



ACADEMY OF MEDICINE  
SINGAPORE



COLLEGE OF RADIOLOGISTS  
SINGAPORE

MAY 2020

## PRACTICE GUIDELINES

# REMOTE REPORTING GUIDELINES FOR HOME/OFFSITE REPORTING USING A VIRTUAL DESKTOP CONNECTION DURING COVID-19 PANDEMIC

### 1. PURPOSE

This guidance represents a temporary relaxation of currently available radiology display and reporting guidance from other professional bodies, both international and local during the COVID-19 global pandemic. It serves to provision for telecommuting in all workplaces in order to curb the transmission of disease locally.

These guidelines are created by consulting imaging informatics leads and in consultation with stakeholders from all hospitals.

This document aims to -

- (i) Provide an alternative means of reporting whilst away from at work in the setting of -
  - (1) enhanced social distancing measures where telecommuting is desired or mandated by law
  - (2) acute staff shortages
- (ii) set out recommended guidelines to enable radiologists and their department managers:

- (1) to procure, setup and calibrate hardware to enable remote-reporting and review of radiological scans at home in a timely fashion, without requiring additional IT specialist support
- (2) to report radiology investigations in a way that is safe and meets a minimum standard

The ultimate responsibility for radiology investigation reporting rests with the person who finalises the report.

## 2. DEFINITIONS

- |     |      |   |  |
|-----|------|---|--|
| 2.1 | COTS | - | Consumer off the shelf                         |
| 2.2 | IT   | - | Information technology                         |
| 2.3 | RIS  | - | Radiology Information System                   |
| 2.4 | PACS | - | Picture Archiving and Communication System     |
| 2.5 | RAM  | - | Random Access Memory                           |
| 2.6 | CPU  | - | Central Processing Unit                        |
| 2.7 | GPU  | - | Graphics Processing Unit                       |
| 2.8 | AAPM | - | American Association of Physicists in Medicine |

## 3. LIMITATIONS

This guideline does not apply to plain radiography and mammographic radiography reporting.

## 4. SETUP AND CALIBRATION OF HARDWARE

Individual departments may choose to adopt more stringent standards above what is provided in this document. This is the basic minimum standard required. The College of Radiologists Singapore does not endorse any particular brand of hardware or software.

### 4.1 Recommended Remote Reporting Workstation Hardware and Software

| MINIMUM    |   |
|------------|---|
| 1) Monitor | <ul style="list-style-type: none"> <li>Size: 27"</li> <li>Minimum Resolution: 2560 x 1440 (2K monitor) Optimal: 4K (also called UHD, 3840 x 2160 pixels)</li> <li>Ports: DP or USB-c (Thunderbolt3) [HDMI only if the former is not available]</li> </ul> |

|                                     |  |
|-------------------------------------|--|
|                                     | <ul style="list-style-type: none"> <li>• Luminance: 350 cd/m<sup>2</sup></li> <li>• Contrast ratio 1000 : 1</li> </ul>   |
| 2) CPU (Laptop or desktop)          | <ul style="list-style-type: none"> <li>• Processor: Intel i7 (or equivalent e.g. AMD Ryzen 7) or above</li> <li>• Minimum Memory: 8 GB DDR RAM (recommended 16 GB DDR4 RAM)</li> <li>• Output Ports: USB-C (Thunderbolt3) MiniDisplayPort, (HDMI only if the former are not available)</li> </ul>  |
| 3) Connection cables to monitor     | <ul style="list-style-type: none"> <li>• These need to be purchased separately: mDP to DP or Thunderbolt3 (USB-C), (HDMI if this is the only port available)</li> </ul>  |
| 4) Graphics card for monitor        | <ul style="list-style-type: none"> <li>• A dedicated graphics card is recommended. Some manufacturers combine a graphics card into their CPU which has lower processing power. Recommended Graphics card with GPU benchmark speeds which can support 4K output, which is equivalent to NVIDIA GeForce RTX 2060 Super or GeForce RTX 2070 and above or the AMD Radeon equivalent. This information can be found at <a href="https://gpu.userbenchmark.com/">https://gpu.userbenchmark.com/</a></li> </ul> |
| 5) Broadband Internet               | <ul style="list-style-type: none"> <li>• At least 1GBps Broadband (Fibre)</li> <li>• Ethernet (recommended), or WiFi</li> </ul>  |
| 6) Ambient lighting recommendations | <ul style="list-style-type: none"> <li>• At least equal to a typical reporting room (which is approx 3-6 lux)</li> <li>• Try shutting the blinds or using blackout curtains to produce this effect</li> </ul>  |
| 7) Calibration software             | <ul style="list-style-type: none"> <li>• Recommended if available. Most require USB connected photometers</li> </ul>   |
| 8) Operating Software               | <ul style="list-style-type: none"> <li>• Recommend Windows 10, 64-bit version</li> </ul>   |

## 4.2 Recommended Calibration Standards

- (i) Using a professional photometer and calibration software is recommended
- (ii) If the above is not available, several manual calibrations are to be performed using the following steps:
  - (1) Turn on the monitor, leaving it to warm up for at least 30 minutes. Turn down the ambient lights in your room. Manually use the physical buttons on the screen to maximise the brightness and contrast of your monitor. Launch your luxmeter app or use a photometer to check the Luminance of your screen at a distance of 1 foot away from your monitor when open

to a blank word-processor document (white screen). The reading should be at least 350 Lux

- (2) Ask your PACS team to download test images from AAPM: [http://deckard.mc.duke.edu/~samei/samei\\_tg18/index.html](http://deckard.mc.duke.edu/~samei/samei_tg18/index.html)
- (3) Open test image TG180IQ2K which will open the TG18-QC pattern and Next, open the test image “Luminance1K”, which will open the TG18-CT pattern. Use these two patterns to calibrate your monitor. Further pictorial instructions may be obtained from (email: [crs@ams.edu.sg](mailto:crs@ams.edu.sg)) upon request.

## 5. REPORTING STANDARDS

- 5.1 Reporting standards of radiological reports which are performed remotely should be maintained at the highest level possible.
- 5.2 Individual departments are recommended to conduct timely retrospective audits of these remotely reported studies so that the quality of these reports may be assessed in an objective manner.
- 5.3 It is left to the purview of individual department management to issue final or provisional reports, but a disclaimer should be inserted.
- 5.4 Reports which are generated from remote reporting at home should be caveated with a statement before the report is finalised. A sample statement is provided below.
  - 5.4.1 *“This provisional report at a time of staffing difficulty has been based upon remote review of compressed lossy images, subtle but important findings may be missed. If imaging findings are not consistent with the clinical presentation please arrange for on-site review as soon as is practicable. These images will be audited for quality and a formal report may be issued when staffing permits.”*

## 6. SUMMARY OF GUIDELINES:

- 6.1 The College of Radiologists Singapore (CRS) recognises that the radiological community is facing an unprecedented situation with increased demands for remote reporting hence will relax guidance on display specifications and reporting standards during the COVID-19 pandemic.
- 6.2 This only applies to non-mammographic radiography and non-plain radiography reporting.

- 6.3 The hardware and software specifications are a base minimum standard to cater for the majority of radiologists in order for equipment to be setup in a timely manner.
- 6.4 CRS leaves to individual departments the choice to adopt more stringent standards above what is provided by these guidelines.
- 6.5 Reports should be caveated with a disclaimer.
- 6.6 Individual departments should decide if these reports are final or provisional.

## REFERENCES

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This information is accurate as of 16/05/2020.

**PUBLISHED: MAY 2020**

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