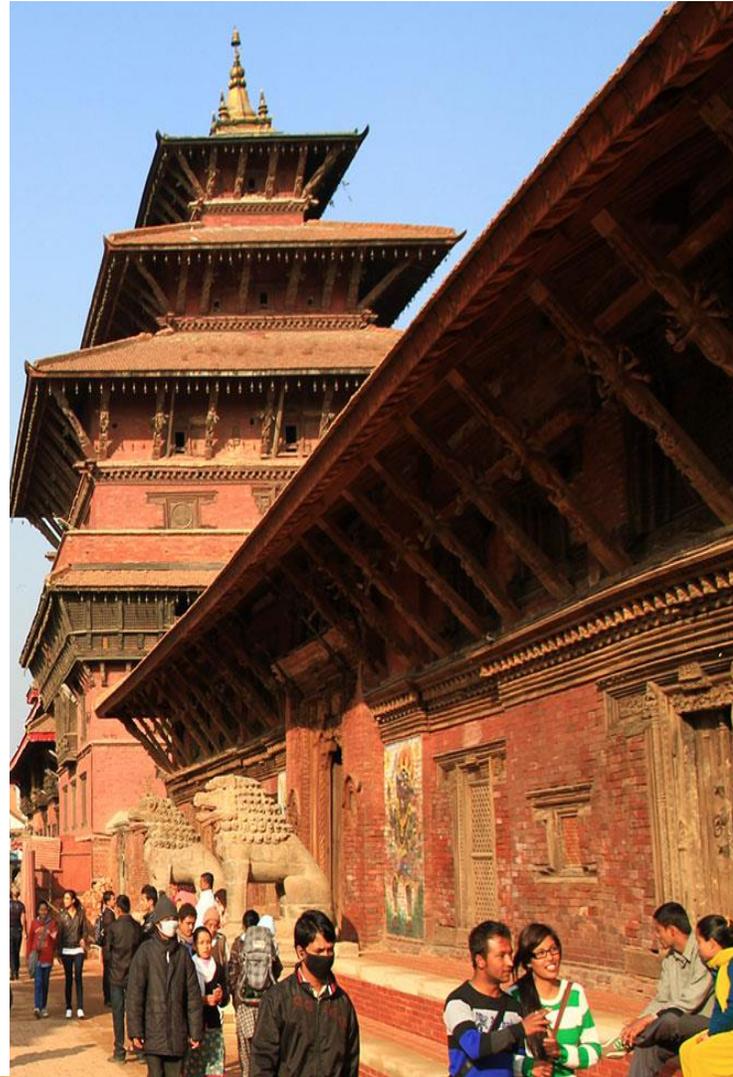


INTERIM GUIDELINES FOR RADIOLOGY PRACTICE DURING COVID -19 PANDEMIC



Version-1

NEPAL RADIOLOGISTS' ASSOCIATION
April 17, 2020





काठमाडौं
बाँसबारी काठमाडौं, नेपाल
पो.ब.नं. : १३८१०

नेपाल मेडिकल काउन्सिल

(नेपाल मेडिकल काउन्सिल ऐन २०२० अन्तर्गत स्थापित)

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(Under Nepal Medical Council Act 1964)

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श्री अध्यक्षज्यू
नेपाल रेडियोलोजिष्ट एसोसिएसन
काठमाडौं ।

विषय : निर्देशिका अनुमोदन बारे ।

उपरोक्त विषयमा मिति २०७७ वैशाख फाल्गुण १७ गते बुधवार बसेको नेपाल मेडिकल काउन्सिलको पूर्णवैठकको निर्णयानुसार त्यस एसोसिएसनबाट निर्माण भई यस काउन्सिलमा प्रस्तुत भएको Interim guidelines for radiology practice during COVID-19 pandemic 2020 लाई प्रस्तुत गरिएको छ। र उल्लेखित विवरण यमोजिम अनुमोदन गरिएको जानकारी गराउँदछु ।

डा. कृष्णप्रसाद अधिकारी
रजिष्ट्रार

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Need for the guidelines

Nepal is not untouched by COVID-19 pandemic, although there are only sporadic cases and to date very few cases of community transmission of this disease have been identified. COVID-19 is primarily spread via respiratory droplets produced when an infected person coughs or sneezes, which are exaggerated in the aerosol generating procedures, putting those around at higher risk of infection. It is easily transmitted from the infected person during incubation, symptomatic and convalescent period. Transmission rate is very high compared to other diseases. There is a need for radiology professionals to be prepared to face the challenges posed by COVID-19 pandemic, so that the disease can be contained and diagnosed, and appropriate radiology services can be provided throughout this period and in future with appropriate safety precautions.

The health and safety of radiologists, allied professionals, health care workers and patients are of primary importance. There are a limited number of health care professionals in Nepal, and they need to be in perfect health to be able to provide services during this crisis. There may be asymptomatic patients or health care providers who can potentially spread the disease. Notably, most of the COVID-19 patients found to date in Nepal are asymptomatic. So, minimum universal precautions should be taken while performing all radiological investigations.

RTPCR is the valid test conducted to find COVID 19 in a patient. Radiology has a limited role in the management of COVID-19 patients or in modifying the outcome of the disease. However, there are specific conditions where radiology plays a vital role. Various articles have been published in the last few months highlighting the logistic, technical, diagnostic and safety issues of treating COVID 19. It is essential to utilize this knowledge and know-how in our national context, so that we can provide uniform radiology services throughout Nepal.

Aim of the guidelines

While supporting the care of patients with COVID 19, we must follow appropriate practices in the radiology department with the following aims:

1. To limit exposure to the virus.
2. To determine best use of imaging.
3. To protect staff.
4. To maintain uninterrupted radiology department operations.

General recommendations

During COVID-19 epidemic/pandemic period we should follow the following general recommendations:

- Rescheduling diagnostic tests and procedures which are not urgent. This needs to be decided by the clinician and radiologist.
- Social distancing needs to be maintained at all times within the radiology department. Only one or minimum number of accompanying persons must be allowed.
- Departments should work with local clinicians to ensure the following relevant clinical information on all imaging requests:
 - Suspicion of COVID 19
 - Infection risk: impacts on how, where and when patients are imaged
 - Raised white cells count/lymphopaenia: usually present in COVID-19

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- CRP: unusual to be COVID-19 +ve if CRP is normal
 - Relevant respiratory history
 - Smoking history
 - Follow the recommended precautions while performing respective procedures for suspected or confirmed COVID-19 patients.
 - Follow the basic precautions while doing procedures like sonography or interventions which bring the radiologist or allied staff close to patients with other diagnoses. The reporting radiologist who does not come in contact with patients may maintain the basic recommended precautions, i.e. hand hygiene, clean workplace, mask and social distancing.

Use of portable X-ray

Portable radiography units must be used **in ambulatory care facilities** when chest X-rays are considered medically necessary for a patient diagnosed with COVID-19. **Dedicated portable x-ray machine is preferable for isolation ward with suspected or diagnosed patients of COVID 19.** The surfaces of these machines can be easily cleaned, avoiding the need to bring patients into radiography rooms, which will need more extensive cleaning and also increase risk of transmission to any other patient.

Following precautions **MUST** be taken while performing Chest X Ray of a suspected or diagnosed COVID-19 patient:

- Portable X-ray, preferably dedicated to isolation ward, must be used to limit the movement of patients and to limit infection.
- Radio technician / technologist should wear Cat I PPE.
- X-ray Cassette must be double bagged in plastic envelop before handing over to clinician/ nurse.
- Clinician caring for the patient within the room positions the patient and cassette.
- Radiographer makes sure the cassette is in proper position and takes the radiograph.
- Clinician slides out the cassette from outer envelope without touching inner envelope and transfers the cassette to the radiographer.
- To avoid contamination of the x-ray unit and cassette, radiographer avoids touching the patient.
- Portable radiography machine must be cleaned by radiographer twice with disinfectant for subsequent use.
- If the fixed X-ray machine is to be used for other general patients, clean the surfaces of room and equipment using hospital approved methods.
- After x-ray, the room downtime is typically between 30 min to 1 hour for room decontamination with passive air exchange.
- The X-ray cassettes coming in contact with patients need to be disinfected each time.
- Communicate x-ray findings and dispatch report as soon as possible. Use recommended x-ray reporting format for COVID-19 suspected or diagnosed cases (Appendix-1).

Use of CT scan

Center for Disease Control, Fleishner Society, British thoracic Imaging Society and ACR currently do not recommend x-rays and CT scan to screen for or as a first-line test to diagnose COVID-19. Provision of diagnostic imaging services to large numbers of patients suspected or confirmed to have

COVID-19 during an outbreak can be challenging, as each study is prolonged and complicated by the need for strict adherence to infection control protocols.⁵

Therefore, criteria are set for imaging of chest as follows (as recommended by multinational consensus statement from the Fleischner Society):⁸

- Imaging is not indicated for patients with mild features of COVID-19 unless they are at risk for disease progression. (Mild features mean no significant pulmonary dysfunction or damage, e.g., absence of hypoxemia, no or mild dyspnea. Risk factors for disease progression are age >65 years and presence of comorbidities, e.g., cardiovascular disease, diabetes, chronic respiratory disease, hypertension, immune-compromised). However, when COVID-19 test results are unavailable, patients with moderate-to-high pre-test probability should be initially treated as if COVID-19 testing is positive, and treated as negative in low pre-test probability.
- Pre-test probability is defined by the background prevalence of disease as estimated by observed transmission patterns and could be modified by individual's exposure risk.
(Low =sporadic transmission; Medium =clustered transmission; High = community transmission)
- Imaging is indicated for patients with moderate to severe clinical features of COVID-19 regardless of COVID-19 test results (Moderate to severe features include evidence of significant pulmonary dysfunction or damage).
- Imaging is indicated for patients with COVID-19 with evidence of worsening respiratory status.
- In a resource constrained environment where access to CT is limited, chest x-ray may be preferred for patients with COVID-19 unless features of respiratory worsening warrant the use of CT.
- CT is indicated in patients with functional impairment and/or hypoxemia after recovery from COVID-19.
- COVID-19 testing is indicated in patients incidentally found to have findings suggestive of COVID-19 on a CT scan.
- Adequate appropriate infection control procedures should be followed before scanning subsequent patients.

Following precautions MUST be taken while performing CT scan of a suspected or diagnosed COVID-19 patient:

- As transport is essential, patients should wear a surgical mask when travelling to and out of CT facility.
- Care personnel should take care of personnel precaution (Use PPE, i.e., full body cover, double layer gloves, N-95 respirator and shoe cover).
- Use PPE, i.e., full body cover, double layer gloves, N-95 respirator and shoe cover, if technologist will be exposed during positioning.
- Before transferring patient to CT room, cover CT couch with plastic sheet, which should be disposed immediately after the procedure.
- To avoid contamination, don't allow accompanying clinicians and transferring personnel to enter CT console room.
- Communicate CT findings and dispatch report as soon as possible. Use recommended CT reporting format for COVID-19 suspected or diagnosed cases (Appendix-2).

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- Clean the surfaces of room and equipment using hospital approved methods and dispose sheet used for CT couch covering.
 - Seal the CT room with tape and plastic covering (doors and vents).
 - Implement hydrogen peroxide vapor decontamination.
 - After imaging, the room downtime is typically between 30 minutes to 1 hour for room decontamination with passive air exchange. It's better to do CT in cluster if there are many confirmed patients requiring CT scan, and if possible, as the last patient of the day.

Use of Sonography

There is no valid role of sonography in screening and diagnosis of COVID-19 patient. Unnecessary modalities will only cause avoidable exposure to others, including the healthcare professionals, and increase risk without any benefits. Both ACR and BTSI recommend only chest X-ray and rarely CT scan for the investigation of COVID-19 patient. Ultrasound of the patients is needed in different situations which could be divided into 2 groups.

Group I *Ultrasound needed in highly suspected (in isolation) or diagnosed COVID-19 patients.*

If there is a significant impact of sonography on the management of these cases, sonography could be done. Following precautions **MUST** be taken while performing sonography:

- Radiologist should use category I PPE.
- Use portable USG, preferably dedicated to isolation ward, to avoid patient transport.
- Before entering the patient room, cover the probe including cord with plastic sheath. Put more gel within the sheath.
- Cover the USG control panel with plastic cover.
- Patient must be wearing mask.
- Ask other staff & clinician to manipulate the control panel (to avoid contaminating the USG unit).
- Determine the specific goal of sonographic examination after discussion with treating physician and their expectations before the scan
- Perform the sonography with adequate precautions, limiting contamination to as low as possible and spending minimal possible time
- Clean the probe with the sheath with disinfectant wipes prior to removal of the sheath.
- Clean the USG unit with hospital approved method.
- Dispose the PPE appropriately.
- Take general precaution (hand washing before and after the procedure).

Group II *Ultrasound needed in general patients in this particular time of pandemic of COVID-19 and its recovery period.*

Meticulous and justified use of the radiological modalities is suggested during the pandemic for general and non COVID 19 patients, because of the risk of unknown carriers.

Following precautions **MUST** be taken while performing sonography:

- Spread out appointment time to avoid crowding in the waiting area.

- Patient must wear surgical mask. Only one patient is allowed to enter the USG room and only one support person if needed.
- No additional staff should be in the room.
- Bed should be covered with disposable paper/plastic and should be changed after every patient.
- Radiologist must wear surgical cap.
- Wear surgical or N95 mask depending upon institutional policy and availability.
- Wear gown or work uniform.
- Avoid wearing watch, bracelets or rings and keep mobile phone in a sealed plastic cover.
- Use disposable gloves and discard after every patient.
- Hand hygiene before and after every patient.
- Use plastic cover over the control panel (keyboard/TGC knobs etc).
- The probe should be covered with disposable covers (plastic wrap used to wrap food or gloves could be used for it) for each patient. Or it can be used after wiping with disinfectant. Probes should be kept on the side other than the patient's bed.
- Control panel must be cleaned regularly as per the company recommendation.
- Reduce scanning time if possible.

Recommendation for interventional radiology

Interventional radiologists are involved in aerosol generating procedure. Therefore, they need special precaution during the interventional procedure for general patients during this COVID 19 pandemic and its recovery period. We suggest following precautions which are in keeping with the Society of Interventional Radiology:

- Defer/delay procedure and pursue alternative treatment options whenever the procedure is not urgent.
- If an aerosol generating procedure must be done, in a COVID-19 positive or suspected patient, appropriate PPE (category I) which includes N-95 mask or higher level respirator, sterile gloves, eye protection (face shield or goggles), disposable water proof gown and disposable surgical cap is needed.
- If an aerosol generating procedure must be done in other patients, then standard procedure attire should be worn which includes – surgical mask (preferably N-95), sterile gloves, protective eyewear, disposable sterile gown and disposable surgical cap.

The aerosol generating procedures include procedures which may cause increase in coughing/sneezing. They include- Lung biopsy, thoracocentesis, pleural drains, chest tube for pneumothorax, bronchial artery embolization, procedures involving NG tube, gastrostomy, jejunostomy, gastro-jejunostomy tube placements, GI stent placement.

Recommendation for well-functioning of the Radiology Department during COVID-19 pandemic

- Use screeners at the radiology reception desk as far as possible.
- Deep clean the scanner and room after imaging and allow for passive air exchange.
- Use appropriate precautions for patients who are undergoing aerosol-generating procedures.
- Issue a moratorium on travel for all employees.

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- Maintain supply of masks and other personal protective equipment.
 - Provide infection control tutorials, especially to CT, ultrasound, and interventional technologists.
 - Establish a coronavirus crisis management team that oversees the department's preparedness.
 - Develop a plan for separate urgent care sites for treating coronavirus patients.
 - Put social distancing measures into place: Allow staff to work from home, create isolated reading rooms onsite, and use video conferencing for meetings wherever possible. Do not allow staff to rotate between facilities.
 - Create a plan to handle surge if the healthcare system is burdened by increased patient volume and imaging needs.
 - Create a backup call schedule to cover for ill staff.

Universal Precautions to be taken at radiological facilities

At the moment COVID-19 is a pandemic and gradually the number of cases will go down. However, the cases may remain in sporadic and epidemic form throughout the year and subsequent years to come. In this context there is a need to modify our behavior and daily clinical practices so as to prevent cross contamination and spread of infectious diseases of any form. The following universal precautions are recommended for the safety of patients and medical professionals and to reduce the rate of cross contamination and spread of the disease.

- These recommendations are applicable to all health care personnel working in radiology facilities including radiologist, technologist, radiographers and other care personnel.
- Use hospital scrubs (staff dress) while at work to avoid bringing infection to your family and home.
- Avoid wearing watch, bracelets or rings and keep mobile phone in a sealed plastic cover.
- Necessary use of mask during patient examination and procedure.
- Make sure of mandatory use of mask by patients and visitors, who come for radiological investigation and procedure.
- Use disposable top gloves to examine each individual patient and dispose it (including after performing ultrasonography).
- Wrap the sonography probe with plastic wrapper (like food wrapper) before the procedure. Clean the wrapped probe with disinfectant and dispose wrapper immediately at the end of procedure before taking off the gloves.
- Use plastic covers for control panels of medical equipment (CT, MR, x-ray, Sonography) and dispose it every day, or multiples times a day as required.
- Use disposable bed covers for each patient if examination (USG, CT, fluoroscopy) is to be done in lying position. (Cloth bed sheets can be changed after each case, if they are properly washed after every use).
- Use disposable paper towels to wipe the gel (cloth towel can be used if properly washed after every use).
- Practice intermittent hand washing or use sanitizer.

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Appendix -1
Chest X Ray reporting findings and format:

Category	Association with COVID 19	CXR finding	Suggested reporting Language
Negative	No CXR features of Pneumonia	Clear lung or chronic changes confirmed stable with comparison studies	No radiographic evidence of pneumonia (CX-NP)
Indeterminate for pneumonia	COVID 19 pneumonia and/or other disease processes may be present	Pneumonia not confidently seen. Basilar opacities which could represent pneumonia or atelectasis, chronic disease with possible new findings, interstitial disease which could be pneumonia or pulmonary edema	Radiographic findings are indeterminate for pneumonia, COVID 19 pneumonia or other disease may be present (CX-IP)
Focal Pneumonia	Can be seen in COVID 19 pneumonia but less typical	Unilateral focal pneumonia, other patchy opacity, bilateral disease may be present but not detected on CXR	Focal pneumonia (can be seen in COVID-19 pneumonia, but non-specific) (CX-FP)
Multifocal pneumonia	Typical appearance of COVID 19 pneumonia	Bilateral patchy opacities with mid to lower lung zone predominance, often peripheral and rounded, bilateral multifocal consolidation with or without interstitial thickening or diffuse air space disease	Multifocal and bilateral pneumonia (typical appearance for COVID 19 pneumonia) (CX-MP)

**The chest radiograph in COVID 19 pandemic: Role, Standardized reporting and CT Correlation. -Maya Galperin-Aizenberg,MD, Ana S. Kolansky, MD, University of Pennsylvania, Department of Radiology, Cardiothoracic Division*

Appendix -2

HRCT of chest in suspected /diagnosed COVID-19 and its reporting format

Volume scan obtained in HRCT mode.

Findings

1. Typical Appearance

- Thin-section axial images of the lungs show bilateral, multifocal rounded and peripheral ground glass opacities with superimposed interlobular septal thickening and visible intralobular lines (“crazy-paving”). Involvement of ... lobes seen.
- Thin-section axial images of the lungs show peripheral, bilateral, ground glass opacities **with or without** consolidation or visible intra-lobular lines (“crazy-paving”)
- Reverse halo sign is also seen.
- Area/s of consolidation seen with air bronchogram in

2. Intermediate Appearance

- Thin-section axial images of the lungs show multifocal, diffuse, perihilar or unilateral ground glass opacities with or without consolidation lacking a specific distribution and are non-rounded or non-peripheral.
- Thin-section axial images of the lungs show few very small ground glass opacities with a non-rounded and non-peripheral distribution.

3. Atypical appearance

- Thin-section axial images of the lungs show absence of typical or indeterminate features of COVID-19 pneumonia and presence of Isolated lobar or segmental consolidation without ground glass opacities
- Discrete small nodules (centrilobular, “tree-in-bud”)
- Lung cavitation
- Smooth interlobular septal thickening seen with **minimal/small/moderate/large, right/left/bilateral** pleural effusion.

4. Negative for pneumonia:

- Both lungs show normal attenuation and normal parenchymal architecture. No evidence of bronchiectasis on either side. No tramline shadows. No septal or fissural thickening on either side. No cystic or bullous lesion on either side. No cavitating lesion. Trachea and major bronchi are normal. No pleural thickening or pleural effusion on either side.
- No CT features to suggest pneumonia.

Impression

Typical appearance

- In this **suspected /proven** case of COVID-19 infection commonly reported imaging features of COVID-19 pneumonia are present. Other processes such as influenza pneumonia and organizing pneumonia, as can be seen with drug toxicity and connective tissue disease, can cause a similar imaging pattern.

Intermediate appearance

- In this **suspected/proven** case of COVID-19 infection (**Findings**). These imaging features can be seen with (COVID-19) pneumonia, though are nonspecific and can occur with a variety of infectious and noninfectious processes.

Atypical

- In this **suspected /proven** case of COVID-19 infection (**Findings**) These imaging features are atypical and are uncommonly reported for COVID-19 pneumonia. Alternative diagnoses should be considered.

Negative for pneumonia

- In this **suspected / proven** case of COVID-19 infection no CT findings present to indicate pneumonia (Note: CT may be negative in the early stages of COVID-19).

Note:

Clinical correlation is a **MUST** as the same pattern may be seen in many other lung disease. There are no typical features suggestive of COVID-19 pneumonia.

***Radiologists must keep updated about the Xray and CT imaging features of the COVID-19 pneumonia as various updated studies are now available on the web.*

Appendix-3

Differentiating non-COVID-19 and COVID-19 pneumonia in HRCT with sensitivities

Compared to non-COVID-19 pneumonia, COVID-19 pneumonia is more likely to have:

- Peripheral distribution (80% vs. 57%, $p<0.001$)
- Ground-glass opacity (91% vs. 68%, $p<0.001$)
- Fine reticular opacity (56% vs. 22%, $p<0.001$)
- Vascular thickening (59% vs. 22%, $p<0.001$),

But less likely to have a:

- Central & peripheral distribution (14.% vs. 35%, $p<0.001$)
- Pleural effusion (4.1 vs. 39%)
- Lymphadenopathy (2.7% vs. 10.2%, $p<0.001$)