

# Final Report

## Quality Use of Diagnostic Imaging

QS7(ii)

Establish technical standards for  
accreditation requirements for clinical  
teleradiology



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#### NOTE:

The Project Team was commissioned to undertake this work by the QUDI Program, a program managed by the RANZCR and funded by the Australian Government Department of Health and Ageing

## Executive Summary

Radiology Accreditation Services was engaged by the Quality Use of Diagnostic Imaging (QUDI) program to provide recommendations for technical and practice standards for accreditation requirements for teleradiology. This project was undertaken in four stages. Stage 1 was a review of the available literature and other international standards to determine the applications of teleradiology and to define the key components. The literature review is attached at appendix 1.

Stage 2 of the project involved obtaining feedback on the issues relating to teleradiology from key stakeholders. This feedback generated a discussion document of draft standard recommendations. These draft standards were then made available for review and further feedback.

Stage 3 included a draft final report including recommendations and 'snapshot' of current Australian teleradiology in the clinical environment. Incorporated into stage 3 of the project was additional feedback from stakeholders and information provided by practices relating to the current technical installation of teleradiology equipment and infrastructure. From this the authors were able to determine the requirements of practice to comply with the recommendations made in this document.

Additional feedback was reviewed and incorporated into the final report.

The feedback that was received was from a variety of sources. This includes Radiologists, radiographers, managers and IT specialists, professional bodies, physicists and regulatory authorities. The list of respondents is available in the references section of this document.

The feedback documents provided a range of responses from stakeholders. Of particular note were the varying opinions on monitor configuration and quality assurance.

There was universal agreement on the importance of medical imaging specialist supervision of examinations performed using teleradiology. This included the full scope of the examination from ensuring appropriateness of requests, through to

monitoring image quality on the monitors. Of note was the need for the medical imaging specialist to have good lines of communication with referrers and staff.

The industry snapshot showed that the teleradiology in use in Australia is currently of a high standard. It should be noted that it is assumed all respondents made accurate responses. It should also be noted that there were a limited number of responses and it may not be appropriate to apply these results to the whole industry without further investigation. It was clear that practice's providing feedback on technical equipment installed generally had a clear level of minimum standard to which the practice adheres.

Of those practices that responded to the request for technical information there does not appear to be a significant burden on practices to comply with the recommendations in this document.

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## Definitions

### ***Medical Imaging Specialist***

Means reporting medical specialist and may typically include but is not limited to Radiologists, Nuclear Medicine Physicians, Vascular Surgeons, Cardiologists.

### ***Medical Imaging Technologist***

For the benefit of this paper means those non medical staff responsible for the patient examination and teleradiology processes and may include but not be limited to Radiographer, Sonographer, Nurse, Receptionist, Imaging Assistant.

## The Authors

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## Introduction

Radiology Accreditation Services was engaged by the Quality Use of Diagnostic Imaging (QUDI) program to provide recommendations for technical and practice standards for accreditation requirements for teleradiology. The aims of this project are to report the following:

- All current and potential applications of teleradiology in Australia, defining each component the impacts these may have on the clinical practice of teleradiology
- A draft set of recommendations for standards for the use of teleradiology in the provision of diagnostic Imaging for the inclusion in the RANZCR's Practice Accreditation Standards
- A set of recommendations on policy and funding arrangement changes that may be needed to implement these standards in clinical practice
- Clearly define the use of teleradiology by all service providers including how and when it should be used.

The project was undertaken with the above in mind. The recommendations developed in the document reflect the various aspects of teleradiology in both clinical and technical settings. The snapshot will provide a representation of the current installation base. This representation will determine the current level of compliance with the recommendations provided and identify any potential areas of conflict.

This project was undertaken in four stages. Stage 1 was a review of the available literature and other international standards to determine the applications of teleradiology and to define the key components. The literature review is attached at appendix 1.

Stage 2 of the project involved obtaining feedback on the issues relating to teleradiology from key stakeholders. This feedback generated a discussion document of draft standard recommendations. These draft standards were then made available for review and further feedback.

Stage 3 of the project is the current document. This includes a draft final report including recommendations and 'snapshot' of current Australian teleradiology in the clinical environment. Incorporated into stage 3 of the project was additional feedback

from stakeholders and information provided by practices relating to the current technical installation of teleradiology equipment and infrastructure. From this the authors were able to determine the requirements of practice to comply with the recommendations made in this document.

### **Definition of Teleradiology**

The ACR describes teleradiology as “...the electronic transmission of radiological images from one location to another for the purposes of interpretation and/or consultation.” (ACR standard for Teleradiology, 2003).

Teleradiology is one component of telemedicine that only deals with the transmission of radiology images. This project will develop the standards for teleradiology on the basis of imaging practices performing primary and interim diagnosis. Specifically excluded from this process is the review of examinations and images by referring clinicians in the electronic environment.

## Methodology

The project was undertaken using agreed processes with the QUDI project. The initial literature review was performed to determine the key requirements of the standards. These key requirements, through the literature review report were published for stakeholders to review and provide comment. A feedback form was produced for this review. The feedback form was processed by the project managers and the data collated to form the draft recommendations for standards. This draft was circulated to key stakeholders and placed on public display for further comment. The final report collated all the available data in the format requested by the QUDI program for review by the RANZCR for consideration in the standards for accreditation.

The second aspect of the project included a snapshot of the current teleradiology infrastructure in Australia. This was performed by a request for technical information on a standard form available to stakeholders. This form enabled the declaration of equipment specifications installed in the practice or department of the respondent. This information was collated and gave an indication of the level of technical specification of teleradiology equipment in Australia. This was then compared to the recommendations of the project and an observation made about the current level of compliance. The current level of compliance was then used to determine what, if any, changes needed to be made to ensure adherence to the recommended standards across the industry.

# Results

## 1. Management and Infrastructure

### 1.1. *Practice Management*

Practices that perform teleradiology must have management processes in place that will ensure the quality of the examination.

#### **Recommendation:**

The practice must have in place documented policies and procedures for the use of teleradiology. This document must, as a minimum, comply with the relevant legislative and legal requirements for the performance of medical imaging examinations.

#### **1.1.1. Inter-Jurisdictional Reporting**

Inter-jurisdictional reporting has been raised as an issue for this paper as teleradiology improves access to quality images for interpretation at locations separate from the site at which the image was generated. Inter-jurisdiction may be considered as between those regions where regulatory or legal requirements differ in relation to any aspect of the performance of an examination. For the purposes of this section inter-jurisdictional reporting includes between states and territories within Australia and reporting from outside Australia on examinations performed within Australia.

Currently Medicare is not paying for services provided from within Australia and reported from otherwise eligible medical imaging specialists outside of Australia. This is in contradiction to a number of public hospital facilities where non-Medicare eligible services are provided on this basis.

Issues raised in consultation include access to the medical imaging specialist where time zones are variable, qualifications of the medical imaging specialist, compliance with the accreditation standards and medico-legal.

A significant majority of responses support the provision of inter-jurisdictional reporting including international reporting provided the concerns such as those raised above are addressed.

**Recommendation:**

All Medical Imaging Specialists involved in the supervision and reporting of examinations must maintain registration in the state or territory in which the examination takes place.

All Medical Imaging Specialists involved in the supervision and reporting of examinations must maintain all relevant insurances for the jurisdiction in which both the examination and interpretation takes place.

Practices must have contracts with Medical Imaging Specialists reporting from other jurisdictions, clearly defining the responsibility in all aspects of the examination.

The examination must be undertaken in a practice that fulfils the requirements of teleradiology standards. This practice must be able to independently verify compliance with the standards where they are providing reporting services internationally.

**1.1.2. Report Identification/Provider Number Billing**

Following consultation with stakeholders, we are advised that the use of teleradiology increases the incidence of “figurehead billing”. Figurehead billing can be defined as the use of an eligible provide number other than that of the reporting medical imaging specialist whilst maintaining compliance with other aspects of Medicare billing.

An example of this is where an examination is transmitted via teleradiology to a location where there are multiple reporting medical imaging specialists and an account is rendered prior to the final report being completed.

**Recommendation:**

The report must state the name of the reporting Medical Imaging Specialist.

The practice must have documented procedures to ensure that the billing of patients is in compliance with all legal requirements.

Where billing is provided under a provider number that is not allocated to the Medical Imaging Specialist providing the report, the practice must have procedures in place to ensure the items provided match the items billed.

## **1.2. Facilities**

The facilities where the reporting of medical images via teleradiology takes place are, in the main, located within normal practice environments. However, there are increasing numbers of reporting only locations that are not contained within a traditional practice environment. The practice responsible for the examinations must ensure that the reporting facilities conform to the requirements of the standards developed for accreditation.

### **1.2.1. Reporting Environment**

Consideration must be given to the environment in which the teleradiology service is being provided. Relevant occupational health and safety guidelines must be followed. Specific to teleradiology the environment in which reporting takes place must ensure no degradation of image quality.

#### **Recommendation:**

The reporting environment must be established to ensure optimal reporting conditions for the Medical Imaging Specialist.

The Medical Imaging Specialist must ensure conditions are suitable for image interpretation prior to reporting any examinations.

The reporting environment must ensure:

- i. The minimum amount of light reflection on the monitor where interpretation is being made.
- ii. Displays are placed ergonomically at reading level with centre of display slightly below eye level.
- iii. The displays must be placed away from areas that may cause image degradation such as magnetic fields and electronic transformers. (Samei E, AAPM TG18 Report, 2005)

### **1.3. Equipment**

The practice shall ensure that the equipment utilized for teleradiology results in no loss of image quality from point of generation to points of review and reporting. Equipment must be functional and appropriate for the scope of work being undertaken.

#### **1.3.1. Workstations and Display**

Teleradiology and other soft copy reporting applications can provide the medical imaging specialist with tools to manipulate images during reporting. These tools aid in the interpretation and diagnosis and are one of the key features of softcopy reporting that provide advantages over traditional image review methods. The elements determined in this standard have been taken from the literature review and feedback from respondents to this project.

##### **1.3.1.1. Workstation Characteristics Relative to Reporting**

###### **Stations**

###### **Recommendation:**

The minimum system software functionality described in this standard must be available on all workstations performing image manipulation in order to provide the same quality image to the reporting Medical Imaging Specialist.

##### **1.3.1.2. Minimum Specification of Function on Reporting**

###### **Stations**

###### **Recommendations:**

Teleradiology equipment must maintain the following minimum functional features to ensure accurate interpretation of images for all modalities.

- Panning
- Image Magnification
- Rotation
- Window level and width adjustment
- Measurement
- Density Measurement
- Elements of Display

- Matrix Size
- Bit depth
- Total number of images in study (ACR, 2005)

### **1.3.1.3. Monitor Resolution**

Monitor resolution is an area in which respondents to this project differ in their opinions. Likewise, other international standards and the available literature differ in their interpretations of this aspect of quality in teleradiology. The results of this standard are made to make recommendations on the minimum standards for monitor resolution. In particular there are significant differences in opinion regarding monitor requirements for CR and mammography. Respondents for mammography were split between minimum standards of 3MP and 5MP monochrome. In this section the authors have revised the minimum determination for monitor resolution to 3MP with a recommendation to consider 5MP where possible. Noted was the cost of installing 5MP relative to the fees established in the Medicare Benefits Schedule (MBS) for mammography. Establishing a standard of 5MP is likely to lead to a reduction in the availability of softcopy mammography reporting and the associated benefits to the community.

CR was also an area of disparate views. Here there are two issues under consideration. The resolution of 2MP or 3MP in colour or monochrome. The literature and the respondent views did not provide a clear indication for this standard. The recommendations expressed here determine the minimum requirements. A practice should consider the highest quality resolution appropriate to the scope of work performed. The views of respondents and the literature are also not clear on colour versus monochrome. The view of ACPSEM was considered in this context as a reasonable approach, that is the choice of monochrome or colour is less important than the ensuring the monitor conforms to the technical standards described.

Ultimately, the reporting medical imaging specialist utilising teleradiology must ensure that the images are of appropriate diagnostic quality. The Authors recommend that practices have in place the monitors of the maximum resolution that can be achieved in their environment.

ACPSEM have made recommendations regarding the configuration of monitors for reporting. These include:

*Any monitor applied to radiographic interpretation and/or clinical review of medical images should be capable of the following:*

*Contrast ratio of greater than or equal to 250:1 (24dB)*

*Maximum luminance of not less than 171 cdm<sup>2</sup> (as recommended by ACR<sup>1</sup>)*

*Luminance uniformity of less than +/- 15% deviation from the central measured luminance value across the area of the screen. (Note that the +/- 15% is an artefact of CRT displays. High quality AMLCD panels should be capable of better. This is an important conformance issue).*

*An ability to have its luminance transfer characteristic conformed to the DICOM Part 14 Grayscale display function (GSDF).*

*Minimum 10 bit greyscale output from Look Up Table (LUT)*

*The monitor(s) should be supplied complete with automatic luminance calibration capability and automatic DICOM GSDF conformance software.*

Some of these characteristics may require considerable expense in conformance. The recommendations reflect that practices must consider this as part of their overall quality control program.

**Recommendation:**

Monitors for image interpretation must comply with the following table of minimum standards for the scope of examinations performed.

<b>Modality</b>	<b>Minimum Monitor Spatial Resolution</b>
CR	1600x1200 Monochrome or Colour
CT	1024x768 Colour or Monochrome
US	1024x768 Colour or Monochrome
Mammography	Minimum: 3MP Monochrome Recommendation: 5MP Monochrome
MRI	1024x768 Colour or Monochrome
Nuclear Medicine	1024x768 Colour or Monochrome

**1.3.1.4. Monitor Evaluation and Conformance**

A practice shall ensure that monitors used in reporting of images for teleradiology or PACS have been assessed to ensure compliance with the characteristics in the following table.

<b>Characteristic</b>
Geometric Distortions
Display Reflection
Luminance Response
Luminance Dependencies
Display Resolution
Display Noise
Veiling Glare
Chromaticity

As a minimum assessment the visual evaluation techniques must be performed as described by the ***AAPM Assessment of Display Performance for Medical Imaging Systems, 2005*** and comply with the standards set within that document

In addition to the above evaluation, the practice shall ensure that the monitors used for teleradiology or PACS comply with the following characteristics:

Brightness: at least 171cd/m<sup>2</sup> (ACR)

Contrast Resolution: at least 250:1 (ACPSEM)

Grey Scale: at least 10bit capable (24 bit colour) (ACPSEM)

Luminance transfer characteristic conform to the DICOM Part 14 Grayscale display function (GSDF). (ACPSEM, 2006)

Practices shall document conformance tests of display systems and maintain them for ongoing QA.

### **1.3.2. Quality Improvement and Quality Control**

Quality improvement and quality control must be performed continually to ensure the compliance of the teleradiology system.

There was agreement amongst the respondents regarding implementing an appropriate quality improvement/quality control program to ensure compliance of teleradiology systems.

The method of testing has been identified from the AAPM Assessment of Display Performance for Medical Imaging Systems, 2005. These visual techniques are simple to implement and the test images are available directly from the AAPM.

**Recommendation:**

A practice utilizing teleradiology must have a QIS/QC program in place relevant to the scope of work provided.

The Quality control program must have documented procedures for monitoring and evaluating the effective management, safety and proper performance of acquisition, digitization, compression, transmission, archiving and retrieval functions, and backup and recovery of the system.

The QC system must also cover the environmental conditions under which reporting of teleradiology examinations is performed.

The QC program must include:

- i. Test images and clinical reference image availability
- ii. Service and maintenance records
- iii. Monitors and image display characteristics in accordance with the visual evaluation techniques as described by the **AAPM Assessment of Display Performance for Medical Imaging Systems, 2005**
- iv. Environmental conditions
- v. Quality control must include review of diagnostic image quality by the Medical Imaging Specialist.

*Note: It is recommended that monitors have inbuilt auto-calibration and where this is not available that monitors are calibrated routinely by an appropriately trained person in accordance with a documented schedule. There are significant compliance issues in relation to this that must be considered when the final standards are set. The authors feel that this should be a recommendation to practices at this stage and not set as a standard. (ACPSEM, 2007)*

## **2. Standards of Practice**

### **2.1. Personnel**

The personnel providing all aspects of teleradiology be qualified, trained and competent in the scope of work that that they perform.

#### **2.1.1. Qualifications**

**Recommendation:**

***Medical Imaging Specialist***

The Medical Imaging Specialist must be registered in the state or territory in which the examination takes place.

The medical imaging specialist must be registered in the state or territory in which the report is generated.

The Medical Imaging Specialist will maintain all relevant insurances for reporting in the state or territory in which the examination takes place.

The Medical Imaging Specialist will maintain all relevant insurances for reporting in the state or territory in which the report is generated.

Where teleradiology reporting is subcontracted, practices shall have contracts with Medical Imaging Specialists clearly defining the responsibility of all aspects of the examination.

***Medical Imaging Team***

The non-medical, imaging team must maintain all relevant registration and licenses in the jurisdiction in which the examination is performed

#### **2.1.2. Trainee Medical Imaging Specialist**

**Recommendation:**

Trainee Medical Imaging Specialists must only provide reports under the supervision of a qualified Medical Imaging Specialist. (RANZCR 2006)

### 2.1.3. Training in Teleradiology

Respondents to the discussion paper identified training as an important area of teleradiology. All members of the imaging team must be competent in the use of teleradiology. It was also determined that the medical imaging specialist must be aware of system limitations that may affect the quality of the image, the tools available for assisting diagnosis, and responsibility in the supervision of trainee medical imaging specialists.

#### **Recommendation:**

The practice must ensure that all personnel providing any aspect of the teleradiology possess the professional qualifications according to their position and service and have undertaken appropriate training in the policies and procedures established for teleradiology.

There must be a documented training procedure for staff using teleradiology. The training must include all clinical and technically relevant aspects of teleradiology with documentation of the identity and qualifications of the trainer and the level of competence achieved following the training.

The procedure must include the limitations of the teleradiology system being used. (ACR, 2005)

## 2.2. **Professional Supervision**

The medical imaging specialist is responsible for the conduct of the examination.

The RANZCR have developed a comprehensive policy on professional supervision. Teleradiology does not remove the requirements for professional supervision by medical imaging specialists.

The RANZCR defines professional supervision in the accreditation standards as:

*The performance of diagnostic medical imaging services carried out under the leadership of a medical practitioner is defined as professional supervision.*

*Diagnostic imaging services are provided in multi-disciplinary teams comprised of members with the required expertise drawn from various professional groups (e.g. medical practitioners, radiographers, sonographers and medical physicists). The individual professional responsibilities of team members are interdependent, and collectively enable the effective delivery of this service.*

*The components of professional supervision are:*

- 1. Professional Competence*
- 2. Review of Appropriateness of Request & Patient Preparation*
- 3. Performance of Imaging Examination*

#### *4. Interpretation & Reporting*

In providing teleradiology services consideration of professional supervision must be provided for each examination performed.

#### **Recommendation:**

The supervising Medical Imaging Specialist must be responsible for the conduct of the examination and must be qualified and certified for the scope of examinations performed by teleradiology. The supervision requirements for teleradiology must, as a minimum, comply with the general professional supervision standards. A documented protocol relating to supervision for teleradiology examinations must be available.

### **2.2.1. Delegation of Tasks under Professional Supervision**

Some aspects of teleradiology involve the delegation of tasks from the medical imaging specialist to technical and administrative staff. Delegation must be performed under a documented framework developed and implemented by the practice with reference to the following details.

#### **2.2.1.1. Personal Attendance**

##### **Recommendation:**

Where a particular procedure has been determined that personal attendance by the medical imaging specialist is required, the practice must have a policy in place to ensure the examination is performed at a location where personal attendance by a medical imaging specialist is available.

#### **2.2.1.2. Direct Supervision**

##### **Recommendation:**

Where a particular procedure has been determined that personal attendance by the medical imaging specialist is not required but direct face to face supervision of other members of the imaging team is required, the practice must have a policy in place to ensure the examination is performed in a location where this direct face to face supervision is available.

### **2.2.1.3. Indirect Supervision**

#### **Recommendation:**

Where it has been determined that a particular procedure can be performed in accordance with appropriate written protocols under the direction of a Medical Imaging Specialist, the protocols must be clearly written and readily available at the site at which the examination takes place. These protocols must include triggers for the medical imaging team to identify the need for direct involvement of the medical imaging specialist.

### **2.2.2. Professional Competence**

#### **Recommendation**

The practice must determine the professional competence of all members of the imaging team undertaking examinations in teleradiology in accordance with **2.1 Personnel**.

### **2.2.3. Imaging Requests**

#### **Recommendation:**

The practice must have a policy for the review of imaging requests including appropriateness of the examination. Consideration must be given to delegation of this task under section 2.2.1.

### **2.2.4. Performance of the Imaging Examination**

#### **Recommendation:**

The Medical Imaging Specialist is responsible for the conduct of the examination and must ensure that the examination is undertaken under appropriate supervision of all aspects of the examination.

### **2.2.5. Interpretation and Reporting**

Through professional supervision it is the responsibility of the medical imaging specialist to ensure that the use of teleradiology does not adversely affect the outcome of the examination. Most respondents identified the role of the medical imaging specialist in ensuring best practice was a key to ongoing quality in teleradiology.

#### **Recommendation:**

The Medical Imaging Specialist must ensure that the quality of interpretations and reporting are not adversely affected by the use of teleradiology.

### **2.2.6. Clinical Liaison Between Referrer and Medical Imaging Specialist**

The clinical relationship between the medical imaging specialist and the referring practitioner is not diminished by teleradiology. The literature review and stakeholder feedback indicates that communication between the medical imaging specialist and referrer must be maintained to ensure best clinical outcomes for the patient. The method of this communication may be through channels including phone, fax, secure email or online. Teleradiology does provide some situations where contact may be made by a referring practitioner to the site where a medical imaging specialist is not located. Practices must ensure that this does not impact on clinical liaison between the referrer and medical imaging specialist.

#### **Recommendation:**

The Practice must ensure lines of communication between referrer and Medical Imaging Specialist is available for a patient whose imaging report is being produced by teleradiology.

The medical imaging specialist must have access to the referring practitioners contact details in order to facilitate this communication.

The send and receive sites must have access to rosters to ensure any contact by the referring practitioner can be referred directly to the supervising radiologist.

### **2.2.7. Clinical Liaison between the Medical Imaging Technologists and Medical Imaging Specialist**

As part of the professional supervision of each examination, clinical liaison must be available between the medical imaging technologist and the medical imaging specialist.

#### **Recommendation:**

The practice must ensure there is appropriate clinical liaison between the Medical Imaging Technologist and Medical Imaging Specialist during all stages of the examination.

The Medical Imaging Specialist must be available for immediate contact both prior to and after the examination. The Medical Imaging Specialist must be available to alter the conduct of the examination should it be required.

The send and receive sites must have access to rosters and personnel directories to ensure any contact required by the Medical Imaging Technologist can be referred directly to the supervising Medical Imaging Specialist.

### **2.2.8. Preliminary and Final Interpretations**

Concerns were raised in stakeholder consultation that the use of teleradiology in the provision of preliminary reports, particularly after hours, may be undertaken on systems that fail to meet the accreditation standards. An example was provided that suggested reporting was even being undertaken on a notebook computer in a crowded restaurant, while enjoying a glass of wine.

#### **Recommendation:**

All interpretations of images, regardless of whether they are preliminary or final, must be performed on systems that meet the technical specifications determined in this standard.

### **2.2.9. Examination Protocols**

As part of the professional supervision arrangements, clinical protocols must be available to the medical imaging team.

#### **Recommendation:**

Clinical protocols must be clear, available and reviewed by the supervising Medical Imaging Specialist for the scope of examinations performed at the site of acquisition. Where reporting is contracted there must be a policy that clearly states that the contracted Medical Imaging Specialist is responsible for the protocol of examinations.

## **2.3. Safety**

### **2.3.1. Contrast Administration**

The administration of contrast must be undertaken in a safe environment. The medical imaging specialist is responsible for determining when contrast is to be administered. At all times the administration of contrast is to be under the direct supervision of a medical practitioner.

**Recommendation:**

Where contrast media is required for any examination the Medical Imaging Specialist shall inform the Medical Imaging Technologist who will arrange for a medical practitioner to supervise the administration of the contrast media.

**2.3.2. Data storage and transmission**

The data used for teleradiology contains confidential patient information. The integrity of this information must be maintained during transmission and storage. The practice must ensure they have policies and procedures in place to ensure this.

**Recommendation:**

The practice must maintain the integrity of data during storage and transmission including the use of firewalls.

Data in transmission across a WAN must maintain a minimum of 128bit encryption.

Data stored must be protected by at least a username and password.

**2.3.3. Redundancy and Back Up**

Stakeholder consultation indicates that there are significant deficiencies in redundancy and back procedures.

**Recommendation:**

Where electronic data for teleradiology/PACS is required to be kept for any period following reporting, backup and recovery processes must be in place.

Back up processes must be documented and performed such that there is no loss of data from the original data set.

Recovery processes must be documented and ensure no loss of data quality. The practice must perform a test on data recovery at least annually as part of its quality program.

## **2.4. Patient Management**

### **2.4.1. Patient Consent**

Stakeholder feedback indicates there are concerns regarding compliance with patient consent. Teleradiology may require the transmission and storage of data in a location remote from the acquisition site. The practice must ensure that where patient data is used for purposes other than reporting the data is de-identified or written consent is obtained (ie. Image review programs, training and education).

**Recommendation:**

A patient must be aware that teleradiology may be used in the course of the examination being completed.

Consent may be obtained directly from the patient or the practice shall have clear signage indicating the use of teleradiology.

### **2.4.2. Patient Confidentiality**

Patient confidentiality must be maintained when utilizing teleradiology.

**Recommendation:**

The practice must have a privacy policy that includes teleradiology. The privacy policy must make reference to the national Privacy Act and the Ten Privacy Principles.

The practice must ensure that patient confidentiality is maintained in accordance with all relevant legislation in this matter.

## **2.5. Teleradiology/PACS**

### **2.5.1. Protocols for the Transmission and Display of Images**

The literature review and stakeholder feedback clearly indicates that protocols for the transmission and display of images must be available. Stakeholder feedback also indicates that protocols for transmission must include the provision of previous studies to the reporting medical imaging specialist.

#### **Recommendation:**

Protocols for transmission of imaging data must be available at the transmitting and receiving sites appropriate to the scope of examinations being performed including access previous studies where available.

The protocols must be clear for each examination type being performed. The protocol must include references to the following:

- i.The examination
- ii.Acquisition method including resolution
- iii.Compression type and level for each examination
- iv.Image orientation
- v.Image sequence selection
- vi.Urgency of Examination
- vii.Transmission time
- viii.The number of images in the series
- ix.Previous studies where available

### **2.5.2. Method of Acquisition**

The literature review determined that the current best practice standard for image acquisition is the DICOM format.

#### **Recommendation:**

Acquisition of teleradiology images must be made using DICOM format on modalities where this is available.

Practices that do not currently have DICOM compliant equipment on modalities must use DICOM acquisition format by 1 January 2012.

### **2.5.3. Identification of Data**

**Recommendation:**

Patient data must be identifiable and contain the following information:

- i. Full name
- ii. Unique Identifier
- iii. Date and time of examination
- iv. Facility name
- v. Type of examination
- vi. Compression type and level
- vii. Patient notes
- viii. Annotations including side markers

### **2.5.4. Compression**

The literature review and stakeholder feedback did not provide a consensus on the use of compression algorithms. Compression techniques continue to evolve and improve. Compression must not reduce the diagnostic image quality.

**Recommendation:**

Primary diagnosis must only be performed on images where there is no reduction in diagnostic image quality. Compression levels must be selected according to practice quality requirements based on test pattern analysis and subject to ongoing review by the Medical Imaging Specialist. (ACR 2005)

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## **List of Appendices:**

**Appendix 1: Literature Review**

**Appendix 2: Recommendations on Standards for Accreditation**

**Appendix 3: Industry Snapshot**