Role of Imaging patients with Suspected or Confirmed Covid-19 Infection in ED/In-patient and Ambulatory Settings

Situation:
No guidelines exist for enhancing the safety process for imaging patients with suspected or confirmed COVID-19 infection. There also remains lack of clarity on the role of chest imaging.

Background:
The goal of imaging in COVID-19 patients is to provide high level care while minimizing risks to healthcare staff and other patients. For in-patients and ED patients some radiology exams can be performed portably (US, radiographs, head CT, minor procedures), other exams require patient transport off the floor (MR, CT, Nuclear Medicine, Fluoroscopy, IR).

Assessment:
The transport of suspected/confirmed COVID-19 patients for imaging should be minimized. As such, ensuring appropriate imaging utilization is necessary. For ED and in-patients, portable alternatives to off floor imaging should also be used whenever possible. The use of chest imaging should follow best practice guidelines. Any non-critical imaging or procedure should be deferred until COVID-19 diagnosis is either confirmed (and patient recovers from their illness) or excluded.

Recommendation:
1. For in-patients and ED patients, all imaging requests (excluding radiographs) for patients with pending or confirmed COVID-19 will be approved by a radiologist whenever possible. For out-patients, medical necessity of any imaging test should be determined by the ordering provider and/or radiologist. COVID test results are not necessary to proceed with indicated ED imaging orders.
2. From 8am to 5pm approval will be sought by the relevant radiology technologist before performing the study (Appendix A, B, C for technologist work-flow).
3. After normal business hours, the technologist may need to discuss case with relevant working/on call radiology teams.
4. Best practice guidelines should be followed for a) chest imaging (Appendix D) and b) technologist use of PPE (Appendix E).
5. Radiology COVID Call Center has been established to assist in Radiology related questions for Yale New Haven Health. Call center number is 475-246-9660. Hours are currently 7am-7pm seven days a week.
Appendix A: Ultrasound and X-Ray ED and In-Patient Tech workflow for CONFIRMED or SUSPECTED COVID-19 cases. All studies should be PORTABLE whenever possible.

Order for radiology exam that can be performed portably

* Radiologist approval is not necessary unless the technologist feels order may not be needed

Ultrasound

Discuss the exam to determine medical necessity with a radiologist

Radiologist contacts clinical team

Not necessary

Arrive to the unit and prepare to put on your personal protective equipment before entering the patients room

Proper PPE includes:
- N95 Mask
- Gown
- Gloves
- Face shield (or any type of eye protection)

* Depending on supplies surgical mask may need to be used and many supplies may need to be re-used

Enter room and perform exam

Properly take off all PPE before exiting the patient’s room (see video link for instructions)

Exit the room and completely wipe down the entire portable machine

https://vimeo.com/397424618/5e69e27680
Appendix B: CT/MRI/Nucs/Fluoro ED and In-Patient workflow for CONFIRMED or SUSPECTED COVID-19 cases

Order for radiology exam that CANNOT be performed portable

For MRI, CT, Nuc Med, Fluoroscopy, and invasive procedures on inpatients/ED

*Note* Expected that radiographs and ultrasounds will rarely have to be performed in diagnostic radiology department

Radiologist contacts clinical team

Discuss the exam to determine medical necessity with a radiologist

Discuss transport with nurse. Precautions need to be taken during transport to minimize spread.

Before entering the imaging room, proper PPE must be put on. Proper PPE currently includes:
- N95 Mask
- Gown
- Gloves
-Face shield (or any type of eye protection)

Enter room and perform exam

Properly take off all PPE before exiting the imaging room (see video link for instructions)

If the patient wears their surgical mask properly throughout their entire stay in our imaging room, the room can be used again after proper disinfection of all imaging equipment and surfaces

If a patient mask has not utilized, or has been deemed compromised during any part of the exam, the room must be cleaned and left vacant for a specified time (1 hour for most rooms, shorter for some CT scanners)

Equipment in the pavilion closest to the patient unit should be used to limit travel time

*Depending on supplies surgical mask may need to be used and many supplies may need to be re-used

For select studies, technologists may need to remain in the room for the exam in order to conserve PPE

https://vimeo.com/397424618/5e69e27680
Appendix C: NON-“HOT-SITE” OUT-PATIENT work-flow for technologist/front-desk staff

Patient presents as an outpatient for ANY Radiology Appt. Mask given at arrival

**Screening:** In the last month, have you been in contact with someone who was confirmed or suspected to have COVID-19, including outside the US.

OR

Do you have ANY of the following:
- Fever > 100°F or 37.8°C
- New cough
- New shortness of breath
- New sore throat
- New chills
- New loss of smell
- New onset diarrhea

OR

Have you been advised to stay home by a medical professional due to illness that might be COVID-19

Some sites can offer temp. check at front desk

If possible, obtain patient’s cell phone number or phone in the waiting room. Use phone communication whenever possible.

For the safety of patients and staff, the patient will not be permitted to proceed with the appointment, and should return to his or her car. They patient can contact the responsible clinician for further guidance. If patient does not have a responsible clinician or PCP, instruct to call contact Yale COVID-19 Call Center 203.688.1700.

SCREENER isolates patient per facility protocol

**Is test medically necessary?**
Tech should confirm with referring provider (or responsible radiologist when needed)

*If medical indication clearly necessary (acute DVT/PE, obvious fracture deformity, stroke/TIA, etc) additional confirmation will be unnecessary.
CHEST XRAY is not part of routine respiratory infection work-up currently. See next page

Route to designated “hot” site where staff will use appropriate PPE

Technologist performs imaging

*If the patient wears the surgical mask properly throughout their entire stay in our imaging room, the room can be used again after proper disinfection of equipment and surfaces. If the patient has NOT worn the surgical mask throughout the procedure, the room will need to be left vacant for a specified time (1 hour for most rooms, shorter for some CT suites).

Proper PPE includes:
- N95 (or surgical mask based on availability)
- Gown
- Gloves
- Face shield (or any type of eye protection)

LINK for proper PPE USE.  https://vimeo.com/397424618/5e69e27680
Appendix D.1:

Role of Chest Radiographs (CXR):

CXR plays a role in the imaging management of pneumonia in immunocompetent patients, despite known low sensitivity.

Any CXR of a suspected or confirmed COVID infection should be done portably for ED or In-Patient.

- CXR should NOT be obtained to rule out COVID infection
  - A normal CXR does not rule out the possibility of COVID. CXR is reported to have 25-60% sensitivity in detecting pneumonia for these patients. Ground glass opacities commonly seen with COVID can be occult on CXR.
- CXR should only be obtained when absolutely necessary and x-rays should be minimized when possible (e.g. for line placement, get one film after all lines placed).
- Examples of indications for CXR
  - Initial baseline imaging for a COVID Suspect or Known patient being admitted
  - To evaluate for complicated pneumonia (cavitation, effusions, etc)
  - To assess ETT placement after intubation or after line placement if concerned for malposition
  - When change in clinical status raises concern for possible superimposed pulmonary process

Role of Chest CT:

Chest CT plays a role in the imaging work-up of immunocompetent patients with pneumonia, mainly to detect complications such as cavitation, intra-parenchymal abscess and empyema. The role of CT in patients with suspected viral pneumonia is controversial.

Following recent statements by the American College of Radiology (ACR) and the Society of Thoracic Radiology (STR), CT is considered indicated in the following situations involving patients with suspected or confirmed COVID-19 infection:

1. CT should NOT be used to screen for or as a first-line test to diagnose COVID-19.
2. CT may be indicated in patients with positive COVID PCR testing AND suspicion for complications such as cavitation, intra-parenchymal abscess and empyema not adequately assessed via portable CXR.
3. We are not currently recommending Chest CT as a tool to guide admission decisions or medical management decisions for COVID as no data suggests clear benefit over traditional approach using clinical risk factors, labs, etc. Doing so wastes PPE and increases risk of spread to staff.
Appendix D.2- Current ADULT in-patient COVID treatment guide

YNHIS Initial Treatment Algorithm for Hospitalized ADULTS with Non-Severe* COVID-19

Disclaimer: There are no FDA-approved treatments for COVID-19; support care is standard of care. Limited treatment data are available & clinical judgment is warranted. - Algorithm text updated 4/9/20

Patient with confirmed POSITIVE SARS-CoV-2 by PCR
*If mechanically ventilated or on ECMO, proceed to severe algorithm

A-Presence of:
- Oxygen saturation ≤ 93% on room air or on 3L O2 (supplementation; <90% for <50 yr)

B-Presence of:
1) Fever and/or signs & symptoms of respiratory disease (e.g., cough, dyspnea)
2) Chest X-ray showing lung opacities

START TREATMENT
(see treatment below)

SUPPORTIVE CARE & EVERY 4 HOUR OXYGEN MONITORING
Evaluate for Clinical Trials (YNHIS only)

If oxygen saturation ≤ 93% on room air

TREATMENT
Start hydroxychloroquine x 5 days
Assess Clinical Trial Eligibility (YNHIS only)

If ≤ 3 Liter O2 requirement
OR ≥ 2 Liter O2 requirement & no CRP >70
Consider tocilizumab

Chest X-ray &/or CT: (as per clinical judgment)

YNHIS ID consult is mandatory; consider ID input if<br>immunosuppressed* or clinically decompensating<br>BN, GL, LMH, or WH consult ID

*Immunosuppressed includes following: Cancer treatment<br>within 1 year, the use of immunosuppressive drugs<br>including, systemic steroids (>20mg daily), with renal<br>replacement therapy, bone marrow transplantation, HIV/AIDS<br>(regardless of CD4 count), idiopathic, lymphoma, SIV, and<br>vasculitis.

Algorithm reviewed by YNHIS SAS and YNHIS/YSM Ad-Hoc COVID-19 Treatment Team
Appendix D.3- Current adult URI work-up for out-patients

ADULT OFFICE TRIAGE for Patient Calls w/ Respiratory Symptoms

--- DO NOT BRING PT INTO OFFICE ---

START: Telephone Triage

If Pt has Moderate/Severe Symptoms

Minor respiratory symptoms
- Sore throat
- Hoarse voice
- Cough

Moderate Symptoms
- Breathing okay
- Does not feel well overall
- Coughing
- Headache or sore throat
- Loss of smell or taste
- Chest pain/tightness

URI, Fever & Cough

COVID Suspect
- Home isolation minimum 7 days and ≥ 3 days symptom resolution
  - Symptomatic
    - Consider treatment for influenza or bacterial infection only if highly suspected

Negative COVID Test

ADVICE FOR ALL SYMPTOMATIC PATIENTS:
- Self isolation per CDC
- Call back for worsening
- Call back for worsening
- Consider testing

Positive COVID Test

ADVICE FOR ALL ASYMPTOMATIC PATIENTS:
- Self monitor per CDC
- Call back for fever or respiratory symptoms
- We do not recommend testing at this time
- Exposures/recommendations:
  - Work exposure: HCW - monitor for symptoms and continue to work
  - Household exposure: Self isolate ≤ 14 days, monitor for symptoms

Severe Symptoms
- Unable to get out of bed
- Dyspneic (RR > 25)
- Chest pain
- Tachycardic (HR > 110)
- Difficulty breathing
- Confused

- Needs ED and hospital admission
- Call before sending to inform "COVID suspect" can self transport
- If ambulance needed must inform "COVID Suspect"

SIM COVID AMBULATORY GUIDELINE 3/29/20
* Aligned with CDC guidelines as of 3/29/20
Appendix E

PPE for Patients with Suspected or Confirmed COVID-19 in ED and Acute Care Settings

Hospital Settings

Emergency Room and Acute Care

COVID Precautions
N95, eye shield, gown, gloves
(surgical mask if N95 not available)

Private room with door closed
Negative pressure not required
N95 fit-testing not required

Aerosol Generating Procedures

COVID Precautions
N95/PAPR, eye shield, gown, gloves

Negative pressure room
(if not available, place in private room with door closed using above PPE)

- Respiratory specimens can be collected in a normal pressure private room with the door closed wearing a mask or N95, eye shield, gown and gloves
- Care team entering room should be limited to 1 Physician/IP and 1 nurse with limited dedicated assistants as needed.
- Students\(^1\), non-essential staff or visitors are not to enter the room.
- Respirators, masks and eye shields are to be reused per PPE Reuse and Extended Use protocol.
- Cluster care to minimize people entering room and PPE use
  - Masks, respirators, eye shields and gowns can be worn between patients per the PPE Reuse and Extended Use protocol.
  - Nursing should pull trash and linen and place by door for EVS to pick up.
  - Nursing to clean high touch surfaces (bed rails, call bell, tray tables, etc.) with disinfectant wipes daily.
  - Nursing should prepare patient for transport and push into corridor for transporter to receive.

\(^1\) Aerosol Generating Procedures: Examples include intubation, non-invasive ventilation, CPAP, bronchoscopy, open suctioning of the respiratory tract, nebs.
\(^2\) Medical students serving in a role as sub-intern which are essential to patient care are an exception.

3/24/2020

Link for PPE use.  [https://vimeo.com/397424618/5e69e27680](https://vimeo.com/397424618/5e69e27680)

**CLICK HERE FOR FULL PPE GUIDANCE POLICY INCLUDING REUSE PROCEDURES**

References:


(4). YNHHS Covid Resource Website