CAR Position Statement on Remote Reporting

Key Points

- The value of radiology is derived from the embedding of radiologists' expertise in their local department, hospital, or clinic. Remote reporting arrangements should be a supplement to on-site reading and consultation.
- Radiologists reporting remotely must always have an open line of communication with the referring physician, local radiologist(s), and medical imaging team when possible.
- Radiologists reporting remotely should continue the practice of including relevant prior imaging and medical history as correlative information in interpretations.
- Medical physicists and medical radiation technologists should be consulted when establishing remote reporting solutions and workstations.
- Remote reporting is a medical act and should be governed by the same systems that safeguard patients in all medical acts.

Background and definitions

In this position statement, the Canadian Association of Radiologists (CAR) provides an update on the status of remote reporting arrangements in radiology departments and clinics, along with recommendations to facilitate patient-centered care. **Remote reporting** refers to interpretation and reporting on medical imaging examinations by radiologists that would otherwise have been done on-site. The unique circumstances of the COVID-19 pandemic led to an increased need and demand for remote reporting, with many radiologists reading studies and reporting from home due to social distancing mandates and other factors, to alleviate or mitigate disruptions to patient care and radiology workflows created by the pandemic.[1,2]

The CAR last issued guidance about the intersection of telemedicine and radiology reporting in 2008, in the CAR Standards for Teleradiology.[3] That document defined teleradiology as the electronic transmission of diagnostic imaging studies from one location to another for the purposes of interpretation and/or consultation. Today, **teleradiology** most frequently refers to workflows in which the radiologist reviews, interprets, and reports on imaging studies which were conducted at a transmitting site that may have been far outside their local hospital catchment area. This may be in instances where interpretation and reporting are required for extremely rural or remote imaging sites,[4] or instances where reading and reporting on imaging studies may have been carried out by third-party companies employing radiologists not employed by the facility.

The following position statement and its recommendations pertain specifically to remote reporting arrangements where radiologists affiliated with and/or employed by an imaging clinic or department are interpreting, reporting, or consulting on imaging studies for that local site from a location outside the clinic or hospital.

It is paramount that radiologists reporting remotely are able to maintain a strong connection to the local department, hospital, or clinic to ensure that the value of radiology is harnessed for the sake of patient care and the optimal functioning of the healthcare system.[5] Regardless of whether reporting is conducted on-site or remotely, it is essential that radiologists be involved as advocates for their patients by assisting in the selection of the most appropriate examinations, consulting with other physicians, working with patients to help them understand their imaging options, and actively engaging as a member of the patient's health care team.

Current state of remote reporting and impacts of the COVID-19 pandemic

Radiology has undergone significant changes over the past several decades, as the field and telecommunications have evolved.[6,7,8] With the onset of the COVID-19 pandemic, the operations of many radiology departments were recalibrated and restructured.[9,10,11,12] The pandemic greatly increased the number of radiologists engaged in remote reporting arrangements with their local department or hospital. In July 2021, the CAR surveyed Canadian radiologists about their participation in and perspectives on remote reporting:

- 90.3% of respondents had reported on studies originating from their hospital, clinic, or health authority from home, with the majority (59.7%) reporting less than 25% of their total reads remotely or from home.
- For the radiologists who reported remotely or from home:
    - 68.7% had done so prior to March 2020
    - 9.0% had done so only during a brief period of initial shutdown caused by the COVID-19 pandemic (from March 2020-May 2020)
    - 9.7% had begun reporting remotely in March 2020 and continued up to the time of the survey in July 2021.
- 80.9% of respondents would like to continue reporting remotely (often in a hybrid model) after the COVID-19 pandemic measures and social distancing requirements have been lifted.[13]

An American College of Radiology survey on the impacts of COVID-19 reported that 62.3% of radiologists in their sample had existing remote reporting capabilities in place prior to the pandemic, and 22.3% of practices developed such capabilities during the pandemic.[12] Among medical specialties, radiology has proven especially adaptable to flexible working arrangements necessitated by the pandemic.[12,14,15,16,17]

Benefits of remote reporting

The main benefit of remote reporting from a health system perspective has been the mitigation of some of the disruption to radiology service provision caused by the pandemic. Remote reporting during the pandemic also

made it possible for some radiologists to work remotely in the pursuit of infection control and workplace safety measures.[9,13] Remote reporting can also facilitate the reallocation of physical work space that would have previously been occupied by radiologists reading on-site, to address evolving demands for space in some hospital settings. More general benefits from remote reporting may be derived if reporting arrangements are expanded to include a wider catchment of patients, or permit a team of radiologists to interpret and report on studies for a wider health network, remote reporting may also reduce the need for transfer among rural and trauma patients, reduced wait times for patients, and expedited image interpretation.[4,18,19]

Challenges and necessary considerations for remote reporting

Although remote reporting can be of great value, it does have inherent challenges, especially related to barriers to effective communication and collaboration. Additional barriers to the further implementation of remote reporting in Canada are related to IT capabilities including network bandwidth and VPN protocols, privacy and security concerns, reimbursement, quality assurance, interoperability of systems, storage capacity, and medico-legal considerations.[1,20]

Effective communication between radiologists reporting remotely and medical imaging team members working on-site must be prioritized. If remote work arrangements are necessitated by a pandemic or other service disruption, it is essential that radiologists and other team members be supported in maintaining a community even at a distance. Concerted efforts must be made to ensure that radiologists remain rightly embedded within medical imaging teams and connected with referring physicians and hospitals to ensure proper continuity of care for patients. Strong communication will promote and improve resilience in teams and ensure that protocols to patient management are recognized and followed.[9,16,21,22,23]

In order for remote reporting to meet the needs of imaging departments and patients, radiologist reporting remotely must have access to patient records and clinical histories, open lines of communication with referring physicians and clinical care teams, IT assistance to maintain for remote reporting, and emergency steps to take if encountering internet/network issues.[21,22,23,24,25] A reliable flow of communication between the local imaging team and radiologists reading remotely is essential to ensure transmission of relevant patient information and queries from technologists. Moreover, relevant prior imaging and medical history must be included as correlative information in interpretations.

Regulatory requirements

Remote reporting of medical imaging studies is a medical act and should be governed by the same systems that safeguard patients in all medical acts. The licensing, insurance, and practice requirements associated with remote

reporting are affected by the various regulatory and licensing requirements across jurisdictions in Canada.[20,26] The absence of national licensure in Canada is a significant barrier to remote reporting arrangements that permit radiologists to report remotely on studies from their local institution in the event that they live and work across a provincial border. The CAR recommends that radiologists and administrators review the insurance requirements and standards of practice for their province of residence, work, and the province in which the patient resides.

The radiologist's combined workload for remote and on-site reporting should be at a level that quality of care and interpretation accuracy are not compromised. As new imaging modalities and interventional techniques are developed additional clinical training, under supervision and with proper documentation, should be obtained before radiologists interpret or perform such examinations or procedures independently. Such additional training must meet with pertinent provincial/regional regulations. Continuing professional development must meet with the requirements of the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada.

Radiologists reporting remotely should participate in quality improvement initiatives, including meeting requirements for continuing medical education (CME) and continuing experience (CE) to the same standard as they would if they were reporting 100% on-site. Hospitals and clinics ties must systematically monitor and evaluate procedures as part of the overall quality improvement program of the facility. Monitoring should include the evaluation of the accuracy of the interpretations and the appropriateness of examinations. Incidence of complications and adverse events must be reviewed to identify opportunities to improve patient care.

Image management

DICOM is an internationally accepted standard for handling, storing, printing, and transmitting medical images and metadata.[18] All imaging systems should include an integrity checking mechanism to ensure that all associated metadata and pixel data are received by the reviewing radiologist.

a. The patient must be identified accurately and unambiguously. This may include patient name, identification number, date and time of examination, film markers, institution of origin, type of examination, degree of compression (if used) and a brief patient history. This information should be associated with the image file.

b. Image storage at either the acquisition or reviewing site as well as transmission must be arranged such that patient confidentiality is maintained and the system is secure. Ongoing storage of confidential patient data must be avoided in an unsecure location, such as a private residence.

c. Capability for the selection of image sequence and display at all the reviewing sites.

d. Capability for the remote reader to obtain prior examinations and reports prior to reading, or during reading if the transfer time is low enough as to not slow down significantly the reading process.

e. The types and ratios of compression used for different imaging studies transmitted and stored by a system must be selected and periodically reviewed by the responsible physician to ensure high clinical image quality.

Communications protocols, file formats and compression should conform to the relevant DICOM and Canadian IHE standard. The type of medical image, the modality, and the objective of the study will determine the degree of acceptable compression. There must be no reduction in clinically diagnostic image quality. The CAR recommends consulting medical technologists and/or PACS administrators to ensure that relevant standards are met.

Workstation guidelines

Specifications for equipment used in remote reporting will vary depending on the individual facility's needs. Compliance with the relevant DICOM and Canadian IHE standard is required for all new equipment acquisitions, and periodic upgrades should be part of a continuing quality improvement program. Other applications, such as speech recognition software, radiology information system, electronic medical records, e-mail, and other telecommunications, should be integrated as needed into the workstation. For specific technical guidelines for workstations, see Appendix A: Technical specifications for remote reporting.

Ergonomic factors such as the position of the work chair, workstation table, keyboard, mouse, and monitors, as well as environmental factors such as ambient room lighting, temperature, and noise, should be considered to maximize efficiency and accuracy of interpretations.[22] Display devices should be placed at an arm’s length from the viewer (about 60 cm) and at a reading level with the center of the display slightly below eye level.[28,29] To minimize eye fatigue, reading room lighting should be controlled to eliminate reflections on the monitor and the ambient lighting level should be lowered as much as is feasible without turning the lighting off completely (20–45 lux is recommended). Proper chairs with lumbar support and adjustable height controls (including armrests) are recommended to avoid injury and excessive fatigue. The workstation table should be height adjustable, and the keyboard, mouse, and monitors should be designed to maximize comfort and efficiency. Dictation tools and other reference tools should be readily accessible and easy to use during image interpretation.

The future of remote reporting

Remote reporting has the potential to increase both the reporting capacity of radiology departments, and the flexibility of those departments to meet growing, evolving demand. This will become particularly important as workloads continue to increase as the COVID-19 pandemic wanes.[9] The CAR recommends that radiology practices and hospitals who are exploring remote reporting options allocate the necessary funding to implement such a system, considering the needs for 24/7 IT support, appropriate bandwidth capacities, and imaging requirements for RIS/PACS systems. Regardless of the radiology reporting arrangement, the CAR recommends that radiologists remain embedded in the medical imaging and clinical care teams of which they are a part. The value of radiology and of radiologists extends far beyond the interpretation of imaging examinations. Medical imaging is fundamental to patient care, and to ensure that radiology is properly recognized and valued within the healthcare system, it is essential that radiologists maintain an on-site presence among the patients they serve and the clinical communities of which they are a part.

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Appendix A: Technical specifications for remote reporting

- **Acquisition:** Initial image acquisition should be performed in accordance with the appropriate CAR modality or examination guideline or standard.
- **Direct image capture:** The entire image data set produced by the digital modality in terms of both image matrix size and pixel bit depth, should be transferred to the PACS/remote reporting system. The DICOM standard must be used.

The network/IT and RIS/PACS suppliers must be consulted when setting up a remote reporting workstation. There are three core elements to a remote workstation:

1. The monitor
    - Specifications for various modalities are listed in **Table 1**. PACS vendors and medical physicists can be consulted on monitor displays. The CAR recommends the ACR display standards as outlined in **Table 1.**
    - Ensure that room ambient lighting is between 20-50 lux. Reflections from ambient lighting can have a strong influence on contrast perception.
    - Display calibration should be assessed and corrected if needed at least once annually to ensure compliance within 10% of DICOM GSDF.[30]
2. The computer
    - No specific hardware requirements
    - Check with RIS/PACS manufacturer to ensure compatibility.
    - Software used for reading (independent software or PACS client)
3. A secure network connection to the hospital RIS/PACS
    - Images may be directly transferred or streamed, depending upon the software being used.
    - A secure VPN connection.[1]
    - A high-bandwidth internet connection.

Table 1. The ACR[28,31] specifications for reporting workstation displays:

Specification	ACR (2017)	ACR (2017)
Modalities	*US, CR, DR, CT, MRI*	*Mammography*
Pixel pitch	Approx. 0.2 mm (<0.21)	Approx. 0.2 mm (<0.21)
Grey scale calibration	DICOM GSDF (±10%)	DICOM GSDF (±10%)
Bit depth	≥8 bits	≥8 bits
Aspect ratio	3:4 or 4:5	-
Max luminance	350 cd/m^2	420 cd/m^2
Min luminance (including screen reflection contribution)	≥1.0 cd/m^2	≥1.2 cd/m^2
Luminance ratio	About 350	About 350
Ambient lighting	25-50 lux	20-45 lux