

Coronavirus update

Update and Clinician Guide to Diagnosis, Management and Disposition

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COVID-19 continues to spread, impacting our hospitals and clinicians most significantly on the West Coast, but sporadically across the United States.

We are hearing first-hand about the clinical and operational impacts from our physicians on the front lines in Washington state, where they have seen high volumes of COVID-19 patients. Due to the lack of availability of tests, the Centers for Disease Control and Prevention (CDC) has indicated the disease is likely severely underreported and that COVID-19 has been spreading throughout the community for several weeks. We have heard similar accounts from our clinicians across the United States of patients presenting with fever, respiratory complaints and even Acute Respiratory Distress Syndrome (ARDS). However, lack of testing capacity or approval for testing is likely impeding the accurate diagnosis of these patients. We will likely see significant increases in case numbers as the disease spreads and as more testing capacity comes online. The CDC reports that we will have the ability to test millions of patients within the coming weeks.

While we cannot control your personal choices, we strongly urge you to avoid any travel overseas, avoid cruise ships and limit or avoid travel and group gatherings in the United States as we begin to see widespread disease in parts of the country, and it is hard to predict the course of the pandemic.

With this perspective in mind, in this update, we provide:

1. CDC updates for healthcare provider exposure criteria

2. Strategies to transition to epidemic Sustained Community Transmission mitigation
3. Clinical guidance for identifying patients through history, physical exam and diagnostic testing
4. Guidance for hospital admission and discharge
5. Guidance for discharge from the emergency department, clinic or primary care office
6. Guidance for clinical management of COVID-19 patients

CDC UPDATES

On March 4, 2020, the CDC updated workplace exposure risk categories, emphasizing the importance of masking the patient and de-emphasizing the use of N95 respirators which are becoming scarce across the nation. This confirms the opinions of many experts that SARS-COV-2 spreads by droplet, not aerosol.

The risk categories were simplified and the importance of masking the patient. *Note that if patient is wearing a mask, all patient interactions (other than intubated and patients undergoing aerosolizing procedures) where the provider is wearing a mask (regular or N95), are considered low risk.* An important footnote covers brief interactions which is important when considering interactions at triage and other screening locations:

“HCP not using all recommended PPE who have only brief interactions with a patient regardless of whether patient was wearing a facemask are considered low-risk. Examples of brief interactions include: brief conversation at a triage desk; briefly entering a patient room but not having direct contact with the patient or the patient’s secretions/excretions; entering the patient room immediately after the patient was discharged.”

Epidemiologic risk factors	Exposure category	Recommended Monitoring for COVID-19 (until 14 days after last potential exposure)	Work Restrictions for Asymptomatic HCP
Prolonged close contact with a COVID-19 patient who was wearing a facemask (i.e., source control)			
HCP PPE: None	Medium	Active	Exclude from work for 14 days after last exposure
HCP PPE: Not wearing a facemask or respirator	Medium	Active	Exclude from work for 14 days after last exposure
HCP PPE: Not wearing eye protection	Low	Self with delegated supervision	None
HCP PPE: Not wearing gown or gloves ^a	Low	Self with delegated supervision	None
HCP PPE: Wearing all recommended PPE (except wearing a facemask instead of a respirator)	Low	Self with delegated supervision	None
Prolonged close contact with a COVID-19 patient who was not wearing a facemask (i.e., no source control)			
HCP PPE: None	High	Active	Exclude from work for 14 days after last exposure
HCP PPE: Not wearing a facemask or respirator	High	Active	Exclude from work for 14 days after last exposure
HCP PPE: Not wearing eye protection ^b	Medium	Active	Exclude from work for 14 days after last exposure
HCP PPE: Not wearing gown or gloves ^{a,b}	Low	Self with delegated supervision	None
HCP PPE: Wearing all recommended PPE (except wearing a facemask instead of a respirator) ^b	Low	Self with delegated supervision	None

Source: Centers for Disease Control and Prevention (CDC) website

STRATEGIES TO TRANSITION TO EPIDEMIC MANAGEMENT

As we transition from outbreak to epidemic/pandemic, there are some important strategies you need to make sure are in the planning phases or in execution:

1. COVID-19 Planning and Disaster Management Team – The facility medical director (FMD) or other designated physician onsite should participate in the planning and disaster response teams. If these teams do not currently exist, you should lead the efforts to establish these teams. Our teams on the West Coast have emphasized that planning and communication are the most important elements of disaster preparedness. Relationships established during these planning phases will be critical to operational success.
2. Primary Care and Urgent Care Center Coordination of Care – It is important that you collaborate with primary care clinicians to create care pathways. Consider mapping health system acute care sites and have a process or protocol for patient movement between each of these sites

(including virtual touch points such as call center, wellness line, virtual care offerings). It is vital that they mask the patient immediately upon arrival. Criteria for admission and discharge should be reviewed with them on a regular basis so they may proactively send patients home and avoid necessary exposure of the emergency department staff and resources. Phone consultation should be offered liberally, when possible, as a way to extend the influence of the emergency clinician expertise. In areas where primary care providers have closed their offices, proactive outreach should be made soliciting assistance in providing low acuity care at the hospital.

3. Arrival, screening, triage and sorting process – You should have a screening and sorting mechanism at the entrance to your emergency department. Patients should initially be sorted based on presence or absence of respiratory complaints. *Any patient with respiratory complaints should immediately be required to wear a regular mask (not N95).* The waiting room should be split into respiratory and non-respiratory sides. Triage into high, medium and low risk

should proceed in each of these two groups of patients. High-risk respiratory patients should be brought back to an isolation room or if none are available, a room with a door. Medium-risk patients should be together, ideally in isolation room or closed room while the undergo evaluation and treatment. Low-risk respiratory patients should be placed in a defined area of the waiting room separate from patients with non-respiratory complaints. Alternative care locations outside of the ED are recommended by ACEP to reduce the operational and potential infectious impact to caregivers and other patients. Offsite testing similar to those employed in Italy and Washington state are strongly recommended.

4. PPE and protecting our clinicians - Providers should wear proper PPE as defined by the CDC. In their most recent recommendations from March 4, 2020, when patients are masked, a mask without face shield, gloves and proper hand hygiene are sufficient to remain low risk. For an unmasked patient, the provider is required to wear a mask with eye protection and gloves to remain low risk. Most experts and the World Health Organization (WHO) agree that SARS-COV-2 is spread by droplet and thus an N-95 respirator is not required for close contact including clinical evaluation in patients who are masked. With intubated patients and patients undergoing aerosolizing procedures, full aerosol PPE (including N-95 respirator) is required.
5. Admission vs. discharge – All suspected COVID-19 patients do not need to be admitted. Admission should be considered for patients with elevated respiratory rate, low pulse oximetry (PO <93), associated comorbidities that place them at higher risk (CAD, pulmonary disease, DM, cirrhosis, cancer, immunocompromised), and patients who cannot quarantine at home or for whom follow-up cannot be guaranteed. The mean duration of illness for mild COVID-19 patients is two weeks and for severe illness is three to six weeks. Relative to the normal mean hospital length of stay (LOS) of four days, admissions will certainly place a burden on already stressed inpatient units. It is imperative we attempt to limit unnecessary admission to conserve available inpatient resources and to protect our inpatient caregivers.
6. Intensive care resources – In coordination with hospital administration, you should immediately begin planning for expansion of intensive care resources. At a minimum, a COVID-19 planning team should designate a primary and secondary overflow area that can be converted to an ICU-like care setting. Any necessary modifications should begin immediately. You should assess the availability of ventilators and personnel and explore backup resources. Plans to cancel elective surgeries should be made with triggers for implementation in the event of saturation if ICU space and/or equipment.
7. Use of scarce resources – Because this disease has a rapidly progressive course, particularly in the elderly, and due to the risk of saturation of critical care resources and equipment, clinicians should be proactive in soliciting their patient's desire for intubation and resuscitation as well as power of

attorney. Collaboration with your legal department and your ethics committee may be required as the impact of the COVID-19 disease tests the limits of healthcare resources. Begin conversations now as the need will present itself when the organization's resources are stretched to their limits.

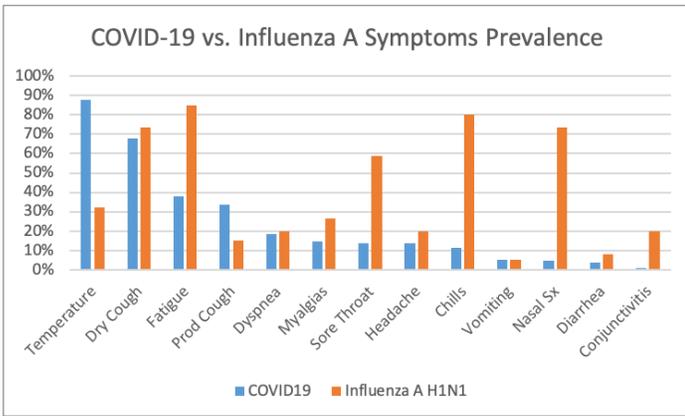
CLINICAL GUIDANCE FOR IDENTIFYING PATIENTS

History

Because COVID-19 has spread outside China and is now demonstrating sustained community transmission in multiple countries including the United States, we can no longer rely on travel history as the key epidemiologic screening determinant. Also, due to lack of testing capacity, we cannot test suspected patients in a timely manner and thus cannot rely on testing to drive our clinical decision-making. Clinical assessment therefore is the most reliable way to determine whether or not a patient is at risk for COVID-19. The following are key presenting complaints of COVID-19 patients. We present them side by side with influenza patients, as this is the most common alternative diagnosis.

COVID-19		Influenza A	
Fever	88%	Fatigue	85%
Dry Cough	68%	Chills	80%
Fatigue	38%	Nasal Symptoms	74%
Productive Cough	33%	Dry Cough	73%
Dyspnea	19%	Sore Throat	59%
Sore Throat	14%	Fever	32%
Chills	11%		
Nasal Symptoms	5%		

Thus, a reasonable approach for history, in addition to travel and known exposure, would be presence of fever and dry cough, and absence of nasal congestion, runny nose, sore throat and chills. Note that fever is present in 44% of patients on admission and documented in 88% during their hospital stay, thus repeated temperatures are recommended. Dyspnea is present in only 20% of cases but, in the context of the COVID-19 disease, would be a worrisome presenting symptom for advanced disease. The following is a graphical representation of all symptoms associated with COVID-19 and Influenza A (H1N1) compiled by Dr. David Hogan:



Based on data from the WHO China Study and relevant publications, age is an important risk factor for disease severity. The following table represents risk based on age cohorts.

Age	CFR
0-9	0*
10-39	0.2
40-49	0.4
50-59	1.3%
60-69	3.6%
70-79	8.0%
>79	14.8%

* none reported in China

Known Risk Factors – Patients with preexisting disease are more likely to have severe disease and have a higher mortality rate. The following table from the WHO represents the case fatality rate (CFR) based on comorbid disease.

Cormorbid Disease	Case Fatality Rate (CFR)
Cardiovascular disease	13%
Uncontrolled diabetes	9%
Hypertension	8%
Chronic respiratory disease	8%
Underlying malignancy	8%
Previously healthy	1%

PHYSICAL EXAM AND ANCILLARY TESTING

Mild patients may appear well with cough and low-grade temperature. According to the WHO report, patients remain relatively asymptomatic for the first five to six days. The patients who progress to critical usually do so from days six to 10. The WHO defines severe cases as tachypnea (≥ 30 breaths/min), oxygen saturation $\leq 93\%$ at

rest or PaO₂/FiO₂ < 300 mmHg. Critical cases are defined as respiratory failure requiring mechanical ventilation, shock or other organ failure requiring intensive care. About 25% of severe cases require mechanical ventilation.

Lab work usually reveals a normal white blood cell (WBC) count, even in severe disease, however leukopenia (WBC $< 4,000/\text{mm}^3$) was present in 33.7% of cases. Lymphocytopenia (Lymphocytes $< 1,500/\text{mm}^3$) is the most common finding, present in 83.2% of cases. Thrombocytopenia (Plt $< 150,000/\text{mm}^3$) is present in 36.2% of cases. Hepatic function tests may be mildly elevated probably as a direct result of the viral infection. C-Reactive Protein (CRP) is elevated 60.7% of the time. The distribution of other findings is shown below.

Lab Finding	All	Mild	Severe
WBC $< 4,000/\text{mm}^3$	33.7%	28.1%	61.1%
WBC $> 10,000/\text{mm}^3$	5.9%	4.8%	11.4%
Lymphocyte $< 1500/\text{mm}^3$	83.2%	80.4%	96.1%
Platelet $< 150,000/\text{mm}^3$	36.2%	31.6%	57.7%
C-reactive protein ≥ 10 mg/L	60.7%	56.4%	81.5%
Procalcitonin ≥ 0.5 ng/ml	5.5%	3.7%	13.7%
LDH ≥ 250 U/L	41.0%	37.2%	58.1%
AST > 40 U/L	22.2%	18.2%	39.4%
ALT > 40 U/L	21.3%	19.8%	28.1%
Bilirubin > 17 $\mu\text{mol/L}$	10.5%	9.9%	13.3%
Creatinine kinase ≥ 200 U/L	13.7%	12.5%	19.0%
Creatinine ≥ 133 $\mu\text{mol/L}$	1.6%	1.0%	4.3%
D-dimer ≥ 0.5 U/L	46.4%	43.2%	59.6%

Chest X-ray (CXR) can be normal in the early stages of the disease, but most commonly (59.1%) reveals ground glass or patchy infiltrates. CT scan is not required to diagnose the disease but does show findings more commonly (86.2%) than plain radiographs (59.1%). Due to the potential cross-infection of other patients needing CT scans and the prolonged downtime for terminal cleaning, CT scanning is only recommended in cases with unexplained severe disease and a negative CXR.

Total Abnormal CXRs	59.1%
Ground-glass opacity	20.1%
Local patchy shadowing	28.1%
Bilateral patchy shadowing	36.5%
Interstitial abnormalities	4.4%
No abnormality	41.9%

Total Abnormal Chest CTs	86.2%
Ground-glass opacity	56.4%
Local patchy shadowing	41.9%
Bilateral patchy shadowing	51.8%
Interstitial abnormalities	14.7%
No abnormality	13.8%

Based on what we know about the COVID-19 disease, the data would support a COVID-19 panel consisting of CBC with manual Diff, CMP, CXR PA/LAT and rapid flu test. A CRP may be added for additional clinical information but is not routinely recommended. A CT Chest may be added for complex cases but is not routinely indicated, especially in cases with abnormal CXR or other results that point to COVID-19 as a likely diagnosis. Lactic acid and blood cultures should be added to patients with suspected sepsis. In cases without a clear diagnosis who require admission, a respiratory pathogen panel, urine testing for strep and legionella may be added, where available, while testing for SARS-COV-2 is pending.

GUIDANCE FOR HOSPITAL ADMISSION AND DISCHARGE

Admission and discharge practices will vary based on local practices and individual patient characteristics. These decisions should be made with the understanding that patients with mild disease will be sick for an average of two weeks and the duration of illness for severe cases will be between three to six weeks. Thus, preservation of inpatient resources is vital to the preservation of our healthcare delivery system. Clinicians should be proactive in soliciting the patient's desire for intubation and resuscitation as well as power of attorney.

The following are compiled guidelines for possible hospital admission for COVID-19 disease:

WHO "Severe" Definition
O2 Sat < 93%
Tachypnea, RR >= 30
PaO2/FiO2 <300 mmHg

WHO "Critical" Definition
Mechanical Ventillation
Shock
Organ Failure requiring ICU

Other
Bilateral or >50% of lung infiltrates
Lactate > 4 or Suspected Sepsis
Encephalopathy
AKI with Cr > 2
Acute Liver Damage (Bili > 2, PIt < 100, INR > 1.5)

Other considerations for admission would be the severity of the patient's specific comorbid conditions and ability to care for self at home under isolation, if indicated. According to the WHO, patients admitted to the hospital are discharged after clinical recovery based on the following criteria:

Hospital Discharge Criteria
Afebrile x 3 days, and
Resolution of symptoms, and
Radiologic improvement, and
2 negative PCR tests 24 hours apart

GUIDANCE FOR DISCHARGE FROM THE EMERGENCY DEPARTMENT, CLINIC OR PRIMARY CARE OFFICE

Patients discharged from the emergency department or clinic should follow the CDC guidelines for isolation and social distancing based on exposure risk. Clinicians should provide contacts for the health department and instructions to call their primary care physician (PCP) and the health department (local or state depending on local protocols) the next business day. Patients should be advised that the normal course of the disease begins with an asymptomatic period of five to six days of followed by symptoms lasting another week for mild cases. They should be instructed to call their PCP or return to the emergency department for rapid breathing, difficulty breathing or confusion, which may be an indication hypoxia. All clinicians should review the CDC's home isolation recommendations based on the risk level of the patient, discuss this with the patient and provide a copy of the CDC guidance.

[Interim US Guidance for Risk Assessment and Public Health Management of Persons with Potential Coronavirus Disease 2019 \(COVID-19\) Exposures: Geographic Risk and Contacts of Laboratory-confirmed Cases](#)

Specific instructions for home monitoring can be found on the CDC website and should be provided to the patient in the form of printed information or as a website reference on their discharge paperwork.

[Preventing the Spread of Coronavirus Disease 2019 in Homes and Residential Communities](#)

While the patient should follow-up with the local health department and their PCP, it may be helpful to provide CDC recommendations for when they may stop home isolation.

[Interim Guidance for Discontinuation of In-Home Isolation for Patients with COVID-19](#)

Because of the limited number of tests available, suspension of quarantine is currently difficult. As the disease becomes widespread and further outpaces our ability to provide testing, we believe more reasonable guidelines will be developed. An example would be 48 hours after resolution of fever without use of antipyretic medication and improvement in illness signs and symptoms to suspend quarantine and return to work.

CLINICAL MANAGEMENT OF COVID-19 PATIENTS

Because SARS-CoV2 is a novel coronavirus, we have little clinical experience. Based on the available data from COVID-19 disease, SARS, MERS, influenza and other coronavirus, the following represent the best consensus recommendations from experts. *The CDC recommends giving antibiotics for all severely ill patients within one hour of arrival, as it may be difficult or impossible to differentiate between COVID-19 and bacterial pneumonia and sepsis.*

Antiviral Therapy

There is a very weak suggestion for alpha-interferon atomization inhalation therapy b.i.d. The clinician might add lopinavir/ritonavir (KALETRA® - Abbvie Inc.) orally b.i.d. These recommendations are based on small numbers of SARS-CoV and MERS-CoV cases (1). There is marginal evidence to support these antivirals, and this support is only with early use (2). Remdesivir, (Gilead Sciences Inc) has shown activity in MERS-CoV infections. There is an initial trial starting for this agent (3). It is important to note that the use of combined antivirals currently has no scientifically valid support. Numerous studies are ongoing worldwide investigating antivirals at this time (4). Off label use is not currently indicated for these medications, but approved sites are anecdotally indicating success in patients with severe clinical disease.

Steroid Therapy

Only scant clinical information regarding steroids in coronavirus illness is available. Information from the initial SARS pandemic ranges from inconclusive to harmful. Complications of steroid therapy in coronavirus patients includes diabetes mellitus, osteoporosis, steroid psychosis, delayed viral clearing, avascular necrosis and increased mortality (5-7). Steroid therapy is currently not recommended for the management of COVID-19 disease (8). Steroid therapy may be indicated and are being used in settings where patients have other comorbid conditions that require them.

Intensive Care Unit Management

Patients who require ICU management for COVID-19 disease should be managed in accordance with typical ICU, sepsis and ARDS protocols (1). These patients should be managed with strict droplet, airborne and aerosol precautions, including full eye protection (8, 9).

Patients will also likely benefit from aggressive airway management with noninvasive ventilation or mechanical ventilation as clinically indicated (1). Earlier intubation is recommended after initial NIV failure to progress. This provides droplet control as well. Paralysis is also considered to reduce oxygen demand and to produce droplet control.

Extracorporeal life support may also be considered in some situations. Clinical experience thus far has indicated that poor outcomes and fatalities are often associated with the development of ARDS and pulmonary decompensation. As such, measures directed at the management of ARDS may be beneficial (8, 9).

Hospital Management

There is a likelihood for widespread community transmission of the SARS-CoV2 virus resulting in an influx of patients with COVID-19 disease into the United States healthcare system. The CDC and others working on the national healthcare response to COVID-19 disease consider the following as critical elements of hospital response:

- Prevent the spread of COVID-19 within the facility
- Rapid identification and isolation of respiratory illness and possible COVID-19 cases
- Rapid communications with infection control professionals and public health authorities
- Provision of care for COVID-19 disease patients as a routine part of hospital operations
- Plan for possible escalation of patient numbers under surge capacity and disaster management
- Develop surveillance, monitoring and management processes for healthcare workers with possible COVID-19 exposure

CONCLUSION

Thank you for reviewing the summary we have provided you today. Our sincere interest is to provide you with the latest information to keep you safe, keep your patients safe and help you feel confident in providing patient care in these unprecedented times. We are grateful for your steadfast effort to care for patients during these unprecedented times. Please stay safe.

Respectfully Submitted by TeamHealth Emerging Infectious Disease Taskforce and Clinical Leadership

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white paper

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