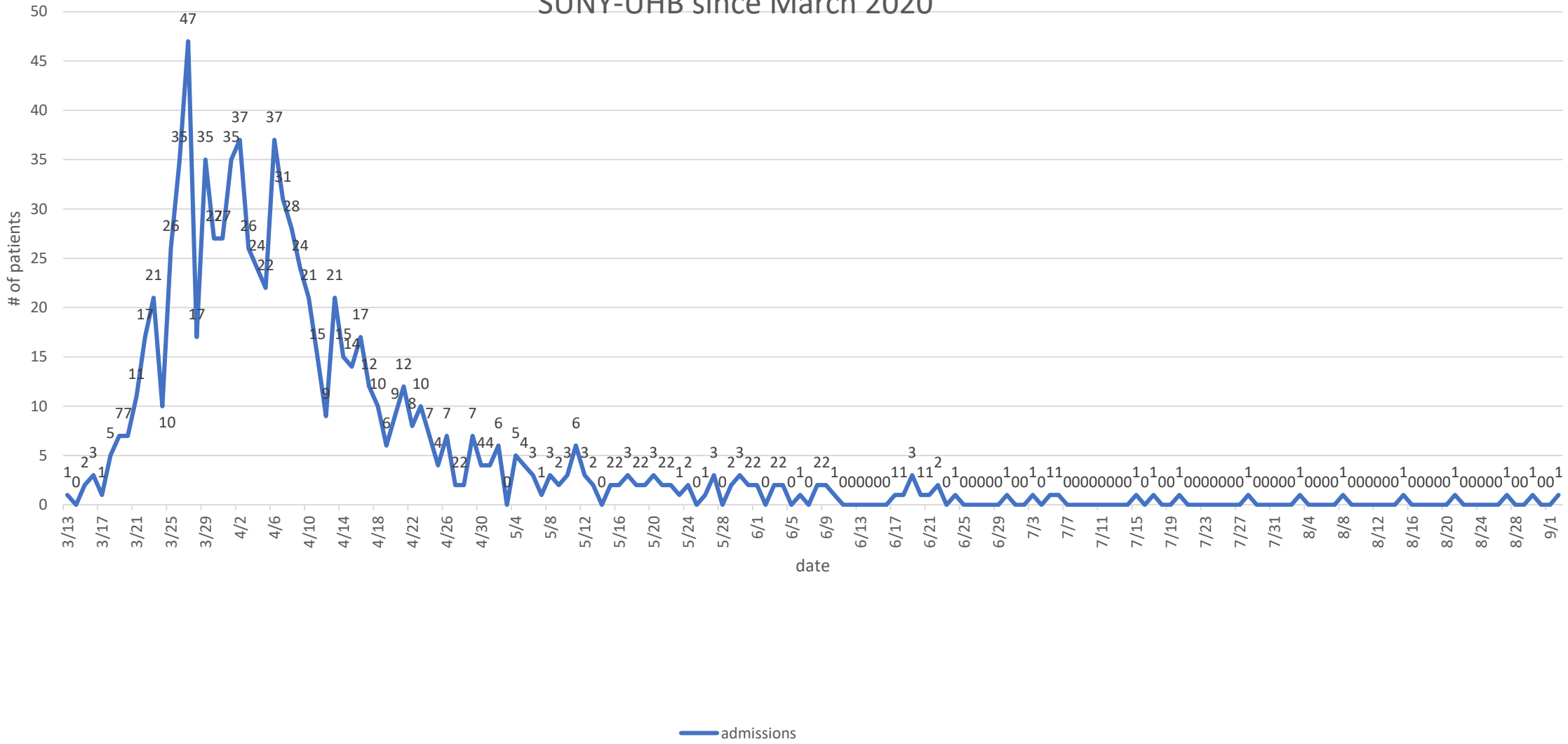
Total Inpatient (COVID Positives and PUIs) By Date

SUNY-UHB since March 2020



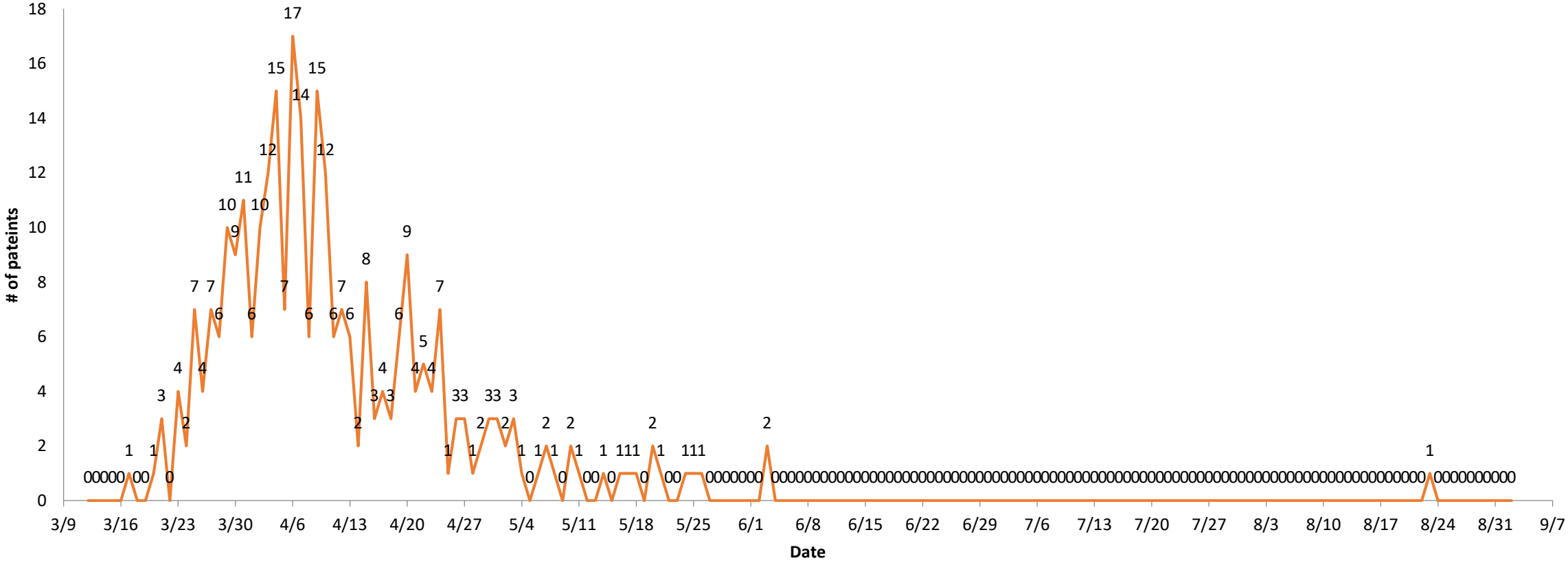
COVID-19 Related New Admissions by Date

SUNY-UHB since March 2020



COVID-19 Related New Death by Date

SUNY-UHB since March 2020



UHB Peds guidelines for MIS-C

- For rule out MISC pathway in UHB Pediatrics:
  - If 3 days of fever
    - the initial labs should be CBC/Comp/CRP/ESR (Other testing as clinically indicated to identify cause of fever, based on clinical features).
    - If abnormal:
    - send additional blood work noted in the MIS-C pathway.

***One caveat** - in children <5 years of age the sensitivity of these screening labs individually for MIS-C are lower than in older children so some clinical judgment would be needed in that age group to consider additional tests, repeat testing in 24 hours or observation in the hospital.

UHB Peds guidelines for Children Returning to School

- We are working with DOH to create a process/screening sheet for children quarantined due to COVID→ once this process is developed we will share with staff

UHB Health Care Workers/Employees returning to New York from the quarantined states must:

a) Quarantine for 14 days in NYC **OR**

b) Have a Negative COVID test (within 24 hours after return to New York State)

PRIOR to returning to WORK

Staff must plan accordingly, give themselves enough time to get tested.

If you miss work because you did not plan the state mandate says you use your PTO days!

NYS Travel Form must be filled out if you are travel back from restricted state, by any means of transportation) or $2,000 fine and may also be subject to charges.

- https://forms.ny.gov/s3/Welcome-to-New-York-State-Traveler-Health-Form -

UHB-Personal Protective Equipment

- Masks with valves are NOT PERMITTED to be worn by anyone in the facility
- Booties or caps/bonnets MAY NOT BE WORN as part of PPE garb outside of OR/procedural areas[1]
- Staff with facial hair or who are unable to wear an N95 respirator, will be issued a PAPR mask, per hospital policy
- Hand washing practices should be rigorously adhered to before and after every clinical encounter

UHB HEALTH CARE PERSONNEL IN CLINICAL AREAS (Inpatient or Outpatient)		
Not engaged in direct patient care activities (i.e. passing through units, meeting with colleagues, charting or reviewing EMR, making phone calls etc.)		• Ear loop mask
DIRECT PATIENT CONTACT WITH PATIENTS NOT SUSPECTED OF COVID-19[1]		• Ear loop mask + Eye protection (i.e., face shield or goggles)
ALL AEROSOL-GENERATING PROCEDURES (i.e., intubation, nebulizer tx, tracheal suctioning, obtaining nasopharyngeal specimens) use Transmission-Based Precautions. No exceptions.		• N95 + Eye Protection + Gown + Gloves
DIRECT PATIENT CONTACT[1 and 1a] WITH COVID-19+/PUI (Persons Under Investigation)	Engaged in hands-on activity or activity that requires sustained close proximity (≤ 6' for ≥ 10 minutes) with COVID-19 + patients / PUIs AND potential for exposure to body fluids/secretions[3]	• N95 + Eye Protection + Gown + Gloves
ED/NS24/NS33/Stepdowns[2]	All times Direct COVID-19 +/PUI care	• N95 + Eye Protection • N95 or equivalent + Eye Protection+ Gown+ Gloves
OTHER SERVICES		
Environmental Services	In patient rooms with COVID-19+ or PUIs ENHANCED PRECAUTIONS	• Ear loop mask + Eye Protection + Gown
Vendors/Contractors	In patient rooms with COVID-19+/PUI	• Ear loop mask + Eye Protection + Gloves
ALL PERSONNEL		
Simulated Clinical Activities	With other personnel in close proximity (≤ 6' for ≥ 10 minutes) whose status is unknown	• Ear loop mask + Eye Protection + Gloves
OFFICES/CORRIDORS/CONGREGATE SETTINGS	With interactions with other employees or public, all parties must wear a mask at all times	• Ear loop mask
NON-UHB PERSONNEL		
All Activities	All times, in all public and congregate spaces	• Ear loop mask

	Updated - 9/2/20

Laboratory	• We are not seeing flu cases yet.
	  • We do have some rhinovirus cases.
	  • Please help us save our flu testing for symptomatic patients.
	
	• BioFire Respiratory panel 2.1 in use but only reporting to the SARS-CoV-2.
	• Launching the 2.1 as the respiratory panel later this month, it should have Flu, COVID-19, & RSV
	
	• EXPECT FOR MOST SARS-CoV-2 TESTS TO HAVE A 6- 30 h TURNAROUND TIME. If in lab by 11 AM, should have result by 5 PM same day for routine test. After 11 am, tests processed next day with result by 5 PM.
	
	• **ED using "stat" stickers for Rapid Test . If you have long TAT in ED, most likely because no stat sticker on tube.**
	
	• Three test platforms now in use with an order set of SARS-CoV-2 RNA (lab makes decision which test).
	•
	• Swabs and media are available in Central Stores. Swabs are Puritan PurFlock Ultra.
	
	• Employee / Student Health available for SARS-CoV-2 testing of employees and students – approx 30 h TAT (except Friday resulted Monday afternoon)
	• Antibody testing (IgG qualitative) available for employees and patients using Abbott Architect.

Please be advised that beginning immediately all **SARS-CoV-2 RNA** laboratory test orders will **require the answering of several questions** at the time of order entry when using the Healthbridge, T-System and Cerner LIS systems.

What information is needed?

Users will be prompted to answer the following questions:

1. Is this the first SARS-CoV-2 RNA order?
2. Is the patient employed in healthcare?
3. Is the patient symptomatic? and if so, what is the date of symptom onset?
4. Is the patient hospitalized?
5. Does the patient require the ICU?
6. Does the patient live in a congregate care setting?
7. Is the patient pregnant?

ALL questions must be answered to effectively submit an order for a SARS-CoV-2 RNA test. Incomplete responses to these questions will delay the processing and testing of samples.

Why is this information needed?

The collection and reporting of the requested information are mandated by the federal Coronavirus Aid, Relief and Economic Security (CARES) Act and is required by all facilities performing Coronavirus testing.

SUNY UHB COVID Trial Participation

- Current: Mayo Clinic Convalescent Plasma Trial
- Previous: Hydroxychloroquine Trial, Tocilizumab Trial

UHB PPE

- New State Mandate:
  - 90 days PPE on hand
  - UHB currently has this
  - During COVID wave, UHB has levels of PPE conservation strategies that are deployed to maintain our supplies

COVID NIH Treatment Updates

- NOT Recommended:
  - Convalescent Plasma
  - Chloroquine/Hydroxychloroquine
  - Interleukin Inhibitors
  - Ivermectin
  - Vaccine (at this time)
  - Pre/Post-Exposure Prophylaxis (ie with Hydroxychloroquine)
  - Antivirals (Lopinavir/ritonavir)
  - Azithromycin
  - Interferons

https://files.covid19treatmentguidelines.nih.gov/guidelines/covid19treatmentguidelines.pdf

COVID NIH Guideline Summary

- The following slides are a summary of the 200 page NIH Treatment Guidelines
  - Link: https://files.covid19treatmentguidelines.nih.gov/guidelines/covid19treatmentguidelines.pdf

Care of Critically Ill Patients With COVID-19

Last Updated: August 27, 2020

Summary Recommendations

Infection Control:

- For health care workers who are performing aerosol-generating procedures on patients with COVID-19, the COVID-19 Treatment Guidelines Panel (the Panel) recommends using fit-tested respirators (N95 respirators) or powered air-purifying respirators, rather than surgical masks, in addition to other personal protective equipment (i.e., gloves, gown, and eye protection such as a face shield or safety goggles) **(AIII)**.
- The Panel recommends that endotracheal intubation for patients with COVID-19 be performed by health care providers with extensive airway management experience, if possible **(AIII)**.
- The Panel recommends that intubation be achieved by video laryngoscopy, if possible **(CIII)**.

Hemodynamic Support:

- The Panel recommends norepinephrine as the first-choice vasopressor **(AII)**.
- For adults with COVID-19 and refractory shock, the Panel recommends using low-dose corticosteroid therapy ("shock-reversal") over no corticosteroid **(BII)**.

Ventilatory Support:

- For adults with COVID-19 and acute hypoxemic respiratory failure despite conventional oxygen therapy, the Panel recommends high-flow nasal cannula (HFNC) oxygen over noninvasive positive pressure ventilation (NIPPV) **(BI)**.
- In the absence of an indication for endotracheal intubation, the Panel recommends a closely monitored trial of NIPPV for adults with COVID-19 and acute hypoxemic respiratory failure for whom HFNC is not available **(BIII)**.
- For adults with COVID-19 who are receiving supplemental oxygen, the Panel recommends close monitoring for worsening respiratory status and that intubation, if it becomes necessary, be performed by an experienced practitioner in a controlled setting **(AII)**.
- For patients with persistent hypoxemia despite increasing supplemental oxygen requirements in whom endotracheal intubation is not otherwise indicated, the Panel recommends considering a trial of awake prone positioning to improve oxygenation **(CIII)**.
- The Panel **recommends against** using awake prone positioning as a rescue therapy for refractory hypoxemia to avoid intubation in patients who otherwise require intubation and mechanical ventilation **(AIII)**.
- For mechanically ventilated adults with COVID-19 and acute respiratory distress syndrome (ARDS), the Panel recommends using low tidal volume (VT) ventilation (VT 4–8 mL/kg of predicted body weight) over higher tidal volumes (VT >8 mL/kg) **(AI)**.
- For mechanically ventilated adults with COVID-19 and refractory hypoxemia despite optimized ventilation, the Panel recommends prone ventilation for 12 to 16 hours per day over no prone ventilation **(BII)**.
- For mechanically ventilated adults with COVID-19, severe ARDS, and hypoxemia despite optimized ventilation and other rescue strategies, the Panel recommends using an inhaled pulmonary vasodilator as a rescue therapy; if no rapid improvement in oxygenation is observed, the treatment should be tapered off **(CIII)**.
- There are insufficient data to recommend either for or against the routine use of extracorporeal membrane oxygenation (ECMO) for patients with COVID-19 and refractory hypoxemia.

Acute Kidney Injury and Renal Replacement Therapy:

- For critically ill patients with COVID-19 who have acute kidney injury and who develop indications for renal replacement therapy, the Panel recommends continuous renal replacement therapy (CRRT), if available **(BIII)**.
- If CRRT is not available or not possible due to limited resources, the Panel recommends prolonged intermittent renal replacement therapy rather than intermittent hemodialysis **(BIII)**.

Pharmacologic Interventions:

- See the Remdesivir section for a detailed discussion of these recommendations.

Immunomodulators Under Evaluation for the Treatment of COVID-19

Last Updated: August 27, 2020

Summary Recommendations
Dexamethasone • On the basis of the preliminary report from the Randomised Evaluation of COVID-19 Therapy (RECOVERY) trial, the COVID-19 Treatment Guidelines Panel (the Panel) recommends using **dexamethasone** 6 mg per day for up to 10 days or until hospital discharge, whichever comes first, for the treatment of COVID-19 in hospitalized patients who are mechanically ventilated **(AI)** and in hospitalized patients who require supplemental oxygen but who are not mechanically ventilated **(BI)**. • The Panel **recommends against** using **dexamethasone** for the treatment of COVID-19 in patients who do not require supplemental oxygen **(AI)**. • If dexamethasone is not available, the Panel recommends using alternative glucocorticoids such as **prednisone**, **methylprednisolone**, or **hydrocortisone** (see Additional Considerations in the Corticosteroids section for dosing recommendations) **(AIII)**. **Other Immunomodulators** There are insufficient data for the Panel to recommend either for or against the use of the following immunomodulators for the treatment of COVID-19: • Interleukin (IL)-1 inhibitors (e.g., **anakinra**) • **Interferon beta** for the treatment of early (i.e., <7 days from symptom onset) mild and moderate COVID-19. The Panel **recommends against** the use of the following immunomodulators for the treatment of COVID-19, except in a clinical trial: • Anti-IL-6 receptor monoclonal antibodies (e.g., **sarilumab**, **tocilizumab**) or anti-IL-6 monoclonal antibody (**siltuximab**) **(BI)**. • **Interferons (alfa or beta)** for the treatment of severely or critically ill patients with COVID-19 **(AIII)**. • Bruton's tyrosine kinase inhibitors (e.g., **acalabrutinib**, **ibrutinib**, **zanubrutinib**) and Janus kinase inhibitors (e.g., **baricitinib**, **ruxolitinib**, **tofacitinib**) **(AIII)**.
Rating of Recommendations: A = Strong; B = Moderate; C = Optional **Rating of Evidence:** I = One or more randomized trials with clinical outcomes and/or validated laboratory endpoints; II = One or more well-designed, nonrandomized trials or observational cohort studies; III = Expert opinion

Antithrombotic Therapy in Patients with COVID-19

Last Updated: May 12, 2020

Summary Recommendations

Laboratory Testing:

- In non-hospitalized patients with COVID-19, there are currently no data to support the measurement of coagulation markers (e.g., D-dimers, prothrombin time, platelet count, fibrinogen) **(AIII)**.
- In hospitalized patients with COVID-19, hematologic and coagulation parameters are commonly measured, although there are currently insufficient data to recommend for or against using this data to guide management decisions **(BIII)**.

Chronic Anticoagulant and Antiplatelet Therapy:

- Patients who are receiving anticoagulant or antiplatelet therapies for underlying conditions should continue these medications if they receive a diagnosis of COVID-19 **(AIII)**.

Venous Thromboembolism Prophylaxis and Screening:

- For non-hospitalized patients with COVID-19, anticoagulants and antiplatelet therapy should not be initiated for prevention of venous thromboembolism (VTE) or arterial thrombosis unless there are other indications **(AIII)**.
- Hospitalized adults with COVID-19 should receive VTE prophylaxis per the standard of care for other hospitalized adults **(AIII)**. A diagnosis of COVID-19 should not influence a pediatrician's recommendations about VTE prophylaxis in hospitalized children **(BIII)**. Anticoagulant or antiplatelet therapy should not be used to prevent arterial thrombosis outside of the usual standard of care for patients without COVID-19 **(AIII)**.
- Reported incidence of VTE in hospitalized patients with COVID-19 varies. There are currently insufficient data to recommend for or against the use of thrombolytics or increasing anticoagulant doses for VTE prophylaxis in hospitalized COVID-19 patients outside the setting of a clinical trial **(BIII)**.
- Hospitalized patients with COVID-19 should not routinely be discharged on VTE prophylaxis **(AIII)**. Using Food and Drug Administration-approved regimens, extended VTE prophylaxis can be considered in patients who are at low risk for bleeding and high risk for VTE as per protocols for patients without COVID-19 (see text for details on defining at-risk patients) **(BI)**.
- There are currently insufficient data to recommend for or against routine deep vein thrombosis screening in COVID-19 patients without signs or symptoms of VTE, regardless of the status of their coagulation markers **(BIII)**.
- For hospitalized COVID-19 patients, the possibility of thromboembolic disease should be evaluated in the event of rapid deterioration of pulmonary, cardiac, or neurological function, or of sudden, localized loss of peripheral perfusion **(AIII)**.

Treatment:

- Patients with COVID-19 who experience an incident thromboembolic event or who are highly suspected to have thromboembolic disease at a time when imaging is not possible should be managed with therapeutic doses of anticoagulant therapy as per the standard of care for patients without COVID-19 **(AIII)**.
- Patients with COVID-19 who require extracorporeal membrane oxygenation or continuous renal replacement therapy or who have thrombosis of catheters or extracorporeal filters should be treated with antithrombotic therapy per the standard institutional protocols for those without COVID-19 **(AIII)**.

Special Considerations During Pregnancy and Lactation:

- Management of anticoagulation therapy during labor and delivery requires specialized care and planning and should be managed similarly in pregnant patients with COVID-19 as other conditions that require anticoagulation in pregnancy **(AIII)**.
- Unfractionated heparin, low molecular weight heparin, and warfarin do not accumulate in breast milk and do not induce an anticoagulant effect in the newborn; therefore, they can be used in breastfeeding women with or without COVID-19 who require VTE prophylaxis or treatment **(AIII)**. In contrast, direct-acting oral anticoagulants are not routinely recommended due to lack of safety data **(AIII)**.

Rating of Recommendations: A = Strong; B = Moderate; C = Optional

Rating of Evidence: I = One or more randomized trials with clinical outcomes and/or validated laboratory endpoints; II = One or more well-designed, nonrandomized trials or observational cohort studies; III = Expert opinion

Monitoring Coagulation Markers in Patients with COVID-19:

- Non-hospitalized patients with COVID-19 should not routinely be tested for measures of coagulopathy, such as D-dimer level, prothrombin time, fibrinogen level, and platelet count **(AIII)**. Although abnormalities of these markers have been associated with worse outcomes, there is a lack of prospective data demonstrating that they can be used for risk stratification in those who are asymptomatic or those with mild SARS-CoV-2 infection.
- Hematologic and coagulation parameters are commonly measured in hospitalized patients with COVID-19. Nevertheless, there are currently insufficient data to recommend for or against using such data to guide management decisions **(BIII)**.

Potential Antiviral Drugs Under Evaluation for the Treatment of COVID-19

Last Updated: August 27, 2020

Summary Recommendations

There are no Food and Drug Administration-approved drugs for the treatment of COVID-19. Definitive clinical trial data are needed to identify safe and effective treatments for COVID-19. In this table, the COVID-19 Treatment Guidelines Panel (the Panel) provides recommendations for using antiviral drugs to treat COVID-19 based on the available data. **As in the management of any disease, treatment decisions ultimately reside with the patient and their health care provider.**

For more information on the antiviral agents that are currently being evaluated for the treatment of COVID-19, see Table 2.

Remdesivir

Recommendation for Prioritizing Limited Supplies of Remdesivir

- Because remdesivir supplies are limited, the Panel recommends prioritizing remdesivir for use in hospitalized patients with COVID-19 who require supplemental oxygen but who do not require oxygen delivery through a high-flow device, noninvasive ventilation, invasive mechanical ventilation, or extracorporeal membrane oxygenation (ECMO) **(BI)**.

Recommendation for Patients With Mild or Moderate COVID-19

- There are insufficient data for the Panel to recommend either for or against the use of **remdesivir** in patients with mild or moderate COVID-19.

Recommendations for Patients with COVID-19 Who Require Supplemental Oxygen

For Patients Who Do Not Require Oxygen Delivery Through a High-Flow Device, Noninvasive Ventilation, Invasive Mechanical Ventilation, or ECMO

- The Panel recommends using **remdesivir** for 5 days or until hospital discharge, whichever comes first **(AI)**.
- If a patient who is on supplemental oxygen while receiving remdesivir progresses to requiring delivery of oxygen through a high-flow device, noninvasive ventilation, invasive mechanical ventilation, or ECMO, the course of remdesivir should be completed.

For Patients Who Require Oxygen Delivery Through a High-Flow Device, Noninvasive Ventilation, Invasive Mechanical Ventilation, or ECMO

- Because there is uncertainty regarding whether starting remdesivir confers clinical benefit in these groups of patients, the Panel cannot make a recommendation either for or against starting remdesivir.

Duration of Therapy for Patients Who Have Not Shown Clinical Improvement After 5 Days of Therapy

- There are insufficient data on the optimal duration of **remdesivir** therapy for patients with COVID-19 who have not shown clinical improvement after 5 days of therapy. In this group, some experts extend the total remdesivir treatment duration to up to 10 days **(CIII)**.

Chloroquine or Hydroxychloroquine With or Without Azithromycin

- The Panel **recommends against** the use of **chloroquine** or **hydroxychloroquine** for the treatment of COVID-19 in hospitalized patients **(AI)**.
- In nonhospitalized patients, the Panel **recommends against** the use of **chloroquine** or **hydroxychloroquine** for the treatment of COVID-19, except in a clinical trial **(AI)**.
- The Panel **recommends against** the use of **high-dose chloroquine** (600 mg twice daily for 10 days) for the treatment of COVID-19 **(AI)**.
- The Panel **recommends against** using **hydroxychloroquine plus azithromycin** to treat COVID-19, except in a clinical trial **(AIII)**.

Lopinavir/Ritonavir and Other HIV Protease Inhibitors

- The Panel **recommends against** using **lopinavir/ritonavir (AI)** or **other HIV protease inhibitors (AIII)** to treat COVID-19, except in a clinical trial.

Clinical Presentation

The estimated incubation period for COVID-19 is up to 14 days from the time of exposure, with a median incubation period of 4 to 5 days.[6,17,18] The spectrum of illness can range from asymptomatic infection to severe pneumonia with acute respiratory distress syndrome (ARDS) and death. Among 72,314 persons with COVID-19 in China, 81% of cases were reported to be mild (defined in this study as no pneumonia or mild pneumonia), 14% were severe (defined as dyspnea, respiratory frequency ≥30 breaths/min, SpO_2 ≤93%, PaO_2/FiO_2 <300 mmHg, and/or lung infiltrates >50% within 24 to 48 hours), and 5% were critical (defined as respiratory failure, septic shock, and/or multiple organ dysfunction or failure).[19] In a report on more than 370,000 confirmed COVID-19 cases with reported symptoms in the United States, 70% of patients experienced fever, cough, or shortness of breath, 36% had muscle aches, and 34% reported headaches.[3] Other reported symptoms have included, but are not limited to, diarrhea, dizziness, rhinorrhea, anosmia, dysgeusia, sore throat, abdominal pain, anorexia, and vomiting.

The abnormalities seen in chest X-rays vary, but bilateral multi-focal opacities are the most common. The abnormalities seen in computed tomography (CT) of the chest also vary, but the most common are bilateral peripheral ground-glass opacities, with areas of consolidation developing later in the clinical course.[20] Imaging may be normal early in infection and can be abnormal in the absence of symptoms.[20]

Common laboratory findings of COVID-19 include leukopenia and lymphopenia. Other laboratory abnormalities have included elevated levels of aminotransferase, C-reactive protein, D-dimer, ferritin, and lactate dehydrogenase.

While COVID-19 is primarily a pulmonary disease, emerging data suggest that it also leads to cardiac,[21,22] dermatologic,[23] hematological,[24] hepatic,[25] neurological,[26,27] renal,[28,29] and other complications. Thromboembolic events also occur in patients with COVID-19, with the highest risk in critically ill patients.[30] The long-term sequelae of COVID-19 survivors are currently unknown.

Recently, SARS-CoV-2 has been associated with a potentially severe inflammatory syndrome in children (multisystem inflammatory syndrome in children or MIS-C).[31,32] Please see Special Considerations in Children for more information.

Routes of SARS-CoV-2 Transmission

Transmission of SARS-CoV-2 occurs primarily through respiratory secretions, and, to a lesser extent, contact with contaminated surfaces. Most transmissions are thought to occur through droplets; covering coughs and sneezes and maintaining a distance of six feet from others can reduce the risk of transmission. When consistent distancing is not possible, face coverings may further reduce the spread of droplets from infectious individuals to others. Frequent handwashing is also effective in reducing acquisition.[33] The onset and duration of viral shedding and the period of infectiousness are not completely defined. Viral RNA may be detected in upper respiratory specimens from asymptomatic or pre-symptomatic individuals with SARS-CoV-2.[34] An increasing number of studies have described cases where asymptomatic individuals have transmitted SARS-CoV-2.[35-37] The extent to which this occurs remains unknown, but this type of transmission may be contributing to a substantial amount of community transmission.

Severity of Illness Categories

In general, adults with COVID-19 can be grouped into the following severity of illness categories, although the criteria in each category may overlap or vary across guidelines and clinical trials:

- *Asymptomatic or Presymptomatic Infection:* Individuals who test positive for SARS-CoV-2 by virologic testing using a molecular diagnostic (e.g., polymerase chain reaction) or antigen test, but have no symptoms.
- *Mild Illness:* Individuals who have any of the various signs and symptoms of COVID 19 (e.g., fever, cough, sore throat, malaise, headache, muscle pain) without shortness of breath, dyspnea, or abnormal chest imaging.
- *Moderate Illness:* Individuals who have evidence of lower respiratory disease by clinical assessment or imaging and a saturation of oxygen (SpO_2) ≥94% on room air at sea level.
- *Severe Illness:* Individuals who have respiratory frequency >30 breaths per minute, SpO_2 <94% on room air at sea level, ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO_2/FiO_2) <300 mmHg, or lung infiltrates >50%.
- *Critical Illness:* Individuals who have respiratory failure, septic shock, and/or multiple organ dysfunction.

In pediatric patients, radiographic abnormalities are common and, for the most part, should not be used as the sole criteria to define COVID-19 illness category. Normal values for respiratory rate also vary with age in children, thus hypoxia should be the primary criteria to define severe illness, especially in younger children.

Asymptomatic or Presymptomatic Infection

Asymptomatic SARS-CoV-2 infection can occur, although the percentage of patients who remain truly asymptomatic throughout the course of infection is variable and incompletely defined. It is unclear at present what percentage of individuals who present with asymptomatic infection may progress to clinical disease. Some asymptomatic individuals have been reported to have objective radiographic findings consistent with COVID-19 pneumonia. Over time, the availability of widespread virologic testing for SARS-CoV-2 and the development of reliable serologic assays for antibodies to the virus will help determine the true prevalence of asymptomatic and presymptomatic infections.[1]

Persons who test positive for SARS-CoV-2 by molecular diagnostic or antigen testing (see Testing for SARS-CoV-2) and who are asymptomatic should self-isolate at home. If they remain asymptomatic, they can discontinue isolation 10 days after the date of their first positive SARS-CoV-2 test.[2] Health care workers who test SARS-CoV-2 positive and are asymptomatic may obtain additional guidance

from their occupational health service. See the Centers for Disease Control and Prevention COVID-19 website for detailed information. Individuals who become symptomatic should contact their health care provider for further guidance. Current CDC recommendations for individuals who develop symptoms are to self-isolate for at least 10 days from the onset of their symptoms and until they have no fever and improvement in respiratory symptoms for at least 3 days.

The Panel recommends no additional laboratory testing and no specific treatment for persons with suspected or confirmed asymptomatic or presymptomatic SARS-CoV-2 infection (AIII).

Mild Illness

Patients may have mild illness defined by a variety of signs and symptoms (e.g., fever, cough, sore throat, malaise, headache, muscle pain) without shortness of breath, dyspnea on exertion, or abnormal imaging. Most mildly ill patients can be managed in an ambulatory setting or at home through telemedicine or remote visits.

All patients with symptomatic COVID-19 and risk factors for severe disease should be closely monitored. In some patients, the clinical course may rapidly progress.[3,4]

No specific laboratory evaluations are indicated in otherwise healthy patients with mild COVID-19 disease.

There are insufficient data to recommend either for or against any antiviral or immune-based therapy in patients with COVID-19 who have mild illness.

Moderate Illness

Moderate COVID-19 illness is defined as evidence of lower respiratory disease by clinical assessment or imaging with SpO_2 ≥94% on room air at sea level. Given that pulmonary disease can rapidly progress in patients with COVID-19, close monitoring of patients with moderate disease is recommended. If bacterial pneumonia or sepsis is strongly suspected, administer empiric antibiotic treatment for community-acquired pneumonia, re-evaluate daily, and if there is no evidence of bacterial infection, de-escalate or stop antibiotics.

Hospital infection prevention and control measures include use of personal protective equipment for droplet and contact precautions along with eye protection (e.g., masks, face shields/goggles, gloves, gowns) and single-patient dedicated medical equipment (e.g., stethoscopes, blood pressure cuffs, thermometers).[5,6] The number of individuals and providers entering the room of a patient with COVID-19 should be limited. If necessary, patients with confirmed COVID-19 may be cohorted in the same room. If available, airborne infection isolation rooms (AIIRs) should be used for patients who will be undergoing any aerosol-generating procedures. During these procedures, all staff should wear fit-tested respirators (N95 respirators) or powered, air-purifying respirators (PAPRs) rather than a surgical mask.[7]

The optimal pulmonary imaging technique for people with COVID-19 is yet to be defined. Initial evaluation may include chest x-ray, ultrasound, or if indicated, computerized tomography (CT). Electrocardiogram (ECG) should be performed if indicated. Laboratory testing includes a complete blood count (CBC) with differential and a metabolic profile, including liver and renal function tests. Measurements of inflammatory markers such as C-reactive protein (CRP), D-dimer, and ferritin, while not part of standard care, may have prognostic value.

Severe Illness

Patients with COVID-19 are considered to have severe illness if they have SpO_2 <94% on room air at sea level, respiratory rate >30, PaO_2/FiO_2 <300 mmHg, or lung infiltrates >50%. These patients may experience rapid clinical deterioration and will likely need to undergo aerosol-generating procedures. They should be placed in AIIRs, if available. Administer oxygen therapy immediately using nasal cannula or high-flow oxygen.

If secondary bacterial pneumonia or sepsis is suspected, administer empiric antibiotics, re-evaluate daily, and, if there is no evidence of bacterial infection, de-escalate or stop antibiotics.

Evaluation should include pulmonary imagining (chest x-ray, ultrasound, or, if indicated, CT) and ECG, if indicated. Laboratory evaluation includes a CBC with differential and a metabolic profile, including liver and renal function tests. Measurements of inflammatory markers such as CRP, D-dimer, and ferritin, while not part of standard care, may have prognostic value.

Clinicians should refer to Antiviral Therapy, Immune-Based Therapy and Table 3a to review the available clinical data regarding drugs being evaluated for treatment of COVID-19.

Critical Illness

For additional details, see Care of Critically Ill Patients with COVID-19.

Severe cases of COVID-19 may be associated with acute respiratory distress syndrome, septic shock that may represent virus-induced distributive shock, cardiac dysfunction, elevations in multiple inflammatory cytokines that provoke a cytokine storm, and/or exacerbation of underlying comorbidities. In addition to pulmonary disease, patients with COVID-19 may also experience cardiac, hepatic, renal, and central nervous system disease.

Because patients with critical illness are likely to undergo aerosol-generating procedures, they should be placed in AIIRs when available.

Most of the recommendations for the management of critically ill patients with COVID-19 are extrapolated from experience with other life-threatening infections.[8] Currently, there is limited information to suggest that the critical care management of patients with COVID-19 should differ substantially from the management of other critically ill patients, although special precautions to prevent environmental contamination by SARS-CoV-2 is warranted.

The Surviving Sepsis Campaign (SSC), an initiative supported by the Society of Critical Care Medicine and the European Society of Intensive Care Medicine, issued Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19) in March 2020.[8] The Panel relied heavily on the SSC guidelines in making the recommendations in these Treatment Guidelines and gratefully acknowledges the work of the SSC COVID-19 Guidelines Panel.

As with any patient in the intensive care unit (ICU), successful clinical management of a patient with COVID-19 depends on attention to the primary process leading to the ICU admission, but also to other comorbidities and nosocomial complications.

Hemodynamics

Last Updated: May 12, 2020

For the most part, these hemodynamic recommendations are similar to those previously published in th
Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 201
Ultimately, COVID-19 patients who require fluid resuscitation or hemodynamic management of shock should be treated and managed identically to those with septic shock.[1]

COVID-19 patients who require fluid resuscitation or hemodynamic management of shock should be trea
and managed for septic shock in accordance with other published guidelines, with the following exceptio

Recommendation:

- For adults with COVID-19 and shock, the COVID-19 Treatment Guidelines Panel (the Panel) recommends using dynamic parameters, skin temperature, capillary refilling time, and/or lactate over static parameters to assess fluid responsiveness **(BII)**.

Recommendation:

- For the acute resuscitation of adults with COVID-19 and shock, the Panel recommends using buffered/balanced crystalloids over unbalanced crystalloids **(BII)**.

Recommendation:

- For the acute resuscitation of adults with COVID-19 and shock, the Panel **recommends against** the initial use of albumin for resuscitation **(BI)**.

Additional Recommendations Based on General Principles of Critical Care:

- The Panel **recommends against** using hydroxyethyl starches for intravascular volume replacement in patients with sepsis or septic shock **(AI)**.
- The Panel recommends norepinephrine as the first-choice vasopressor **(AII)**. The Panel recommends adding either vasopressin (up to 0.03 U/min) **(BII)** or epinephrine **(CII)** to norepinephrine to raise mean arterial pressure to target, or adding vasopressin (up to 0.03 U/min) **(CII)** to decrease norepinephrine dosage.
- When norepinephrine is available, the Panel **recommends against** using dopamine for patients with COVID-19 and shock **(AI)**.
- The Panel **recommends against** using low-dose dopamine for renal protection **(BII)**.
- The Panel recommends using dobutamine in patients who show evidence of cardiac dysfunction and persistent hypoperfusion despite adequate fluid loading and the use of vasopressor agents **(BII)**.
- The Panel recommends that all patients who require vasopressors have an arterial catheter placed as soon as practical, if resources are available **(BIII)**.
- For adults with COVID-19 and refractory shock, the Panel recommends using low-dose corticosteroid therapy ("shock-reversal") over no corticosteroid **(BII)**.
  - A typical corticosteroid regimen in septic shock is intravenous hydrocortisone 200 mg per day administered either as an infusion or intermittent doses. The duration of hydrocortisone therapy is usually a clinical decision.

Oxygenation and Ventilation

Last Updated: July 17, 2020

For hypoxemic patients, the recommendations below emphasize well-described and documented recommendations from the Surviving Sepsis Campaign Guidelines for adult sepsis, pediatric sepsis, and COVID-19, which provide more details about management and the data that support the recommendations.

Recommendations

- For adults with COVID-19 who are receiving supplemental oxygen, the COVID-19 Treatment Guidelines Panel (the Panel) recommends close monitoring for worsening respiratory status and that intubation, if it becomes necessary, be performed by an experienced practitioner in a controlled setting **(AII)**.
- For adults with COVID-19 and acute hypoxemic respiratory failure despite conventional oxygen therapy, the Panel recommends high-flow nasal cannula (HFNC) oxygen over noninvasive positive pressure ventilation (NIPPV) **(BI)**.
- In the absence of an indication for endotracheal intubation, the Panel recommends a closely monitored trial of NIPPV for adults with COVID-19 and acute hypoxemic respiratory failure for whom HFNC is not available **(BIII)**.
- For patients with persistent hypoxemia despite increasing supplemental oxygen requirements in whom endotracheal intubation is not otherwise indicated, the Panel recommends considering a trial of awake prone positioning to improve oxygenation **(CIII)**.
- The Panel **recommends against** using awake prone positioning as a rescue therapy for refractory hypoxemia to avoid intubation in patients who otherwise require intubation and mechanical ventilation **(AIII)**.

Recommendations

For mechanically ventilated adults with COVID-19 and ARDS:

- The Panel recommends using low tidal volume (VT) ventilation (VT 4–8 mL/kg of predicted body weight) over higher tidal volumes (VT >8 mL/kg) **(AI)**.
- The Panel recommends targeting plateau pressures of <30 cm H_2O **(AII)**.
- The Panel recommends using a conservative fluid strategy over a liberal fluid strategy **(BII)**.
- The Panel **recommends against** the routine use of inhaled nitric oxide **(AI)**.

Recommendations

For mechanically ventilated adults with COVID-19 and moderate-to-severe ARDS:

- The Panel recommends using a higher positive end-expiratory pressure (PEEP) strategy over a lower PEEP strategy **(BII)**.
- For mechanically ventilated adults with COVID-19 and refractory hypoxemia despite optimized ventilation, the Panel recommends prone ventilation for 12 to 16 hours per day over no prone ventilation **(BII)**.

Recommendations

- The Panel recommends using, as needed, intermittent boluses of neuromuscular blocking agents (NMBA) or continuous NMBA infusion to facilitate protective lung ventilation **(BIII)**.
- In the event of persistent patient-ventilator dyssynchrony, which places the patient at risk for ventilator-induced lung injury, or in cases where a patient requires ongoing deep sedation, prone ventilation, or persistently high plateau pressures, the Panel recommends using a continuous NMBA infusion for up to 48 hours as long as patient anxiety and pain can be adequately monitored and controlled **(BIII)**.

Recommendations

For mechanically ventilated adults with COVID-19, severe ARDS, and hypoxemia despite optimized ventilation and other rescue strategies:

- The Panel recommends using recruitment maneuvers rather than not using recruitment maneuvers **(CII)**.
- If recruitment maneuvers are used, the Panel **recommends against** using staircase (incremental PEEP) recruitment maneuvers **(AII)**.
- The Panel recommends using an inhaled pulmonary vasodilator as a rescue therapy; if no rapid improvement in oxygenation is observed, the treatment should be tapered off **(CIII)**.

Bacterial Superinfection of COVID-19-Associated Pneumonia

Limited information exists about the frequency and microbiology of pulmonary coinfections and superinfections in patients with COVID-19, such as hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP). Some studies from China emphasize the lack of bacterial coinfections in patients with COVID-19, while other studies suggest that these patients experience frequent bacterial complications.[2-7] There is appropriate concern about performing pulmonary diagnostic procedures such as bronchoscopy or other airway sampling procedures that require disruption of a closed airway circuit. Thus, while some clinicians do not routinely start empiric broad-spectrum antimicrobial therapy for patients with severe COVID-19 disease, other experienced clinicians routinely use such therapy. For the treatment of shock, however, empiric broad-spectrum antimicrobial therapy is the standard of care. Antibiotic stewardship is critical to avoid reflexive or continued courses of antibiotics.

Septic Shock and Cytokine Storm Due to COVID-19

Patients with COVID-19 may express high levels of an array of inflammatory cytokines, often in the setting of deteriorating hemodynamic or respiratory status. This is often referred to as "cytokine release syndrome" or "cytokine storm," although these are imprecise terms. Intensivists need to consider the full differential diagnosis of shock to exclude other treatable causes of shock (e.g., bacterial sepsis due to pulmonary or extrapulmonary sources, hypovolemic shock due to a gastrointestinal hemorrhage that is unrelated to COVID-19, cardiac dysfunction related to COVID-19 or comorbid atherosclerotic disease, stress-related adrenal insufficiency).

COVID-19-Induced Cardiac Dysfunction, Including Myocarditis

There is a growing body of literature relating COVID-19 to myocarditis and pericardial dysfunction in approximately 20% of patients.[3,5,8-11] Acute cardiac injury and arrhythmias have also been described in patients with COVID-19.

Thromboembolic Events and COVID-19

Critically ill patients with COVID-19 have been observed to have a prothrombotic state, which is characterized by the elevation of certain biomarkers and an apparent increase in the incidence of venous thromboembolic disease. In some studies, thromboemboli have been diagnosed in patients who received chemical prophylaxis with heparinoids.[12-14] Autopsy studies provide additional evidence of both thromboembolic disease and microvascular thrombosis in patients with COVID-19.[15] Some authors have called for routine surveillance of ICU patients for venous thromboembolism.[16] Please refer to Antithrombotic Therapy in Patients with COVID-19 for a more detailed discussion.

Renal and Hepatic Dysfunction Due to COVID-19

Although severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is primarily a pulmonary pathogen, renal and hepatic dysfunction are consistently described in patients with severe disease.[3] Continuous renal replacement therapy was needed in more than 15% of cases of critical disease in one case series.[5] See Acute Kidney Injury and Renal Replacement Therapy for a more detailed discussion.

Special Considerations in Children

Several large, epidemiologic studies suggest that rates of ICU admission are substantially lower for children with COVID-19 than for adults. However, severe disease does occur in children.[17-22] The risk factors for severe COVID-19 disease in children have not yet been established. Based on data from studies of adults and extrapolation from data on other pediatric respiratory viruses, severely immunocompromised children and those with underlying cardiopulmonary disease may be at higher risk for severe disease.

A new syndrome, multisystem inflammatory syndrome in children (MIS-C), which appears to be a postinfectious complication, has been described.[23,24] Certain symptoms of MIS-C often require ICU-level care, including blood pressure and inotropic support. These symptoms include severe abdominal pain, multisystem inflammation, shock, cardiac dysfunction, and, rarely, coronary artery aneurysm. A minority of children with MIS-C meet criteria for typical or atypical Kawasaki disease. For details on MIS-C clinical features and the treatments that are being investigated, see Special Considerations in Children.

Drug-Drug Interactions Between Drugs Used to Treat COVID-19 and Drugs Used to Treat Comorbidities

All ICU patients should be routinely monitored for drug-drug interactions. The potential for drug-drug interactions between investigational medications or medications used off-label to treat COVID-19 and concurrent drugs should be considered. QTc prolongation due to agents such as chloroquine or hydroxychloroquine is a potential problem for patients with underlying heart disease and/or those who concurrently use drugs that prolong the QTc interval (e.g., azithromycin, quinolones).

COVID in UHB Going Forward

Phase	General Description	Inpatient COVID + Census Metric
1	Full COVID Response High NYC Case/Capita, Mortality Rates	>50% Census COVID +
2	Partial COVID Response Decreasing NYC case/capita x 14 days Goal to maintain ability to EASILY re-enter Phase 1	10-50% Census COVID +
3	Low COVID Response Consistently low NYC case/capita	<10% Census COVID +
4	Minimal COVID Response Minimal NYC case/capita; High NYC Immunity	<1% Census COVID +