



Radiological Society
of North America

RSNA COVID-19 Task Force: Best Practices for Radiology Departments during COVID-19

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Given the emerging and evolving nature of the situation, many institutions, hospitals, and clinics have also established their own local guidelines. We urge you to follow the evolving Centers for Disease Control and Prevention (CDC) recommendations and your local requirements. The information in this document is subject to change as information regarding COVID-19 changes.

RSNA COVID-19 Task Force

The goal of this guidance document is to protect health care workers (HCW) and the general public from exposure and dissemination of COVID-19, while maintaining critical radiology functions and preserving personal protective equipment (PPE) and other critical care resources during the COVID-19 pandemic. These guidelines apply in the setting of sufficient resource availability, and in the setting of a surge when resources are in short supply; mitigating steps and alternative approaches should be considered to provide the best care for patients while protecting all HCW.

Radiology Elective Imaging

- Postponement of nonurgent outpatient imaging
 - All screening radiology examinations including mammography, lung cancer screening, and CT colonoscopy as well as DEXA scans and coronary artery calcium scoring
 - Other elective diagnostic examinations as determined by the institution and in discussion between radiologist, ordering health care provider (HCP), and patient
 - Critical and time-sensitive imaging, necessary for treatment decision making, should be performed within the needed time frame.
- At radiology front desk or hospital/outpatient center entrance, outpatients scheduled for imaging or procedures should be screened for symptoms including fever, new dry cough, dyspnea, and sore throat.
 - Prohibit accompanying visitors except in cases where a single family member and/or caregiver is needed for the patient's ambulation, understanding of, and/or cooperation with the examination.
 - Symptomatic patients, if not already masked (some states/regions require everyone to wear masks publicly), are given surgical masks with use of droplet and contact precautions, and isolated from other patients while awaiting scanner availability.
 - Patient is imaged with portable equipment when possible (eg, chest x-ray) in isolation room.
 - If portable is not possible, after droplet/contact precaution is instituted, patient is imaged using main rooms.
 - Dedicated CT scanners and interventional suites can be used, ideally with negative pressure, as institutional space and resources allow.
- Hand hygiene
 - Hand washing with soap and water for 20 seconds is preferable over use of hand sanitizer, especially when considering sanitizer shortages (1); however, hand sanitizers with at least 60% ethanol and 70% isopropyl alcohol effectively inactivate coronaviruses (2).
 - Avoid touching face
- PPE training video: <https://www.youtube.com/watch?v=bG6zISnenPg>

COVID-19 Suspected or Confirmed Case Precautions (Figure 1)

- Develop a method to identify patients as positive for PUI-COVID-19 or COVID-19, such as in electronic medical record or by report order by HCP.
 - If possible, institutions should consider COVID-19 testing prior to procedures and sometimes imaging studies, especially those that require sedation, are aerosol generating, or are for intubated patients.
- Staff with direct patient contact with COVID-19 and persons under investigation (PUIs) should be fit tested for N95 masks if fit testing has never been performed or has expired.
 - It is recommended that those with beards consider shaving their facial hair for appropriate N95 mask fitting.
 - N95 masks may be preserved for reuse by wearing overlying surgical/isolation masks and/or face shield or by central cleaning per institutional practice.
 - Note that N95 masks may have a metal strip, risking loss of seal in the MRI room; nonferrous N95 masks may be available.
 - Minimize staff in the room with COVID-19 and PUIs to those needed to perform the procedure.
- Droplet/contact precautions with eye protection
 - Majority of cases
 - Patients wear surgical masks
 - HCW wear fitted N95, PAPR, or surgical mask and face shield and contact precaution gear (gown and gloves) and appropriate hand hygiene
- Airborne/contact precautions
 - Aerosol-generating procedures per Society of Interventional Radiology guidelines (3):
 - Lung biopsy, lung ablation, thoracentesis, pleural drain, chest tube, bronchial artery embolization, bronchial stenting, nasogastric or orogastric tube placement, gastrostomy, gastrojejunostomy, jejunostomy, gastrointestinal stent placement
 - Intubation/extubation, open suction, tracheostomy, moderate or general anesthesia
 - Esophagograms, upper gastrointestinal fluoroscopic studies, modified swallow fluoroscopic studies, contrast enemas, and virtual CT colonography should also be considered aerosol generating
 - Patients wear surgical masks.
 - HCW wear N95 masks (or PAPR) and face shield (if N95 mask) and contact precaution gear (gown and gloves) and appropriate hand hygiene

- Limited supply of PAPR hoods at this time
- PAPR hoods cannot be used in MRI suites.

PPE for Staff

- Determined along with institutional guidelines, with resource availability and conservation taken into consideration
- Consider education of staff through communication of guidelines for use of PPE, easy-to-read charts
- Surgical/isolation masks should be worn by all HCW while in clinical facilities, whether performing direct clinical care or not, with consideration for institutional availability and governmental and institutional guidelines.
 - If soiled or exposed during droplet precautions without a covering face shield, the mask should be disposed of, with use of a new mask for the next patient interaction.
- Surgical masks with covering face shield (if available) should be worn for exposure to patients with respiratory symptoms.
- Encourage judicious use of HCW PPE for conservation in accordance with institutional policy and supplies.

Postimaging Room Cleaning

- Room cleaning is multifactorial, with need for consideration for room air exchange rates
 - Please communicate with local infection control to evaluate workflows for room clean-up for imaging of patients positive for or suspected of having COVID-19.
 - The higher the air exchange rate per hour, the shorter duration needed for room closure (4).
- Droplet/contact precautions
 - Standard antiseptic wipe down of equipment using quaternary ammonium/alcohol-impregnated wipes or other Environmental Protection Agency (EPA)–approved disinfectants (5)
 - No need for room closure if adequate air circulation in the room
- Airborne/contact precaution
 - Standard wipe down
 - Room closed for 1 hour after imaging/procedure for rooms with greater than 6 air exchanges per hour, which includes cleaning time
 - Use high-efficiency particulate air (HEPA) filter if possible and available to accelerate air circulation and shorten room closure.
 - HEPA filtration is not compatible with MRI suites.

Patient Screening for COVID-19

- Patient screening may be performed with reverse-transcription–polymerase chain-reaction (RT-PCR) and is especially recommended prior to image-guided procedures with risk of aerosolization.
- With a negative RT-PCR result in a PUI for COVID-19, high-risk cases are retested.
- Chest imaging currently is not typically used for screening or for follow-up if RT-PCR is available.
 - Consideration for CT use if patient surge exceeds capacity for PCR testing and quick throughput is needed.
 - Imaging should also be kept in mind for patients with atypical presentations.
 - Assess the role of imaging and determine reporting language from chest imaging studies in PUI or confirmed COVID-19 cases in consultation with HCP.

Chest Imaging in COVID-19 (Figure 1) (6)

- Fleischner Society Guidelines for Imaging in Patient Management during the COVID-19 Pandemic (7)
 - Imaging can be considered in patients:
 - With mild clinical features of COVID-19 who have risk factors for progression and are either positive for COVID-19 or have moderate/high pretest probability of COVID-19 (RT-PCR unavailable)
 - With moderate to severe clinical features (any pretest probability), regardless if RT-PCR positive (to assess severity) or if RT-PCR negative or testing not performed (to identify any alternative diagnosis)
 - Setting of a surge of patients suspected of having COVID-19
 - Risk factors: Patients with high likelihood of poor outcomes with COVID infection
 - Age greater than 65 years, hypertension, diabetes mellitus, immunocompromised, cardiovascular disease, and chronic respiratory disease (7)

Imaging in Patients with Confirmed or Suspected COVID-19

- Nonscreening imaging is reserved for those in which there will be impact on patient management.
 - This will typically apply to cases where alternative diagnoses are considered or acute patient worsening is considered due to an alternative diagnosis, such as pulmonary embolism.
 - Patients with high pretest probability of COVID-19 despite negative PCR tests
 - If patients require emergent imaging for other reasons (suspected of having appendicitis, cholecystitis, stroke, etc), the targeted imaging for diagnosis (eg, CT abdomen/pelvis for appendicitis) will also be performed.
 - Nonemergent imaging for inpatients will be delayed until diagnosis is confirmed and the patient has recovered from the illness and is considered noncontagious based on clearance from infection control.
 - Identify imaging units/scanners that are to be used for PUI-COVID 19 and patients positive for COVID-19 who undergo imaging
- When possible, chest radiography is performed in patient rooms using portable equipment (6).
 - Radiographic imaging can be performed through the glass of isolation rooms (**Figure 2**), where only the cassette enters the room and the source remains outside. This reduces equipment cleaning time, PPE use, and potentially exposures.
- Transports will observe droplet/contact or airborne/contact precaution.

Elective Procedure Cancellations

- Elective nonemergent procedures should be postponed or cancelled during the pandemic surge.
- The goal is to conserve resources (PPE, staff resources), conserve inpatient capacity that may become needed, consolidate staff for mobilization, and protect our patients from exposure.
- This should not affect emergent/critical procedures.
 - Decisions to proceed, postpone, or cancel image-guided procedures should be made jointly with the referring HCP.
- Scheduling of future procedures can be performed in coordination with the ordering physician, with placement of procedures into nonurgent (can be postponed for months), time-sensitive (short delay is acceptable), and critical (performed as soon as possible) categories (**Table 1**).

Pregnancy and COVID-19

- As of now, there is no evidence to indicate teratogenic effects or detrimental effects on pregnancy from COVID-19 infection; however, there have been reports of transmission during late stages of pregnancy (8,9).
- Recommend redeploying pregnant HCW to sites with minimized exposure to patients with COVID-19 and PUIs

Meetings

- Meetings should be held via teleconferencing software such as Zoom, Cisco's WebEx, Microsoft Teams, or Skype.
 - Safe social distancing at small meetings (few attendees) if not virtual
- Encourage frequent and potentially daily updates for the entire department and within sections/teams, depending on the evolving situation.

Radiologist Workflows

- Section faculty, trainees, and essential staff can be scheduled to work in exclusive teams that alternatively cover weeks to minimize exposures across the section and maintain the workforce.
 - A backup workforce can be established for shifts, particularly in high-exposure areas; HCWs may work in teams in which Team A and Team B alternate working for 2 weeks followed by 2 weeks out.
- Social distancing of 6 feet is recommend to reduce risk of potential person-to-person transmission.
- Reconfigure reading rooms and radiologists in the reading room to maintain distancing.
- Radiologists should sterilize shared workstation equipment before and after use; ideally, workstations should be dedicated to a single radiologist or resident/fellow for full shift with cleaning between shifts.
- Phone communications between radiologists and other staff are preferable to in-person communications.
- Radiologists who can perform their clinical duties remotely should be permitted to do so.
- Create single-radiologist and single-workstation reading rooms, if feasible.
- Consider workflows for virtual consults with ordering clinical teams, including phone and telecommunication capabilities.
- Consider development of radiology PACS/RIS worklists and approach to reporting language for chest imaging studies for PUIs or confirmed COVID-19 cases in consultation with HCP and communication of findings.

Screening, Evaluation, and HCW Return-to-Work Criteria

- Recommend screening employees and patients at all entrances (symptoms within last 72 hours and potential SARS-CoV-2 exposure) and consider temperature checks
- Employees to complete daily attestation of health and lack of symptoms (fever, new dry cough, sore throat, new shortness of breath, new muscle aches, loss of taste or smell)
 - Employees with these symptoms should stay home and contact occupational/employee health officer for need for potential further testing.
 - Per CDC guidelines, two options for return-to-work criteria for HCW that are positive for COVID-19 (10)
 - Test-based strategy
 - Can return to work after resolution of fever, resolution of respiratory symptoms, and at least two negative PCR tests from nasopharyngeal swab separated by at least 24 hours
 - Non-test-based strategy
 - Requirement to stay home for 7 days from symptom onset AND 72 hours after symptom resolution (fever and respiratory symptoms)
 - After return to work, HCW should wear a face mask at all times while in the health care facility until all symptoms are completely resolved or until 14 days after symptom onset (whichever is longer)
 - Restricted from contact with severely immunocompromised patients for 14 days
 - Another approach is having COVID-affected HCW to continue to wear a mask for 7 days after symptom resolution.
 - Patients with these symptoms should be considered PUIs.

Formation of a Radiology Crisis Management Team/Task Force

- Consider formation of a departmental crisis management team comprised of leadership from radiologist, technologist, and staff with standing meetings to assess situation and adapt staffing and other approaches according to time within surge. This task force will provide quick decision making, policy discussion, information gathering, and policy dissemination.
- Surveillance of number of examinations performed, emergency department visits for PUI-COVID-19 for technologist and radiologist staffing
- Daily communication within sections, technologist groups, department, and institution to disseminate policies
- Departmental point person in charge of guidelines/policies and communication updates

Social Distancing within Radiology

- In addition to workspace areas, emphasis on social distancing throughout the department, including in break rooms, congregation areas, and scanner unit console areas
- Reconfiguration of seating in these areas, as well as reduced staffing and staggered breaks, can be considered.
- Staff education and engagement to explain the importance of social distancing should be conducted.

Staff Engagement and Well-Being

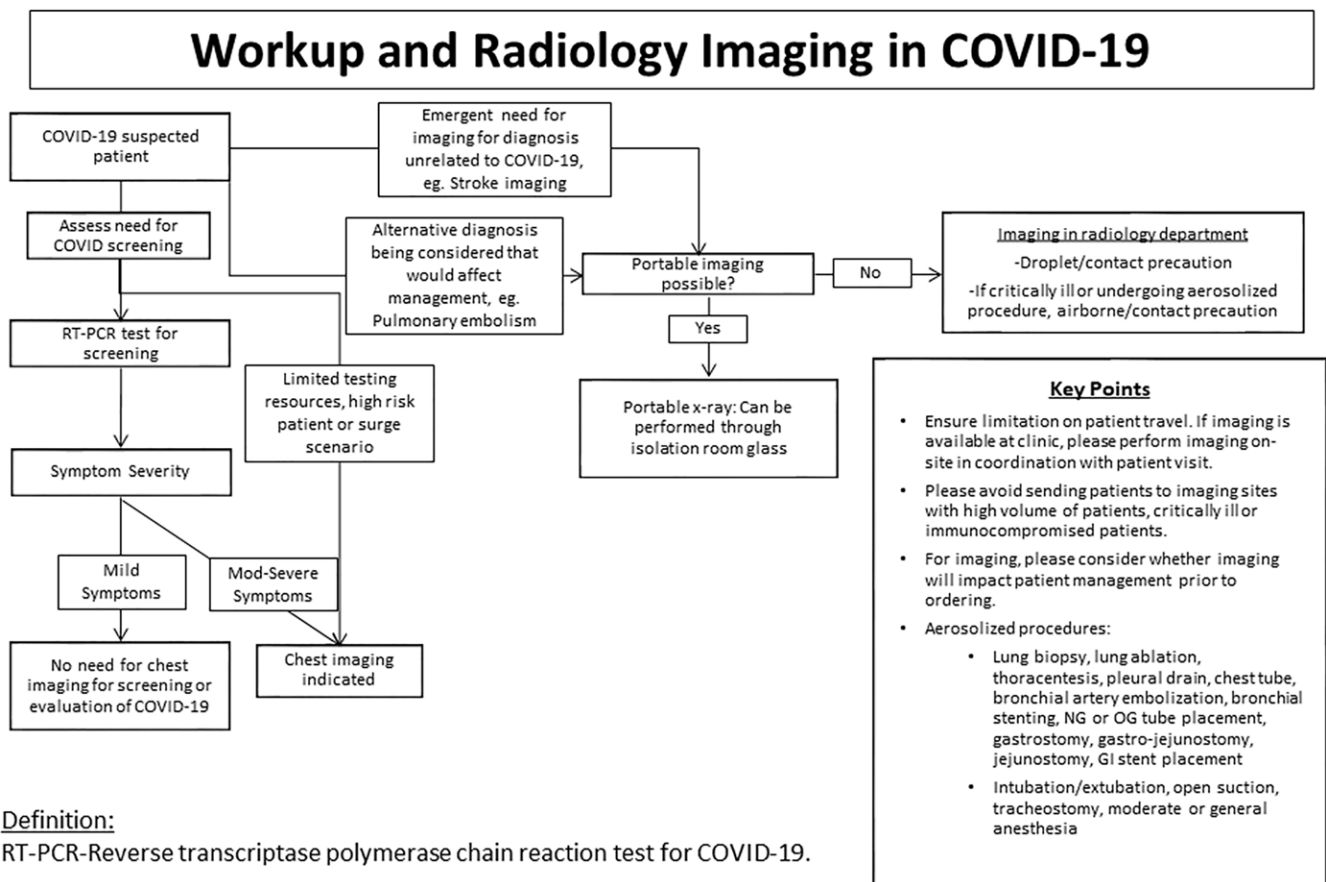
- Radiology leadership should monitor for staff anxiety or burnout.
- Constant communication and engagement with staff and faculty
 - Daily virtual meetings with sectional, trainee, and operational leadership to communicate policy and informational updates, as well as to check on team morale and listen to questions and concerns
 - Weekly departmental meetings to listen to questions and concerns and to communicate policy updates

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Support Figures



Definition:

RT-PCR-Reverse transcriptase polymerase chain reaction test for COVID-19.

Figure 1: Imaging workflow and indications in patients suspected of having COVID-19.

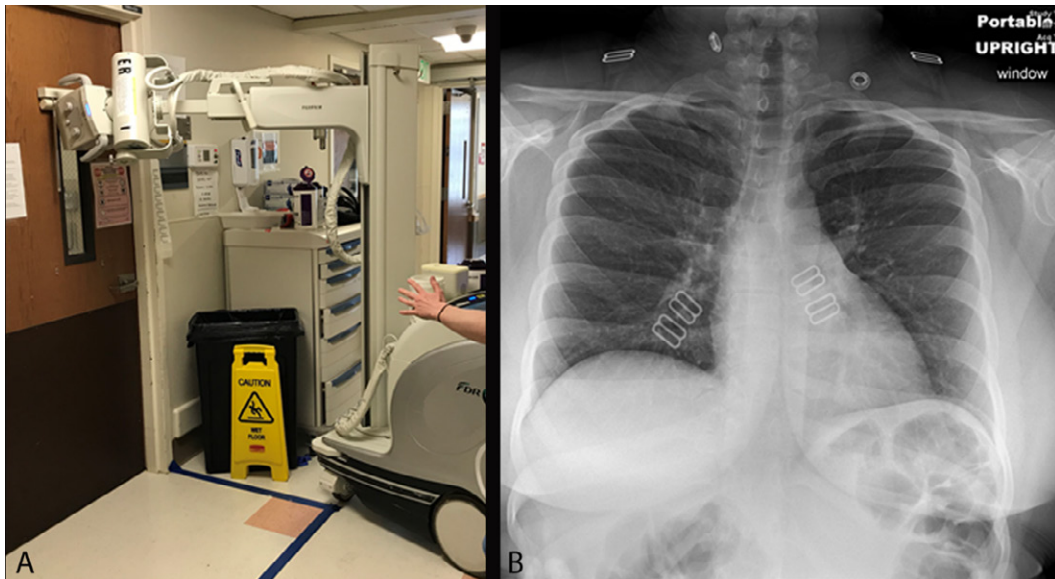


Figure 2: Chest radiography through glass. A, Technologists position the portable x-ray unit outside the patient room, with the tube peering through the mesh wire-reinforced isolation room window. B, Anteroposterior chest radiograph obtained is of diagnostic quality.

Category	Designation	Description	Evaluator
Category 1	Elective/Nonurgent	If delayed, will not harm patients in the next 2-6 months. These procedures can be delayed until after postponement period.	Radiologist in consensus with ordering clinician
Category 2	Time-Sensitive	Short delay (eg, 2–4 weeks) is acceptable within a certain time frame.	
Category 3	Critical	Cannot be delayed. Schedule these procedures right away.	

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