

Radiology Department Preparedness for COVID-19: *Radiology* Scientific Expert Panel

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The Coronavirus Disease 2019 (COVID-19) pandemic began in December 2019 in Wuhan, China. The outbreak is due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection (1). Approximately 81,000 patients have been infected in China (2). Although infection rates are said to be controlled in China through severe public health measures, Italy (more than 10,000 cases) and Iran (more than 8000 cases) have seen exponential increases in the number of infected individuals.

Other than China, Italy, and Iran, most countries have had approximately 2 months to prepare their responses to the COVID-19 pandemic. These responses are led by public health authorities of national governments in coordination with local governments and hospitals. Due to the nature of the emergency in China, chest CT findings (eg, peripheral ground-glass infiltrates and/or organizing pneumonia) temporarily became part of official diagnostic criteria of COVID-19 as a surrogate for viral nucleic acid testing (1). With improved disease understanding, chest CT findings are no longer part of the diagnostic criteria for COVID-19. Instead, at present, the focus of most radiology departments outside of China has shifted from diagnostic capability to *preparedness*.

Radiology preparedness is a set of policies and procedures directly applicable to imaging departments designed (a) to achieve sufficient capacity for continued operation during a health care emergency of unprecedented proportions, (b) to support the care of patients with COVID-19, and (c) to maintain radiologic diagnostic and interventional support for the entirety of the hospital and health system.

Because of varying infection control policies (both nationally and regionally), steps for radiology preparedness for COVID-19 will vary between institutions and clinics. The *Radiology* Editorial Board has assembled a team of radiologists who are active in coordination, development, and implementation of radiology preparedness policies for COVID-19. Their policies have been developed in conjunction with top infection control experts at their respective world-class healthcare systems. In the sections below, each panel member describes their department's top priorities for COVID-19 preparedness in their environment. The Editorial Board hopes that readers may find one or more the highlighted healthcare systems to be similar to their own, providing impetus for action or confirmation of your current preparedness activities.

See also summary Tables 1-2 and Figures 1-2 for further resources.

University of Washington Medicine (UW)

UW is a major metropolitan medical system, with three major urban medical centers and many outpatient clinics and imaging centers spread across Western Washington, at the epicenter of the COVID-19 outbreak in the United States. There have been more than 267 cases of COVID-19 and 24 deaths in Washington state, including approximately 18 patients with confirmed COVID-19 hospitalized at our institutions as of this writing. There is a substantial Asian population that exists in Seattle, including many professionals and students that frequently travel to China and other high infection rate regions. The largest risk remains in older patient populations, as 71% of patients infected in Washington state are over 50 years of age and 57% are over 60 years of age.

Radiology leadership has helped in development of policies and guidelines relating to COVID-19 in areas of patient screening, spread precautions and patient triage in coordination with the hospital leadership. Radiology leadership has worked with input from our department membership, especially operations leaders and chest imagers to develop screening-specific guidelines.

Top Priorities in Our Environment for COVID-19 Preparedness

1. Early detection and limiting exposure of healthcare workers, employees and patients, especially critically ill patients. The hospitals have implemented screeners at all hospital entrances to check those coming in for symptoms that could be related to SARS-Cov-2 infection or with risk factors related to travel or exposure. The radiology front desk serves as a screening site, with similar screening to that performed at the hospital front door. Patients who present with respiratory symptoms who are undergoing outpatient imaging or procedures have their studies canceled and are asked to follow up with their primary care physician. For inpatients with suspected or confirmed COVID-19, all nonemergent imaging and procedures are delayed until diagnosis is confirmed and they recover from their illness and are considered noncontagious.

2. Use of radiography and chest CT. Despite reports from China (3) and initial concerns from the United States Centers for Disease Control regarding unreliable test performance (4), our current RT-PCR for SARS-CoV-2 viral nucleic acid is estimated to have a sensitivity of 95%-97%. Our lab also has a turnaround time of less than 1 day, making RT-PCR an easy, accurate, and less resource-intensive examination. Our lab has been performing more than 500 tests per day, covering our system but also other regional systems, with approximately 10% positive results. Inconclusive results are seen in a small subset, which are then sent for confirmation to Washington state labs.

Sensitivity and specificity of chest CT for COVID-19 are reported to range from 80%-90% and 60%-70%, respectively (3, 5). Thus, imaging is reserved for those cases where it will impact patient management and is clinically indicated or to evaluate for unrelated urgent/emergent indications. This is typically in cases where an alternative diagnosis is being ruled out or being

considered for acute symptom worsening. In our current workflow and with the accuracy and rapidity of the RT-PCR testing, there is no need for immediate CT imaging. In addition, if symptom worsening is thought to be secondary to COVID-19, imaging would not change management, as current treatment consists of oxygen and supportive care.

When possible, imaging is performed at sites with less foot traffic and with fewer critically ill patients in that area to avoid secondary patient and staff exposure. Considerations are also being made to implement a containment zipper (a room isolation tarp barrier with a zipper for room access) to separate the control area from the CT scanner room. Imaging is performed in the imaging center nearest to the patient and, if possible, at the ambulatory clinic. This approach limits the transit of contagious patients and potential exposure of others. When possible, portable imaging is performed (both portable x-rays and portable CT in patient rooms) to limit equipment, room, and hallway decontamination requirements.

3. Imaging in COVID-19 patients who are suspected positive or RT-PCR positive. For these patients, droplet precaution is employed. Patients are masked during imaging and procedures. Deep cleaning of the room is performed after each patient. Air exchange processes are not employed due to patient masking. After imaging, the room downtime is typically between 30 minutes to 1 hour for room decontamination and passive air exchange. Airborne precautions are reserved for those patients who are critically ill or are undergoing aerosol-generating procedures (bronchoscopy, intubation, nebulization, or open suction). Ventilated patients are not an airborne precaution, as the system is considered a closed system. The decision to remove patients from isolation is determined by hospital infection control staff. Those staff members consider RT-PCR results, imaging findings, clinical characteristics, potential exposures, and risk factors and comorbidities into their decision making.

4. Staff protection. Our hospital systems in coordination with the state have worked to reduce the need to bring patients to major hospitals and clinics. This will help protect our vulnerable patient population and university employees. Harborview Medical Center instituted a team of physicians and nurses that go out to SARS-CoV-2 suspected patient homes to perform testing and evaluation. In coordination with the Seattle Flu Study and Gates Foundation, University of Washington has begun issuing SARS-Cov-2 testing kits for home use. UW Medical Center Northwest Hospital has implemented drive-thru testing for University employees who are symptomatic. The University has placed a moratorium on travel for all employees for 1 month.

5. Maintenance of radiology department operations. In radiology, we have focused on providing the ability for radiology faculty to work from home if needed for isolation. For those that are not suspected of having been exposed or infected but are concerned about potential exposures, we have created radiology outposts and isolated reading rooms across our enterprise, including single station reading rooms in our hospitals as well as in our outpatient imaging centers. Staff that do not need to be on-site and who can work remotely (eg, including coders, billers and schedulers) are directed to work from home. The majority of hospital staff-related meetings now use video conferencing rather than having in-person attendance. For

those meetings that cannot be virtual, a determination of the necessity of the meeting is made by department leadership and those determined as nonessential are cancelled.

Emory University School of Medicine, Atlanta, Georgia

Emory is a large urban, academic, research-oriented healthcare system with 10 affiliated hospitals and extensive outpatient facilities covering an urban sprawl of more than 6.5 million persons in the greater Atlanta area. Atlanta is also home to the world's busiest airport and the Centers for Disease Control and Prevention (CDC).

Emory Healthcare has central coordination for COVID-19 preparedness, including *daily* leadership teleconferences; maintenance of a central stockpile of N-95 masks and other personal protective equipment; policy alignment with CDC, employee health, and infection control personnel. In the radiology department, we are holding regular meetings of the departmental leadership, including division directors and healthcare staff to plan for workforce integrity and the health of our staff. We also work closely with the Emory Office of Critical Event Preparedness and Response to ensure communication between our Emergency Department and the Radiology Department's Division of Emergency and Trauma Imaging. Email notifications, leader calls, and redistribution of the department's disaster preparedness escalation policy are the main modes of communication.

Top Priorities in Our Environment for COVID-19 Preparedness

- 1. Ensuring the health of our workforce** so that we can best care for our patients.
- 2. Planning for sufficient staffing to cover our clinical needs.**

Quarantine of clinical radiologists, staff, and trainees following travel to Level 3 countries and/or following exposure to patients with proven or suspected COVID-19 have the potential to quickly overburden our ability to adequately staff critical services. We are working to rapidly obtain and deploy additional home workstations so that asymptomatic radiologists can work from home. While this approach does not help procedural services, it can decompress diagnostic interpretations and provide back up for surge capacity.

- 3. Arranging for surge potential should the healthcare system be taxed** by increased volume of patients and associated imaging needs.
- 4. Contamination of CT scanners is major concern.** CT equipment may be out of commission for several hours for cleaning. Should a patient presenting atypically and/or not triggering suspicion for COVID-19 be scanned, the potential for additional patient and radiology staff exposure is heightened.

Other workforce considerations. The many spring radiology meetings are important venues for professional satisfaction, networking, and sharing meaningful scientific and educational material. With the prospect of major conferences being canceled we are finding opportunities for faculty and trainees to present their work locally to colleagues. During this period our colleagues have significant concerns about the safety of their families and school and daycare closings can impact their ability to get to the hospital.

New York University Langone Health (NYU), New York, NY

NYU is a large academic health care center in New York City. The catchment area includes the tri-state region of New York, New Jersey, and Connecticut. With three large airports serving the area, there is a large volume of domestic and international people traffic. Currently, New York has the second the greatest number of COVID-19 cases in the United States. On March 7, 2020, the governor of New York, Andrew Cuomo, declared a state of emergency for New York State.

At our institution, guidelines are distributed from the institutional leadership and then implemented by individual departments, including radiology.

Top Priorities in Our Environment for COVID-19 Preparedness

1. COVID-19 crisis management team.

A dedicated team from radiology leadership was charged with overseeing the departmental preparedness for COVID-19. A vertical communication network was established to coordinate the activities of four hospitals and multiple ambulatory care offices that comprise our department. Department directors and site managers participated in regular conference calls to standardize the protocols for patient care and operational workflow. The crisis management team share institutional news and sources of information to inform the department leaders. The crisis management team serves as a centralized resource to answer questions and address concerns from individual sites and department members.

2. Implementing protocols for patients with known or suspected COVID-19 exposure

Institutional directives for patient care protocols were adapted to the radiology environment. For outpatients, patients who schedule imaging examinations are screened for pertinent symptoms, travel history and exposure to individuals with known COVID-19. Based upon these answers, patients are scheduled for their imaging examinations or directed to the Virtual Urgent Care program or the Emergency Department. At radiology reception areas, patients are screened for symptoms of fever and cough. Initially, patients with travel history to countries with widespread transmission or contact with individuals with known COVID-19 were identified and consult calls were placed to the institution's Infection Prevention and Control (IPC) team to determine the need for patient testing and whether the patient will be

transferred to the emergency department or discharged home. Subsequently, as evidence of community spread of COVID-19 appeared in our geographic area, the threshold for calling the IPC team has been lowered with increased emphasis on patient symptoms. For these high-risk patients, the need to perform the scheduled imaging examination was determined by the relative urgency of the examination for patient care management.

In the hospital and emergency department (ED) setting, patients have usually already been identified as known or suspected COVID-19 patients and imaging examinations are provided as clinically warranted.

3. Reducing potential transmission from known or suspected COVID-19 patients

The guiding principle to reduce potential transmission from known or suspected COVID-19 patients is *source control*. In the ambulatory care setting, a patient presenting with fever and cough is immediately given a mask and directed to an isolation room for further screening and consultation with the IPC team. Healthcare providers who perform this additional screening wear personal protective equipment (PPE) including gloves, mask, and eye-shield. If the scheduled imaging examination is ultimately performed, the healthcare providers, such as the technologist and nurse, wear the same PPE and may wear a gown if there is the potential for close or direct contact with the patient. *A census of the other patients and staff in the practice at the time of the patient visit is logged* so that they may be contacted should the patient test positive for COVID-19.

In the hospital and ED setting, patients have usually already been identified as known or suspected COVID-19 patients. A dedicated portable x-ray machine was assigned to image only these patients. If additional advanced imaging examinations are required, the radiology staff wears the necessary PPE and the room is cleaned and disinfected according to hospital protocols.

4. Reducing potential exposure for department members

In order to minimize risk and potential for exposure, travel restrictions were instituted for all employees of our organization. All domestic and international work-related travel and business/academic attendance at meetings, conferences, and similar events were banned for a temporary time period. Large group gatherings were discouraged.

In our department, a significant number of the clinical faculty already have home workstations as part of our clinical wellness program. Prior to the travel ban, radiologists returning from high risk areas were asked to self-quarantine and interpret cases from home. With the possibility of increasing COVID-19 related quarantines involving the clinical faculty, additional home workstations have been ordered to provide quarantined clinical faculty the ability to work from home to meet the clinical demand.

With the increased usage of PPE and the concern for shortages, our institution implemented conservation measures to ensure that supplies are available for radiology staff

and patients who required them. In addition, allocation of PPE has been centralized within our hospital. PPE is distributed to areas of our department based upon clinical need.

University of Wisconsin Hospital

The University of Wisconsin hospital is a 675-bed academic hospital in Madison, WI. Our catchment area is a population of about 600,000 people. The main risk factor in our area is the international nature of our university and area businesses. There are 44,000 students at the University of Wisconsin – Madison, many do a semester abroad; the university research programs thrive on international outreach. Madison is home to Epic Systems; under normal conditions, 4000 employees traveled weekly to work in hospitals throughout the United States and internationally.

At the time of writing, the University of Wisconsin hospital has had one patient diagnosed with COVID-19. None of the hospital personnel in contact with the patient developed symptoms or positive real-time reverse transcriptase polymerase chain reaction (RT-PCR) for viral nucleic acid.

Our radiology department response is closely coordinated with our hospital infection control team. Hospital infection control personnel have had in-person meetings with our radiography technologists and have given tutorials on infection control procedures for respiratory infections. The hospital infection response workgroup sends out daily emails to all employees. Our department's Senior Director attends daily hospital COVID-19 command center briefings and meets daily with the radiology Vice Chair of Operations. Department modality managers have policies and procedures developed several years ago to deal with patients who might have EBOLA; existing policies were reviewed, and staff were updated.

For the faculty radiologists, our hospital infection response workgroup had our department create a back-up call schedule. The purpose is to cover faculty who become ill or are quarantined. Each radiology section has responsibility for sick-coverage for their daily clinical services and on-call staffing; individual radiology specialty areas have created back-up call schedules. Almost all radiologists have home PACS workstations; use of remote interpretation has been incorporated into our department's response plan.

Top Priorities in Our Environment for COVID-19 Preparedness

- 1. Insure all department employees are aware of and are performing recommended infection control protocols.** This applies not only to interacting with patients but also with fellow employees and working on shared workstations.
- 2. Arrange infection control tutorials led by hospital infection control experts.** Time has been allocated for hospital infection control experts to provide in person tutorials and provide

information required protocols for interaction with patients who may have COVID-19. Seminars by our Infection control personal have also been arranged with our CT, ultrasound and interventional technologists. These individuals are anticipated to be on the front lines in interaction with patients with suspected COVID-19 infection.

3. Develop a detailed operational plan for a new, separate urgent care site for COVID-19.

In the case of severe community outbreak, hospital infection control staff may take steps to provide care for COVID-19 patients in a separate facility away from our main hospital. We have developed a plan to equip and staff the site with a portable x-ray machine using strict infection control procedures.

4. Review and practice protocols for decontaminating imaging rooms after caring for a COVID-19 patient. This includes a 1 hour downtime for passive air exchange.

5. Work to better define the role of CT and 2-view chest x-rays in patients with COVID-19. While multiple publications in RADIOLOGY and other major journals have described COVID-19 findings on chest CT, the vast majority of patients have been from China. In that environment, lack of RT-PCR test kits, remarkable influxes of patients required detecting and staging of COVID-19 disease patterns with chest CT. The applicability of those results to our environment is not yet know.

6. Continue sharing information with all department employees, including open discussions on ramp-up of stricter infection control procedures if needed. This includes having faculty work from their home PACS or sections splitting their faculty and fellows into separate reading sites, having residents attend conferences remotely from their reading rooms so they do not gather in one location, and having technologists work from one location and not rotate between health care facilities.

University of California San Francisco (UCSF)

UCSF is a tertiary-quaternary, 1000 bed urban referral academic center. San Francisco is an international crossroads and one of the earlier sites of disease in the United States.

The prevalence of COVID-19 cases in our institution's catchment area has increased rapidly over the last two weeks. UCSF has instituted a Hospital Incident Command System (HICS) structure to guide decisions and practice. The institution has shifted its strategy from containment to risk-mitigation in view of the size of the outbreak and the documented community spread of infection. Until internal laboratory testing had been developed, confirmatory RT-PCR testing represented a significant bottleneck in patient triage.

The response of our radiology department is coordinated with health system leadership, including radiology planning and strategy at the health system level. Policies are developed at

the health system level, including stay-at-home and return-to-work, faculty travel, and procedures for safe transport, respiratory isolation and treatment of suspected or confirmed COVID-19 patients. We have developed Radiology-specific guidelines for safe imaging of Patients Under Investigation (PUI) with CT and x-ray, contingency staffing planning and reducing risk of nosocomial spread.

Top Priorities in Our Environment for COVID-19 Preparedness

1. Identification of patients at risk for having COVID-19. Patient screening is now undertaken at the time of radiology exam scheduling and in all outpatient imaging settings. Additionally, all patients and visitors are screened at the entrance to clinic buildings and hospitals. Respiratory clinics equipped with portable x-ray units have been established at each of our 3 main hospital sites. Ambulatory patients who screen positive for possible COVID-19 illness are redirected to one of these respiratory clinics for further evaluation.

2. Development of standard operating procedures for safe imaging of patients with suspected or known COVID-19. (see figures) At UCSF, CT is not considered a screening examination for COVID-19. A multidisciplinary team of experts, including thoracic radiologists, is developing a guideline for use of CT imaging in patients with known or suspected disease. Standard operating procedures for safely imaging patients with portable x-ray units and for imaging patients with CT when necessary have been developed, ensuring that all team members are aware of patients' isolation status and that clinical and imaging teams provide coordinated high-level care in a safe and efficient manner.

3. Staff education regarding COVID-19 prevention. Education of radiology staff regarding stay-at-home policies and infection prevention techniques, such as handwashing and regular cleaning of fomites, was an early focus in our department.

4. Personal protective equipment (PPE) availability and education for health-care workers. Our department has worked with health system leadership to ensure adequate supplies of necessary PPE. Staff and faculty champions were recruited and serve to educate and reinforce appropriate donning and doffing techniques for PPE.

5. Implementation of "social distancing" strategies for staff, trainees, and faculty. All large staff gatherings (e.g. radiology grand rounds) have been cancelled. We have aimed to decrease foot traffic in radiology reading rooms by encouraging remote consultations by video and telephone rather than in-person. Recurring departmental meetings and multiple clinical conferences have been moved to video conferencing. We are exploring strategies to allow diagnostic radiologists to work from home and developing guidance for when this is appropriate.

6. Planning for a potential surge of patients: A surge in patients with known or suspected COVID-19 illness will require re-allocation of resources. Illness or factors such as school closing

may deplete our physician and staff workforce. We have developed contingency plans for maintenance of our clinical activities and staffing in such cases.

In order to maintain hospital bed availability, schedules for interventional radiology and neurointerventional radiology have been frozen (no additional patient slots) for two weeks for procedures that require patients to have overnight observation or hospitalization.

Singapore General Hospital (SGH)

SGH is a 1773-bed academic tertiary hospital in the city center of Singapore. SGH has one million patient visits annually. Singapore is an international travel hub. The first COVID-19 patient in Singapore was diagnosed in SGH on 23 January 2020. As of March 12, 2020, there were 187 confirmed cases of COVID-19 in Singapore.

The activities for infection control in the radiology department are highly coordinated with our institution-wide infection control staff. We have separate imaging facilities for inpatients and outpatients and negative air pressure rooms for radiography, ultrasonography, CT, and MRI to cater for patients with infection control risks.

Even prior to the COVID-19 outbreak, radiology had an infection control committee that included infectious disease (ID) physicians. In addition, there is an institutional disease outbreak task force that includes several members from radiology leadership, as there is acknowledgement that radiology is a key component in an outbreak situation (2).

At the present time, the national strategy for COVID-19 is that of containment. Our institutional strategy is to minimize any possibility of in-hospital transmission and to achieve zero health care worker transmission to ensure a safe environment for both patients and staff.

Top Priorities for Radiology for the Control of COVID-19 in Our Environment

1. Ensure sustainable radiology operations. Our goal is to ensure that *every* staff member is competent with standard infection control practices and use of appropriate personal protection equipment. At the present time, our priority now is to ensure continuous and consistent practice to avoid staff fatigue or complacency that can otherwise easily result in lapses in infection control. Daily audits of infection control procedures are conducted.

We have allocated staff into hybrid teams working in separate physical locations to avoid large numbers of radiology staff members being subject to quarantine. Meetings are conducted via electronic platforms to avoid congregation. Staff are encouraged to practice social distancing. Imaging equipment status is tracked daily to ensure adequate imaging capacity.

2. Monitor and respond to rapid changes in the COVID-19 pandemic. Our existing radiology management structure was too large and cumbersome to effectively respond to the rapid scenario changes. We constituted a smaller radiology disease outbreak task force, incorporating faculty with experience in intense operations (eg, colleagues who have held senior positions in the armed forces). This task force meets daily (eg, 20 minutes each morning) to assess overnight incidents and anticipated changes during the day.

Radiology has inserted itself into our infectious disease clinical team due to the key role of imaging in timely diagnosis as well as infection control (nosocomial infection related to imaging tests). The radiology task force actively disseminates information to all staff members via electronic means (eg, website, emails, text messaging).

3. Long range planning for COVID-19: a new norm for radiology operations. At seven weeks of the COVID-19 outbreak, we have minimized in-hospital transmission. Due to the global spread of COVID-19, we are looking at new norms of practice. Our goal is to inculcate an ongoing culture of infection control practice embraced by all staff members. We are re-thinking how radiology can deliver optimal imaging and treatment while reducing unnecessary movement and congregation of patients within our hospital environment. Teleconsultation and electronic smart appointment applications and counselling are being fast tracked for implementation and will have far reaching impact on our future practice.

Table 1: Relationship between the healthcare institution and radiology department in relationship to the COVID-19 pandemic

<input type="checkbox"/> Central coordination for COVID-19 preparedness for messaging between hospital infection control and the radiology department
<input type="checkbox"/> Screening (standardized questionnaire) for COVID-19 prior to patient examinations, at the time of scheduling, hospital entrances and at radiology front desks
<input type="checkbox"/> Rapid isolation of patients with suspicion of COVID-19 at screening
<input type="checkbox"/> Training of all employees to follow infection control protocols and to use personal protective equipment (PPE)
<input type="checkbox"/> Centralization of PPE supplies to prevent shortages, distributed based on clinical need
<input type="checkbox"/> Restricted travel for staff for all domestic and international work –related activities
<input type="checkbox"/> Use of video-conferencing for hospital/ health system staff meetings.

Table 2: Radiology Preparedness for COVID-19 pandemic

<input type="checkbox"/> Implementation of standard operating procedures for radiological imaging and procedures for patients with known or suspected COVID-19 exposure
<input type="checkbox"/> Imaging only for those COVID-19 patients where imaging will impact management
<input type="checkbox"/> Performance of imaging at locations with less foot traffic and with fewer critically ill patients. When possible, portable imaging is performed
<input type="checkbox"/> Standardized hospital protocols for decontaminating imaging rooms, especially CT scanners, after caring for a COVID-19 patient
<input type="checkbox"/> Improving capability for remote interpretations (home, other sites) in the case of staff isolation or patient surge

Figure 1. Tip sheet posted at the radiology front desk. All front desk locations have been equipped with isolation packets containing instructions for staff roles, N95 masks, gowns (University of California, San Francisco)

An outbreak of respiratory illnesses associated with a novel coronavirus called SARS-CoV-2 was first identified in Wuhan City, Hubei Province, China. The disease caused by this virus has been named coronavirus disease 19 (COVID-19) and cases have been identified in a growing number of other international locations, including the United States.

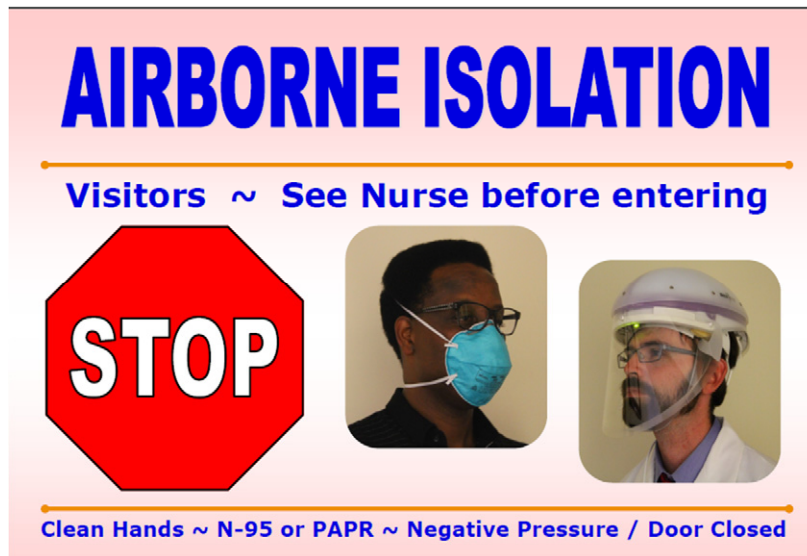
All Radiology front desk reception areas are screening outpatients asking standardized questions. These are hard stop questions before registration is completed. The current CDC criteria for Persons Under Investigation include:

Clinical Features	&	Epidemiologic Risk
Fever or signs/symptoms of lower respiratory illness (e.g. cough or shortness of breath)	AND	Any person, including health care workers, who has had close contact with a laboratory-confirmed COVID-19 patient within 14 days of symptom onset
Fever and signs/symptoms of a lower respiratory illness (e.g., cough or shortness of breath) requiring hospitalization	AND	A history of travel from the affected geographic areas below within 14 days of symptom onset <ul style="list-style-type: none"> • China • Iran • Italy • Japan • South Korea
Fever with severe acute lower respiratory illness (e.g., pneumonia, ARDS) requiring hospitalization and without alternative explanatory diagnosis (e.g., influenza)	AND	No source of exposure has been identified

If a patient presents with fever or cough and meets the criteria above:

- 1) Ask the patient to put on a **surgical** mask and place the patient as quickly as possible into an Airborne Infection Isolation (negative pressure) room in the ED or at least a private exam room. **Keep the door closed.**
- 2) Institute Airborne and Contact isolation plus eye protection—all healthcare personnel entering the patient’s room should be wearing either an N95 respirator with eye protection (goggles or a face shield) or PAPR, a gown, and gloves.
- 3) Consider sending a nasopharyngeal swab for routine respiratory viral panel testing to evaluate for community respiratory viral infections (e.g., influenza).
- 4) Immediately contact Hospital Epidemiology and Infection Prevention (HEIP): phone numbers: XXXX including after-hours numbers.

Figure 2. All radiology sites with rooms that can be used as isolation rooms are identified with appropriate signage.



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