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1.0 Introduction

Alberta’s Health Professions Act provides for the accreditation of medical services in non-hospital facilities by the College of Physicians and Surgeons of Alberta. Section 8.1 in Schedule 21 of the Act states:

8.1(1) A regulated member shall not provide a prescribed health service, or cause a prescribed health service to be provided, in a facility unless the facility is an accredited medical facility or a facility referred to in subsection (2).

(2) Subsection (1) does not apply with respect to a prescribed health service provided in

(a) an approved hospital within the meaning of the Hospitals Act,
(b) a hospital operated by the Government of Canada,
(c) a health care facility operated by the Government of Canada or the Government of Alberta,
(d) a hospital, clinic or centre operated by a regional health authority under the Regional Health Authorities Act,
(e) a facility within the meaning of the Mental Health Act or an accredited health centre established for the purpose of section 49(b) of the Mental Health Act, or
(f) a facility that is prescribed in the regulations.

Diagnostic imaging services are one of many health services for which the College requires accreditation. A complete list of prescribed health services is contained in the College’s by-laws and available on the College’s website.

The College also applies its accreditation standards to diagnostic imaging services in approved hospitals through contract with Alberta Health Services and Covenant Health.

The Advisory Committee on Diagnostic Imaging is a standing committee of the College of Physicians and Surgeons of Alberta which advises the Medical Facility Accreditation Committee (MFAC) of the College with respect to all matters pertaining to Diagnostic Imaging facilities.

The principal function of the Committee is to ensure high standards of medical practice in diagnostic imaging facilities.

The committee may consider issues related to the provision of diagnostic imaging services, including electronic transmission of studies, for general radiography, ultrasound, echocardiography, nuclear medicine, mammography, magnetic resonance imaging, bone densitometry, computerized tomography and positron emission tomography. Activities may include, but are not restricted to the following:

1. Approval and training of physicians in all imaging modalities;
2. Accreditation of imaging facilities;
3. Development and maintenance of standards for imaging procedures;
4. Promotion of safe and effective practices in imaging facilities;
5. Review and audit of the ownership of the facilities to ensure compliance with relevant College By-laws;
6. Consultation on the introduction of new modalities/technologies.

The College requires all accredited medical facilities to have a Medical Director (i.e. a practitioner who is registered with the Alberta College of Physicians and Surgeons) who is accountable for the practice of medicine within the facility. Medical Directors shall be satisfied as to the standing of other professionals with their respective regulatory bodies and to the safety of their practices.
For those facilities where the Medical Director does not have the expertise in the particular imaging modality, the services of a consultant are required.

This document incorporates standards and guidelines in a diagnostic and treatment facility approved by the MFAC/Council:

- “shall” is used when a section is a requirement for accreditation;
- “should” is used when a section is recommended; and
- “may” is used when a section is discretionary.

Due to the constantly changing spectrum of medical imaging, these standards/guidelines will be reviewed on a regular basis and revised when necessary. Input from facilities is encouraged to assist in keeping this document up-to-date.

For the purpose of these standards, “public facilities” mean those which are operated by Alberta Health Services and Covenant Health “private facilities” mean those which are not.
2.0 Role of the College

2.1 Accreditation of Facilities

2.1.1 All diagnostic imaging facilities shall register with and maintain accreditation by the College.

For mammography facilities, current accreditation through the Canadian Association of Radiologists – Mammography Accreditation Program (CAR-MAP) is required.

2.1.2 Applications for accreditation of new facilities shall be made to the College.

2.1.3 Requests for additional modalities shall be made to the College.

2.1.4 The Principles of Ownership, as established by the Council of the College, are applicable for privately owned imaging facilities.

2.1.5 Accreditation involves:
1. A review of detailed questionnaires completed by the facility for each modality;
2. A review of selected films/images, requisitions/in-house worksheets and reports from the facility;
3. A review of the facility’s manuals outlining policies and procedures and radiation safety aspects (where appropriate);

2.1.6 The review, which is completed by one or more physicians (with expertise in the appropriate area of medical practice) designated by the College, is either a distance review or an on-site review.

2.1.7 “Full Accreditation” is granted to those facilities with no identified deficiencies.

2.1.8 “Provisional Accreditation” may be granted for a 30-day period to those facilities with minor deficiencies to allow for their correction. A written response to each deficiency is required from the medical director/consultant of the facility. A follow-up inspection may be required at the sole discretion of the College. “Full Accreditation” will be granted when responses to deficiencies have been corrected to the satisfaction of the College.

2.1.9 Requirements shall be met before accreditation will be granted or renewed by the College.

2.1.10 The College may revoke accreditation if practice in the facility is considered unsafe.

2.1.11 A “Certificate of Accreditation” will be issued by the College to all facilities with “Full Accreditation”.

2.1.12 Accreditation is limited to four (4) years from the initiation of the last review, unless extended by the College, and may be renewed through a process of re-accreditation which will follow the same steps as those for accreditation (refer to Section 2.1.5).

2.1.13 Payment to the College for the cost of the review is the responsibility of the Medical Director of the facility. (Private facilities only)

2.1.14 “Spot” inspections conducted without prior notice may also be conducted. These are at no cost to the facility.
Note: Refer to Appendix A: Accreditation Process for Diagnostic Imaging Facilities.

2.2 Administration

2.2.1 A record of each facility shall be kept on file at the College.

2.2.2 The College shall be advised of any changes of ownership of the medical practice or Medical Director of the facility.

2.2.3 Each facility is required to pay an annual fee, set by Council, for the administration of the accredited program.
3.0 Physician Approval

Physicians providing services in Echocardiography, Magnetic Resonance Imaging (MRI), Nuclear Medicine, Positron Emission Tomography (PET), Ultrasound, and Computed Tomography shall have prior approval by the College.

3.1 Echocardiography

3.1.1 Full Approval - Transthoracic Echocardiography (TTE)
1. Shall be licensed to practice in Alberta as a specialist; and
2. Shall have completed a six month cumulative didactic training program in dedicated echocardiography facilities that are recognized and acceptable to the College; and
3. Interpreted at least 450 transthoracic echo (TTE) cases of which 150 TTE cases were directly performed; and
4. Shall provide a letter from the preceptor(s) attesting to competence.

3.1.2 Full Approval - Transesophageal Echocardiography (TEE)
1. Shall have full approval for Transthoracic Echocardiography (TTE) and
2. Performed 100 cumulative cases of transesophageal (TEE), and
3. Shall provide a letter from the preceptor attesting to competence.

3.1.3 Full Approval – Stress Echocardiography
1. Shall have full approval for Transthoracic Echocardiography (TTE) and
2. Performed 100 cumulative cases of stress echos, and
3. Shall provide a letter from the preceptor attesting to competence.

3.1.4 Full Approval - Contrast Echocardiography
1. Shall have full approval for Transthoracic Echocardiography (TTE) and
2. Performed 20 cumulative contrast cases and interpreted 20 cumulative contrast cases, and
3. Shall provide a letter from the preceptor attesting to competence.

3.1.5 Restricted Approval – Perioperative Transesophageal Echocardiography (TEE) for Anesthesiologists
1. Level 2 approval (to perform and interpret):
   a) Shall be licensed to practice in Alberta as a anesthesiologist; and
   b) Shall have completed a one year fellowship in cardiac anesthesia with echocardiography training; or
   c) Shall have completed a six month cumulative didactic training program in a dedicated echocardiography lab that is recognized and acceptable to the College; and
   d) Shall have interpreted a minimum of 300 cumulative echocardiographic studies, including a minimum of 200 cumulative perioperative TEE studies personally performed, interpreted and reported.
   e) These studies must have been completed within a two year time frame, and
   f) Successful completion of the perioperative TEE examination*.

2. Level 3 approval (to perform, interpret and direct):
   a) Shall be licensed to practice in Alberta as an anesthesiologist; and
   b) Have completed either a one year fellowship in cardiac anesthesia with echocardiography training; or
c) Shall have completed a nine month cumulative didactic training program in a dedicated echocardiography lab that is recognized and acceptable to the College; and

d) Shall have interpreted a minimum of 450 cumulative echocardiographic examinations, including a minimum of 300 perioperative TEE studies personally performed, interpreted and reported.

e) These studies must have been completed within a two year time frame, and

f) Successful completion of the perioperative TEE examination**.

*Note: The following will be used as a guide in reviewing requests for Echocardiography:

- Original training;
- Content of a training program, including an expectation of:
  - Facility to be University affiliated
  - Facility workload (volume and caseload)
  - Review of submitted logbook of cases
- Credentials of the preceptor and details contained in the letter attesting to his or her satisfaction with the applicant’s abilities;
- **Current guidelines/recommendations/examinations as championed by the cardiovascular section of the Canadian Anesthesiologists’ Society (CAS), the Canadian Society of Echocardiography (CSE), and the Canadian Cardiovascular Society (CCS).

3.1.6 Re-approval

1. Physicians who have or qualify for full approval in echocardiography (TEE, stress, contrast), but have not been in active practice of echocardiography for the last **two years**, shall complete a minimum of one month of re-training which includes completing at least 100 studies; or

2. Have not been in active practice for the last **five years**, shall complete a minimum of three months of re-training, which includes completing at least 300 studies; and

3. Shall provide a letter from the preceptor attesting to competence.

3.1.7 Active Practice

1. Refers to performing a minimum of 100 echocardiography cases/year, or in the case of a physician limiting their practice to transesophageal echocardiography (TEE), a minimum of 60 cases/year.
3.2 Magnetic Resonance Imaging (MRI) - General

All training/experience for full or limited approval may be acquired in two-week blocks over a maximum span of two years. Full Approval entitles a physician to interpret and to direct an MRI facility, or a department within a diagnostic imaging facility. Limited Approval entitles a physician to interpret MRI studies only.

3.2.1 Full Approval

1. Shall be a radiologist licensed to practice in Alberta; and
2. Shall complete six months of training in an accredited facility acceptable to the College and under the supervision of a radiologist fully approved in MRI; or
3. Shall complete three months training in an accredited facility acceptable to the College and under the supervision of a radiologist fully approved in MRI, plus six months experience in an accredited facility under the supervision of a radiologist fully approved in MRI; and
4. Shall provide a letter from the preceptor, attesting to competence.

3.2.2 Limited Approval

1. Shall be a radiologist licensed to practice in Alberta; and
2. Shall complete three months of training in an accredited facility acceptable to the College and under the supervision of a radiologist fully approved in MRI; and
3. Shall provide a letter from the preceptor, attesting to competence.

3.2.3 Re-approval

1. Radiologists who have, or qualify for full or limited approval, but have not been in active practice of MRI for the last two years, shall complete a minimum of one month of retraining at an accredited MRI facility, which includes completing approximately 100 cases; or
2. Have not been in active practice of MRI for the last five years, shall complete a minimum of three months of retraining at an accredited MRI facility, which includes completing approximately 300 cases; and
3. Shall provide a letter from the preceptor, attesting to competence.

Note: The following will be used as a guide in reviewing requests for re-approval

• Original training;
• Experience in practice;
• Extent of related activity during the time away from relevant practice;
• Content of a retraining program, including an expectation of:
  ▪ Completion over a reasonably brief time (i.e. weeks or months, but not years);
  ▪ Review of relevant current literature;
  ▪ Degree of supervision;
  ▪ Method of evaluation of competence;
• Credentials of the preceptor and details contained in the letter attesting to his or her satisfaction with the applicant’s abilities.

3.2.4 Active Practice

Refers to performing 100 MRI cases/year.
3.3 Magnetic Resonance Imaging (MRI) - Cardiac

These requirements apply to the scope of cardiac MRI practice that includes evaluation of cardiac anatomy and function in adults and pediatric patients and evaluation of the thoracic aorta in the context of cardiac pathology. The latter may include assessment of post-stenotic aortic dilatation, coarctation of the aorta or dissection of the thoracic aorta presenting for cardiac assessment. The intended scope of this approval does not include other vascular or thoracic imaging. Likewise, evaluation of cardiac involvement by extra-cardiac pathology such as cancer continues to be within the domain of specialists with general MRI approval.

3.3.1 Full Approval

1. Diagnostic Radiologists:
   a) Shall be licensed to practice in Alberta; and
   b) Shall have Full Approval in MRI; and
   c) Shall have a minimum of three months of cardiac MRI training acceptable to the College.*

2. Cardiologists:
   a) Shall be licensed to practice in Alberta; and
   b) Shall have a minimum of six months of cardiac MRI training acceptable to the College.*

Radiologists and cardiologists whose MRI training is limited to cardiac MRI will have their MRI approval restricted to cardiac MRI.

Note: Although no distinction is made between interpreters and medical directors of cardiac MRI facilities, it is expected that medical directors will complete more than the minimum requirements set out above and that cardiac MRI will be a major portion of their imaging practice.

For those physicians who are in current Cardiac MRI practice, their training and experience will be reviewed on a case-by-case basis to determine its equivalence to the above standards.

Note: Acceptable cardiac training is defined as:

- Occurring in a training facility acceptable to the College as determined in consultation with experts in the field;
- Providing:
  - At least 50 hours of cardiac MRI coursework;
  - Supervised interpretation of at least 150 cardiac MR studies representing the range of abnormalities observed in practice. For at least 50 of these, the trainee must perform the analysis and make the initial interpretation.
- Being completed in blocks not less than one month in duration over a total period of not more than two years; and
- Being completed to the satisfaction of the training facility training director who attests to the learner’s preparedness for independent interpretation of cardiac MRI.
3.4 Nuclear Medicine

The following requirements are for in-vivo Nuclear Medicine and are not intended to affect pathologists utilizing in-vitro Nuclear Medicine techniques.

3.4.1 Full Approval
1. Shall be a physician certified in Nuclear Medicine by the Royal College of Physicians and Surgeons of Canada (effective January 1, 1993); and
2. Licensed to practice in Alberta.

Note: Prior to January 1, 1993, all physicians practicing Nuclear Medicine were given full approval by the College under the grandfather clause with the exception of those grandfathered for specific areas such as pediatrics or cardiology.

3.4.2 Limited Approval

Limited approval may be granted if a position of need can be established and a certified Nuclear Medicine specialist cannot be recruited after a reasonable period of time. The physician will receive approval to practice in-vivo Nuclear Medicine, but the practice will be limited to the sites for which the initial application was requested.

1. The physician shall be certified in Diagnostic Radiology and be licensed to practice in Alberta; and
2. Shall complete a minimum of one year of formal training in a recognized Nuclear Medicine teaching program; and
3. Shall provide a letter from the preceptor, attesting to competence.

3.4.3 Restricted Approval

Restricted approval shall be limited to a specialized area such as Cardiac or Pediatric Nuclear Medicine.

1. The physician shall be a specialist licensed to practice in Alberta; and
2. Shall complete one year of Nuclear Medicine training in a recognized teaching program; and
3. Shall provide a letter from the preceptor, attesting to competence.

3.4.4 Re-Approval

1. Physicians who have, or qualify for approval in Nuclear Medicine, but have not been in active practice of Nuclear Medicine for the last two years, shall complete a suggested minimum of one month of retraining in an accredited Nuclear Medicine Residency Training Program; or
2. Have not been in active practice of Nuclear Medicine for the last five years, shall complete a suggested minimum of three months of retraining in an accredited Nuclear Medicine Residency Training Program; and
3. Shall provide a letter from the preceptor, attesting to competence.

Note: The following will be used as a guide in reviewing requests for approval:
- Original Training;
- Experience in practice;
- Extent of related activity during time away from relevant practice;
- Content of a retraining program, including an expectation of:
3.4.5 Active Practice

Refers to performing a minimum of 100 Nuclear Medicine studies/year.

3.5 Positron Emission Tomography (PET)

3.5.1 Physicians seeking approval in PET:

1. Shall be licensed to practice in Alberta; and
2. Shall have full approval\(^1\) in Nuclear Medicine; and
3. Shall be in active Nuclear Medicine practice that includes a substantial proportion of the Nuclear Medicine studies performed in Alberta; and
4. Shall have a working knowledge of CT anatomy; and
5. Shall have completed approved instruction\(^2\) in PET incorporating several days of didactic education followed by the supervised interpretation of a minimum of 200 live cases.

Note: \(^2\) For more than ten years, “full approval” in nuclear medicine by this College has required certification in nuclear medicine from the Royal College of Physicians and Surgeons of Canada.

\(^1\) Approved instruction is completed within a 12 month period in a facility providing a broad spectrum of PET studies (such as full body PET for medical oncology) and is supervised by a preceptor recognized by peers as an expert in PET imaging.

3.6 Ultrasound

3.6.1 Full Approval

1. Diagnostic Radiologists
   a) Shall be licensed to practice in Alberta; and
   b) Shall complete a minimum of six months of full-time training and complete a minimum of 1000 studies at a tertiary care teaching ultrasound centre that is recognized and acceptable to the College; and
   c) Shall provide a letter from the preceptor attesting to competence and satisfactory completion of the training.

Note: Full Approval is for all areas of ultrasound except echocardiography.

3.6.2 Restricted Approval

1. Physicians and surgeons applying for approval in a focused area of ultrasound imaging relevant to their area of practice will be considered on a case by case basis, but at minimum:
   a) Shall be licensed to practice in Alberta; and
b) Shall complete a minimum of six months full-time training in ultrasound imaging focused on the specific area consistent with their specialty, completing a documented minimum of 500 studies of which 150 are personally performed at a tertiary care teaching ultrasound centre that is recognized and acceptable to the College; and

c) Shall provide a letter from the preceptor attesting to competence and satisfactory completion of the training.

2. Notwithstanding 3.6.2.1, the following will apply:

1. Urologists for Prostatic Ultrasound

   a) Shall be licensed to practice in Alberta; and

   b) Shall complete a minimum of one month of full-time training in ultrasound imaging of the prostate gland completing a documented minimum of 80 studies, at a tertiary care teaching ultrasound centre that is recognized and acceptable to the College; and

   c) Shall provide a letter from the preceptor attesting to competence and satisfactory completion of the training.

2. Cardiologists for Carotid Doppler

   a) Shall be licensed to practice in Alberta; and

   b) Shall have College approval in echocardiography; and

   c) Shall have successfully performed and interpreted a minimum of 200 carotid doppler studies:

      i) Under the direct supervision of a physician approved in cardiac ultrasound by this College (or with equivalent qualifications, if outside Alberta).

      ii) In a facility acceptable to the Committee as meeting university level training standards for these guidelines

3.6.3 Re-Approval

1. Physicians who have, or qualify for approval in ultrasound, but have not been in active practice of ultrasound for the last two years, shall complete a minimum of one month of retraining; or

2. Have not been in active practice of ultrasound for the last five years, shall complete a minimum of three months of retraining; and

3. Shall provide a letter from the preceptor, attesting to competence.

Note: The following will be used as a guide in reviewing requests for approval:

- Original Training;
- Experience in practice;
- Extent of related activity during time away from relevant practice;
- Content of a retraining program, including an expectation of;
- Completion over a reasonably brief time (i.e. weeks or months, but not years);
- Review of relevant current literature;
- Degree of supervision;
- Method of evaluation of competence;
- Credentials of the preceptor and details contained in the letter attesting to his or her satisfaction with the applicant’s abilities.
3.6.4 Active Practice

Refers to performing a minimum of 100 ultrasound studies/year.

3.7 Computed Tomography (excluding Cardiac CT)

3.7.1 Full Approval

1. Shall be a radiologist licensed to practice in Alberta; and
2. Shall have completed a radiology residency program accredited by the Royal College of Physicians and Surgeons of Canada within the past 2 years; or
3. Shall have been involved in the supervision, interpretation and reporting of 300 CT examinations in the past 2 years; and
4. Shall provide a letter from a preceptor or Chief of Service attesting to competence.

3.7.2 Re-approval

1. Radiologists who have, or wish to qualify for full approval, but have not been in active practice* of CT for the last two years, shall complete a minimum of one month of retraining at an accredited CT facility, which includes completing approximately 100 cases; or
2. Have not been in active practice* of CT for the last five years, shall complete a minimum of three months of retraining at an accredited CT facility, which includes completing approximately 300 cases; and
3. Shall provide a letter from the preceptor attesting to competence.

*Active practice refers to performing 100 CT cases/year.

3.8 Computed Tomography – Cardiac and Coronary (Adult medicine only)

These requirements apply to a scope of cardiac CT (CCT) practice which includes the contrast-enhanced evaluation of cardiac chambers, coronary vessels and coronary bypass grafts and the non-enhanced evaluation of coronary calcium. These requirements do not include approvals necessary for other vascular or thoracic imaging. Pediatric CCT should be performed only by pediatric cardiology or radiologists trained in the use of pediatric cardiac CT.

3.8.1 Level 2 approval (to perform and interpret CCT but not to direct a CCT facility or department)

1. Shall be licensed to practice in Alberta as a specialist in Radiology or Cardiology; and
2. Shall have completed a program of training in CCT through didactic teaching and at least 150 total cases of ECG-gated contrast-enhanced CCT studies of which:
   a) At least 75 are coronary CTA studies that are directly acquired, reconstructed, interpreted and reported by the trainee on real patients (not merely research subjects) for whom an official report is subsequently placed on the permanent medical file under the mentorship of an expert CCT reader with Level 3 training; and
   b) At least 75 are gated contrast-enhanced thoracic CT cases that may include cardiac CT or other non-cardiac thoracic CT studies. These may be directly acquired and interpreted or in the case of cardiac CT, may be drawn from a case library or other
teaching resource. Cardiologists will interpret cardiac CT studies. Radiologists may interpret cardiac or other gated thoracic CT studies. However, if non-cardiac gated thoracic CTs are chosen, these must be directly acquired; and

c) At least 25 cases include a non-contrast CT for calcium scoring; and

d) At least 25 cases are coronary CTA studies with correlation to invasive angiography. These may be acquired by the trainee or read from a case library. However, for cases obtained from a library, the original CTA dataset should be reviewed (not just prepared 3D reconstructions) as well as the invasive angiography. The majority of the cases obtained from the library should be abnormal.

3. Shall provide a letter from the preceptor, attesting to competence in CCT; and
4. Shall continue in active CCT practice and participate in continuing professional development and quality assurance of CCT in order to remain competent.

3.8.2 Level 3 (to direct a CCT facility or department and to interpret CCT for congenital heart disease)

1. Shall be licensed to practice in Alberta as a specialist in Radiology or Cardiology; and

2. Shall have completed a program of training in CCT through didactic teaching and at least 300 total cases of ECG-gated contrast-enhanced CCT studies of which:
   a) At least 150 cases are coronary CTA studies that are directly acquired, reconstructed, interpreted and reported by the trainee on real patients (not merely research subjects) for whom an official report is subsequently placed on the permanent medical file under the mentorship of an expert CCT reader with Level 3 training; and

   b) At least 150 cases are gated contrast-enhanced cardiac CT cases; directly acquired and interpreted or drawn from a case library or other teaching resource; and

   c) At least 50 cases include a non-contrast CT for calcium scoring; and

   d) At least 50 cases are coronary CTA studies with correlation to invasive angiography. These may be acquired by the trainee or read from a case library. However, for cases obtained from a library, the original CTA dataset should be reviewed (not just prepared 3D reconstructions) as well as the invasive angiography. The majority of cases from the library should be abnormal.

3. Shall provide a letter from the preceptor, attesting to competence in CCT; and
4. Shall continue in active CCT practice and participate in continuing professional development and quality assurance of CCT in order to remain competent.

3.8.3 Grandfathering:

Radiologists and Cardiologists who practiced CCT prior to (a date which is 3 months after final approval of these standards) are eligible for approval in CCT by the College if they provide satisfactory evidence of active practice:

1. For Level 2 approval: interpreting a minimum of 50 CCT cases of which a minimum of 25 coronary CTA studies involved the applicant in acquiring, reconstructing, interpreting and reporting the case on real patients (not merely research subjects) for whom an official report is subsequently placed on the permanent medical file; or

2. For Level 3 approval: interpreting a minimum of 100 CCT cases of which a minimum of 50 coronary CTA studies involved the applicant in acquiring, reconstructing, interpreting and reporting the case on real patients (not merely research subjects) for whom an official report is subsequently placed on the permanent medical file.
3. For approval to interpret Coronary Calcium Scoring only: acceptable evidence to the College of having been substantially engaged in such scoring prior to the implementation of these standards.
Diagnostic Imaging

4.0 Diagnostic Imaging Administration

4.1 General

4.1.1 There shall be a facility organization chart which includes all the following where appropriate: imaging technical/non-technical staff, imaging supervisor, medical director, imaging director, consultant/on-site radiologist, liaison physician.

4.1.2 The responsibility for supervision of the imaging facility shall be assigned to one person and a designate appointed when that person is absent.

4.1.3 There shall be job descriptions for all imaging staff.

4.1.4 There should be a process in place to assess staff performance on an annual basis.

4.1.5 There shall be a specified orientation period for all new staff or for present staff when new procedures are introduced and this shall be documented.

4.1.6 Records shall be maintained on all employees including:
   1. Registration status (i.e. ACMDTT, CARDUP)
   2. Continuing education taken
   3. Annual performance evaluation
   4. Staff health (i.e. accidents, immunizations, etc.)

4.1.7 There shall be written personnel policies.

4.2 Personnel – Medical

4.2.1 Medical Director

1. General
   a) A medical imaging facility/department shall be under the complete direction and supervision of a medical director who is a physician licensed to practice medicine in Alberta.
   b) Ideally the medical director should be an imaging specialist.
   c) When the medical director is not an imaging specialist, there shall be a consultant physician who is approved for modalities not within the scope of practice of the medical director.
   d) The medical director/consultant must be familiar with the accreditation standards of the College, and must notify the College when the facility does not meet those standards.

2. Responsibilities
   a) When the Medical Director is an imaging specialist or accredited in an imaging modality the responsibilities include:
      (i) General
          - Supervising the day to day operation and the practice of medicine within the diagnostic imaging facility/department. The practice of medicine means the professional business of medical diagnosis, advice and treatment conducted by a registered practitioner or a medical professional corporation for the cure, alleviation, or prevention of disease or injury to human beings.
          - Ensuring that there is as a policy/procedure manual, which is up to date.
- Registering all designated radiation equipment in compliance with the Radiation Protections Act.
- Providing advice and support to technical and clerical staff on a day to day basis.
- Providing continuing education for the technical staff, where possible.
- Providing input to scheduled technical staff meetings within the imaging department.
- Ensuring that all personnel participate in radiation exposure monitoring, and maintaining a record of results (where appropriate).
- Making available films/images, records, reports, qualifications of staff and policy/procedure manuals for review for accreditation.
- Assuring there is sufficient adequately trained and qualified personnel to supervise and perform the work.
- Ensuring that all imaging studies are interpreted in a timely fashion and reports distributed on a timely basis.
- Establishing and maintaining effective and appropriate safety procedures for waste management, infection control, fire and electrical hazards.

(ii) Imaging
- Complying with the requirements of Provincial and Federal statutes and regulations.
- Instituting and maintaining an adequate quality assurance program.
- Ensuring that optimal quality imaging examinations are performed.
- Advising the technologists of problems in the technical quality of the images, which are interpreted.

(iii) Administrative
- Making application to the College for the approval of the facility.
- Remitting the initial registration fee and subsequent annual facility renewal fee (private facilities only).

b) When the Medical Director is not an imaging specialist the responsibilities include:

(i) General
- Supervising the day to day operation and the practice of medicine within the diagnostic imaging facility/department. The practice of medicine means the professional business of medical diagnosis, advice and treatment conducted by a registered practitioner or a medical professional corporation for the cure, alleviation or prevention of disease or injury to human beings.
- Ensuring that there is as a policy/procedure manual, which is up to date.
- Registering all designated radiation equipment in compliance with the Radiation Protections Act.
- Providing advice and support to technical and clerical staff on a day to day basis.
- Providing continuing education for the technical staff, where possible.
- Providing input to scheduled technical staff meetings within the imaging department.
- Ensuring that all personnel participate in radiation exposure monitoring, and maintaining a record of results (where appropriate).
- Making available films/images, records, reports, qualifications of staff and policy/procedure manuals for review for accreditation.
- Assuring there is sufficient adequately trained and qualified personnel to supervise and perform the work.
- Ensuring that all imaging studies are interpreted in a timely fashion and reports distributed on a timely basis.
- Establishing and maintaining effective and appropriate safety procedures for waste management, infection control, fire and electrical hazards.
4.2.2 Consultant

1. General
   a) There shall be a Consultant physician approved for modalities not within the scope of practice of the Medical Director, as defined above. The Consultant shall be licensed to practice medicine in the province of Alberta, and be a specialist in those modalities for which he/she provides consultative services.

2. Responsibilities
   a) Imaging
      i) Maintaining the standards set by Provincial and Federal authorities.
      (ii) Instituting and maintaining an adequate quality assurance program.
      (iii) Providing input into scheduled technical staff meetings within the imaging department.
      (iv) Ensuring that optimal quality imaging examinations are performed.
      (v) Advising the technologists of problems in the technical quality of the images which are interpreted.
      (vi) Visiting the facility at least once per year and providing an annual report to the Medical Director of the facility. Radiologists/imaging specialists are encouraged to have a senior technologist accompany them.

      The content of the report should include, but not restricted to, the following:
      • Equipment Evaluation
        ▪ Preventative Maintenance
        ▪ Calibration
        ▪ Quality Control
      • Review of Quality Control
      • Film Quality Assessment
      • Radiation Health and Safety Review
      • Review of Manuals
      • Assessment of Operator Technique/Competency
      • Radiologist/imaging specialist’s comments and advice.

4.2.3 Liaison Physician

1. General
   a) In hospital facilities that do not have an on-site imaging specialist, there shall be a liaison physician, who is a local member of the medical staff.
   b) The liaison physician shall be a member of the hospital’s medical staff and shall be appointed to act in concert with administration and the radiology consultant.

2. Responsibilities
   a) The liaison physician shall have the following responsibilities:
4.3 Policies

4.3.1 General

1. Informed consent shall be explicitly given verbally or in writing for all invasive procedures after explanation of benefits, risks and alternatives.

4.3.2 Sedation

1. Non-Hospital facilities administering general sedation, or sedation requiring the monitoring of vital signs, shall meet the standards of the College for administering sedation.
2. There shall be a policy and procedure for administering sedation.
3. There shall be protocols to monitor and discharge patients who have been sedated.

4.3.3 Intravascular Contrast Agents

1. The use of contrast shall adhere to a policy approved by the radiologist/imaging specialist responsible for imaging in the facility.
2. Contrast shall be injected only in those facilities equipped to manage adverse reactions.
3. There shall be a policy and procedure for injecting contrast agents which includes:
   a) Patient preparations;
   b) Choice of contrast material;
   c) Treatment of contrast reactions;
   d) The emergency situations when contrast may be injected by a non-radiologist or non-imaging specialist.
4. The policy/procedure shall detail the circumstances under which injectable contrast agents are used.
5. The type and amount of injectable contrast agent, the time of injection, the name of the person injecting and any adverse reaction shall be documented on the patient’s medical record.
6. Patients shall be asked if they have any known allergies prior to injecting contrast.
7. A physician shall be immediately available during an examination in which an intravascular contrast agent has been administered.
8. Ionic or high osmolality agents shall not be used for intravascular contrast studies.
9. All images shall be reviewed and interpreted by a radiologist/imaging specialist.
5.0 Physical Facilities

5.1 General

5.2 Space

5.2.1 Space shall be sufficient and functionally located for:

1. Administrative Functions
   a) Professional staff
   b) Section supervisors
   c) Clerical staff

2. Patient Service Areas Waiting room
   a) Change room
   b) Washrooms

3. Technical Areas

4. Staff Areas
   a) Washrooms
   b) Lockers
   c) Conference rooms
   d) Library

5. Facility procedures

6. Processing

7. Imaging storage

5.3 Temperature

5.3.1 The facility shall have a properly controlled temperature for the following:

1. Staff and patient safety
2. Film processing
3. Equipment function

5.4 Washroom Facilities

5.4.1 The facility shall have a wheelchair accessible washroom.

5.5 Ventilation

5.5.1 The facility shall have adequate ventilation in all areas.

5.6 Housekeeping

5.6.1 Floors shall be uncluttered and clean.

5.6.2 Garbage shall be removed regularly.

5.6.3 Biohazard waste shall be segregated and bagged properly.
5.7 Imaging Storage

5.7.1 The facility shall provide dedicated space for storage. Storage may be remote from the imaging department.

5.8 Communication

5.8.1 There shall be adequate numbers of telephones.

5.8.2 Telephones shall be functionally located.
6.0 Electronic Information – Storage/Transmission/RIS/PACS

6.1 Radiology Information System (RIS)

6.2 Digital Image Data Management (Picture Archiving and Communication System [PACS] and Remotely Supervised Radiology)

These standards have been adapted from the American College of Radiology – Standards for Digital Image Management and remotely supervised Radiology and The Canadian Association of Radiologist National Standards for remotely supervised radiology and include requirements and recommendations for the accreditation of Picture Archiving and Communication Systems by the College of Physicians and Surgeons of Alberta.

These standards are applicable to any system of digital image data management, from a single-modality or single-use system (including stand-alone transmission and receiving under separate administrative control to a complete PACS.

Remotely supervised radiology and PACS involves the electronic acquisition, storage and transmission of diagnostic imaging studies from one location to another for the purposes of interpretation and/or consultation. The following requirements pertain to final diagnostic interpretation only and are not intended to regulate the quality of image review for preliminary evaluation/interpretation.

6.2.1 Accreditation Process

1. Each remotely supervised radiology and PACS, whether within a facility (i.e. hospital) or between facilities for the purpose of interpretation is a distinct modality for which application shall be submitted to the College for approval.
2. All reporting sites/stations/imaging facilities in Alberta shall be approved by the College.

6.2.2 Qualifications and Responsibilities of Personnel

1. Physicians
   a) Physicians involved in the performance, supervision and interpretation of images shall be licensed to practice in Alberta and be diagnostic radiologists or imaging physicians otherwise approved by the College of Physicians and Surgeons of Alberta in the modality.
2. Technologists/ Sonographers
   a) Each technologist or sonographer shall be registered by the appropriate professional regulatory authority in Alberta.
   b) Each technologist or sonographer using a PACS or remotely supervised-radiology system shall be competent to operate the system. Under the overall supervision of the imaging physicians, the technologist / sonographers will have the responsibility for evaluation and quality and applicable quality assurance. In imaging sites remotely supervised by a radiologist, the technologists / sonographers shall have a documented program of ongoing feedback and supervision from the imaging physician responsible for the system's quality assurance program.
   c) PACS services should have medical physicists, bioengineers and image communication specialists, or image management system specialists on-site or as consultants.
6.2.3 Acquisition Equipment Guidelines

Equipment guidelines cover three basic categories of systems: small matrix size, large matrix size and very large matrix size.

The initial image acquisition should be performed in compliance with the appropriate modality and examination standards and guidelines.

1. 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 image management system. The current DICOM standard shall be used.

2. Secondary image capture
   a) Small matrix systems, computed tomography (CT), magnetic resonance imaging (MRI), ultrasound and nuclear medicine.
      i) Digitization system:
         Static systems require 0.5K x 0.5K (.3 mega pixel) x 8 bits array or better.
   b) Large matrix systems digitized radiographic films and computed radiography:
      i) Digitization system:
         These systems require 2.5lp/mm resolution (200 micron) x 10 bits array or better.
   c) Very large matrix systems: digital mammography (DR & CR)
      i) Digitization/acquisition system:
         These systems require 5.0 lp/mm acquisition resolution (100 micron wide detector elements) x 10 bits array or better. This is true for both small field (18 x 24 cm) and full field (24 x 30 cm) digital mammography systems.

3. Display/reporting system
   Less stringent standards may be acceptable when display systems are used for Quality Assurance or preliminary consultation.

   a) Small matrix systems, computed tomography (CT), magnetic resonance imaging (MRI), ultrasound and nuclear medicine.
      Static systems require 0.5K x 0.5K (.3 mega pixel) x 8 bits array or better.
   b) Large matrix systems, digitized radiographic films and computed radiography:
      These systems require a 1600 x 1200 (1.9 mega pixel) monitor or better with a luminescence rating of at least 50 foot lamberts. However, the workstation shall be able to display segments of the image at full resolution.
   c) Very large matrix systems, digital mammography (DR & CR)
      These systems require a 2560 x 2048 (5.0 mega pixel) gray scale monochromatic monitor or better with a luminescence rating of at least 500 candelas/m² and a contrast ratio of at least 600:1 for an LCD display. The monitor must be capable of displaying a minimum of 1024 levels of gray. The workstation must be able to display segments of the image at full resolution. Less stringent standards may be acceptable when display systems are used for preliminary consultation.
4. General Guidelines
   a) At the time of acquisition (small, large or very large matrix), the system must have annotation capabilities for:
      (i) Patient name;
      (ii) Identification number;
      (iii) Date and time of examination;
      (iv) Film markers;
      (v) Name of facility or institution of origin;
      (vi) Type of examination; and
      (vii) Degree of compression (if any).
   b) Inter-facility PACS systems require the following:
      (i) The patient’s history and other data may be transmitted by fax or by some other means;
      (ii) Compression, if utilized, shall be user selectable;
      (iii) Image quality shall be the same at the transmitting and reporting sites; and
      (iv) Capability for the selection of the image sequence for transmission and display at all the reporting sites.

5. Transmission of Images and Patient Data
   a) New technology systems shall include the current version of ACR/NEMA image data format standard and the DICOM network standard.
   b) For official interpretation, the digital data received at the receiving end of any transmission shall have no loss of clinically significant information.
   c) The transmission system shall have adequate error-checking capability.

6.2.4 Archive Guidelines

1. Compression
   Data compression may be performed to facilitate transmission and storage. Several methods, including both reversible and irreversible techniques, may be used with no reduction in clinical diagnostic image quality.

2. Archiving and Retrieval
   a) Images used for final interpretation shall be stored for a minimum of ten years or two years past the age of majority whichever is longer.
   b) Interpretive reports shall be stored for a minimum of ten years, or two years past the age of majority whichever is longer.
   c) Quality control records shall be stored for a minimum of two years.
   d) Where a digitally stored image database is the permanent record (filmless), all new databases shall be DICOM compliant. It is recommended that all pre-existing databases be upgraded to DICOM compliance.
   e) There shall be written policies regarding backup and disaster data recovery.
   f) A database backup stored in a separate physical site is recommended.
   g) Irreversible compression methods shall be regularly checked for loss of clinically relevant data as part of a quality control program.
   h) Prior examinations should be retrievable in a timely manner and available for comparison at the time of reporting.
   i) Facilities with digitally stored images shall be capable of providing copies of images for off-site review in a timely manner.
   j) If electronic archiving is employed, a database shall be available that includes:
      (i) Patient name, identification number and date;
      (ii) Type of examination;
(iii) Types of images (i.e. modality: CT, ultrasound, radiography, raw digital data, frame captured image, etc.)
(iv) Number of images;
(v) Image acquisition site; and
(vi) Time of examination.

3. Security
   a) Systems shall provide network and software security protocols to protect the confidentiality of
      the patient images, medical record(s), interpretation(s) and other data.
   b) Hardware used should be located in a “safe area” accessible only to health care workers
      responsible for the service.
   c) The system shall allow for user specific access control.
   d) All users of the system shall be required to have individual logins.

6.2.5 Reporting Workstation Requirements

1. Display workstations employed for very large-matrix (digital mammography), large-matrix (digitized
   radiographic films and computed radiography) or small-matrix (CT, MRI, ultrasound and Nuclear
   Medicine) systems shall provide the following functionality:
   a) User selection of image sequence;
   b) Accurate association of the patient and study demographic data with the images of the study
      performed;
   c) Window and level adjustment;
   d) Pan and zoom (magnification) functions capable of meeting guidelines for display of all acquired
      data;
   e) Rotating or flipping the images, with preservation of orientation of patient labeling;
   f) Calculating and displaying accurate linear measurements and pixel value determinations in values
      appropriate for the modality (i.e. Hounsfield units for CT images);
   g) Display of prior application compression ratio, process of cropping, if irreversible;
   h) Displaying the total number of images acquired in the study.

2. Small-matrix (CT, MRI, ultrasound, and Nuclear Medicine) display stations for image interpretation
   shall include:
   a) At least a 0.5K x 0.5K (0.3 mega pixel) resolution monitor with:
   b) Luminance rating of at least 50 foot lamberts.

3. Large-matrix (digitized radiographic films, computed radiography and digital radiography) display
   stations shall include:
   a) At least a 1600 X 1200 (1.9 mega pixel) resolution monitor with;
   b) Luminance rating of at least 500 candelas/m²;
   c) Contrast ratio of 600:1;
   d) Minimum display of 1024 levels of gray;
   e) Automated DICOM calibration software (Display luminance and contrast as per NEMA DICOM
      3.14 GSDF); and
   f) Uniformity: less than 30% difference in luminosity between display centre and corners.
6.2.6 Quality Control

1. Any facility using a digital image data management system (PACS) shall have documented policies and procedures for monitoring and evaluating the effective management, safety, proper performance of imaging, transmitting, receiving and display equipment. The quality control program should be designed to minimize patient, personnel and public risks, and to maximize the quality and accessibility of the diagnostic information. Equipment performance should be monitored at intervals consistent with proper quality control.

2. Important parameters should be indicated on the study when used for the official authenticated written interpretation. These should include, at a minimum, the matrix size, bit depth, compression (if used), and what kind of image processing, if any, was used (edge enhancement, etc.).

3. A test image such as the SMPTE phantom, or its equivalent should be captured on the acquisition device and transmitted at least monthly to test the overall operation of the system.

4. A test pattern should be displayed on the reporting monitor daily as a spatial resolution test. For small matrix systems at least 512 x 512 resolution should be confirmed. For large matrix systems, 2.51 lp/mm resolution should be confirmed.

6.2.7 Quality Improvement

The use of digital imaging and digital image data management does not reduce the responsibilities for the management and supervision of the practice of medicine by a qualified imaging physician. Procedures should be systematically monitored and evaluated as part of the overall quality improvement program of the facility. When feasible, monitoring should include the evaluation of the accuracy of the interpretations as well as the appropriateness of the examination. Incidence of complications and adverse events should be reviewed to identify opportunities to improve patient care. The use of remotely supervised radiology shall be documented. Periodic reviews should be made for appropriateness, problems and quality of transmitted data. The data should be collected in a manner which protects the confidentiality of the patient data.
7.0 Medical Record

7.1 Request for Consultation

7.1.1 Requests for imaging consultations shall be completed for all imaging procedures.

Note: When a request for a procedure is received by telephone, the person receiving the request shall document the procedure(s) requested, the working diagnosis, the name of the requisitioning practitioner, the date and time of the request, and shall sign the record of the request.

7.1.2 Requests for consultation shall include:
1. Pertinent clinical information including indications, history and provisional diagnosis;
2. The basic demographic information of the patient such as name, health number, date of birth, and gender;
3. The name of the referring practitioner;
4. The name of any other practitioner who is to receive a copy of the report;
5. The type of procedure requested for the patient including any special instructions, where applicable.

Note: Providing this information is the responsibility of the referring practitioner. If a patient arrives with requisitions containing incomplete information, the imaging physician or designated staff member may:
- Postpone the service pending the provision of information, or;
- Contact the referring health professional in order to get the required information, or;
- Proceed with the service on the basis of information provided by the patient, or patient’s agent, or;
- Proceed with the service without optimal information, in the best interest of the patient.

7.1.3 If a “stat report” is required, the contact name, address and phone number shall be stated on the request for consultation.

7.1.4 Requests for consultation may come from a physician, dentist, chiropractor, podiatrist, registered midwife, nurse practitioner or physiotherapist with PACA designation and all reports shall be made available to the requisitioning practitioner. The reports may also be made available to other physicians, dentists, chiropractors, podiatrists, nurse practitioners or physiotherapists with PACA designation, following approval by the originating requisitioning practitioner (College By-laws).

Note: Although the ultimate responsibility for the appropriateness of requested procedures is that of the referring practitioner, the imaging physician may communicate to the referring practitioner his or her concerns about the appropriateness of the procedure, potential risk to the patient, or the cost of the procedure.

7.2 Requisition/In-House Worksheet/RIS/PACS

7.2.1 The requisition/in-house worksheet or in RIS or PACS shall include the following:
1. Patient name;
2. Patient identification number;
3. Patient age and/or date of birth;
4. Patient gender;
5. Examination type;
6. Appropriate history;
7. Identification of technologist performing the examination;
8. Number of images taken (if applicable);
9. Name of referring practitioner;
10. Date of examination;
11. Date of LMP or equivalent (where appropriate)

Note: There shall be a procedure in place to determine whether or not a patient may be pregnant for all procedures involving any radiation to the abdomen or pelvis, which includes the lumbar spine, sacrum and hips, etc., on women of childbearing age, and that this be demonstrated. (Diagnostic Imaging Standard 10.2.12)

For facilities with computer generated requisition/in-house worksheets that are not included with the interpretative reports, there shall be an audit process in place to ensure compliance in recording the LMP or equivalent.

12. Type of contrast used (where appropriate);
13. Amount of contrast/materials used (where appropriate);
14. Time of injection (for intravascular contrast)
15. Name of person injecting contrast (for intravascular contrast)
16. Adverse reaction, if any (for intravascular contrast)
17. Fluoro time;
18. Technique used, where appropriate (i.e. portable radiography).

7.3 Images

7.3.1 Medical images shall be identified with the following:
1. Patient name, last name, first name;
2. Second patient identifier (e.g. personal health number) and/or date of birth;
3. Facility site name;
4. Date of examination (where possible, the month should be clearly identified).

7.3.2 Medical images should include the following:
1. The time of the examination.

7.3.3 Images may be exchanged from one health professional to another.

7.3.4 All images, including digitally stored images, shall be readily accessible.

7.3.5 Facilities with digitally stored images shall be capable of providing images, in a timely manner, for off-site review.

7.3.6 Where possible, each examination shall have the optimal number of views considered necessary for an adequate radiological assessment as described in the procedure manual.

7.4 Master Envelope

7.4.1 The master envelope shall be labeled with the following:
1. Patient name and identification number;
2. Second patient identifier (e.g. personal health number) and/or date of birth.

7.4.2 The master envelope should be labeled with the facility name/site.
7.4.3 Images and reports shall be stored together in the master envelope.

Note: This section does not apply to facilities with digital image acquisition and storage. These facilities shall be able to link the image and report on the request.

7.5 Reports

7.5.1 All examinations shall be reported by an appropriately approved imaging specialist as soon as possible after the images are available.

7.5.2 Unusual, unexpected, or urgent findings, which may require immediate case management decisions, shall be communicated immediately to the referring practitioner.

7.5.3 Direct or attempted direct communication shall be documented.

7.5.4 Any significant discrepancy between an emergency or preliminary report and the final written report shall be directly communicated to the referring practitioner or representative.

7.5.5 Previous diagnostic imaging studies shall be available or easily accessible to the interpreting practitioner when medically appropriate.

7.5.6 Report of the interpretation of imaging procedures shall include the following:
1. name of the patient and a second patient identifier (e.g. personal health number, date of birth, facility identification number);
2. name of the requesting practitioner;
3. name of the facility/site where examination was performed
4. name or type of examination;
5. date of examination;
6. date of dictation or transcription, and time when appropriate, with explanation for unusual delays;
7. pertinent findings;
8. pertinent clinical issues raised in the request for the examination. For example, to rule out a fracture, the report states, “there is no evidence of fracture”;
9. comparative information with previous examinations when appropriate;
10. conclusion or diagnosis – a precise diagnosis whenever possible or differential diagnosis when appropriate;
11. recommendations for follow-up and additional diagnostic radiologic studies when appropriate.

Note: Refer to “CAR Standards for Communication: Diagnostic Radiology – A. The Diagnostic Radiology Report” for additional information.

7.5.7 A copy of the final report shall accompany the exchange of relevant radiographic examinations from one health professional to another health professional.

7.5.8 All reports of examinations should be signed or electronically verified by the interpreting radiologist prior to being issued. If reports are not verified, there shall be an audit process to verify the accuracy of the transcription.

Note: All reports containing interpretation by an imaging physician shall indicate authorship and whether or not the contents of the report have been verified by the author. (A signature means that the contents have been verified by the signator).
7.6 Accession Record/Day Sheets

7.6.1 The facility shall maintain a record indicating the daily requests for examinations.

7.6.2 This record shall include the patient’s name, type of examination and date, and the image file number.

7.7 Retention of Medical Records

The following are considered minimum requirements for retention of records. Individual circumstances may warrant extended periods of retention. (e.g. Lung Fibrosis Program) In these cases, the relevant legislation shall apply.

<table>
<thead>
<tr>
<th>Record</th>
<th>Period for Retention</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.7.1 X-ray films/images (adults)</td>
<td>5 years</td>
</tr>
<tr>
<td>7.7.2 X-ray films/images (minors)</td>
<td>5 years or 2 years after the age of majority whichever is longer</td>
</tr>
<tr>
<td>7.7.3 Mammography films</td>
<td>5 years or 10 years if there are no intervening studies</td>
</tr>
<tr>
<td>7.7.4 Archived Digital Images (adults)</td>
<td>10 years*</td>
</tr>
<tr>
<td>7.7.5 Archived Digital Images (minors)</td>
<td>10 years or 2 years after the patient’s eighteenth birthday whichever is later*</td>
</tr>
<tr>
<td>7.7.6 Bone Densitometry</td>
<td>10 years</td>
</tr>
<tr>
<td>(data and records from DXA studies)</td>
<td></td>
</tr>
<tr>
<td>7.7.7 Reports (adults)</td>
<td>10 years*</td>
</tr>
<tr>
<td>7.7.8 Reports (minors)</td>
<td>10 years or 2 years after the age of majority whichever is longer</td>
</tr>
<tr>
<td>7.7.9 Requisition/Request for Consultation</td>
<td>10 years in original or transcribed form</td>
</tr>
<tr>
<td>7.7.10 Quality Control Records/Documentation</td>
<td>2 years except Bone Densitometry which is 5 years</td>
</tr>
<tr>
<td>7.7.11 Repeat/Reject Analysis Records</td>
<td>2 years</td>
</tr>
<tr>
<td>7.7.12 Accession Records/Day Sheets</td>
<td>2 years</td>
</tr>
<tr>
<td>7.7.13 Equipment Maintenance Records</td>
<td>2 years</td>
</tr>
<tr>
<td>7.7.14 Incidents Reports</td>
<td>10 years</td>
</tr>
</tbody>
</table>

*CPSA By-laws

*Hospitals Act – Operation of Approved Hospitals Regulation, September 27, 1995
8.0 Quality Assurance

8.1 General

8.1.1 All imaging facilities shall have in place a quality assurance program that will limit radiation exposure to the patient, the public, and equipment operators while at the same time optimize image quality. The quality assurance program shall assess, document and implement changes. Quality assurance programs will vary depending on the facility size, and scope of practice.

8.1.2 The content and format is flexible, but the program at a minimum should monitor:
1.  Staff Competency – Technologists
   a) A mechanism shall be in place to provide feedback between the interpreter and technologist and this shall be documented.
   b) There should be a formal review of technologists at regular intervals and this shall be documented at least annually.

2.  Equipment Performance
    a) There shall be a schedule of quality control procedures and a preventative maintenance program to ensure adequate performance of equipment.
    b) There shall be a schedule of quality control procedures to ensure the production of optimum quality radiographs with minimum exposure or the patient to radiation.

3.  Reporting
    a) Facilities should monitor turnaround time and set targets for achievement.

4.  Medical Records
    a) There shall be regular audits of medical records to assess completeness/content.
    b) Records shall be stored in such a way (medium) that they are readily retrievable and in a suitable environment to prevent damage or deterioration, loss and unauthorized access.

5.  Safety
    a) There shall be a process to monitor all aspects of safety including radiation safety.
    b) Facilities shall maintain a distinct log of incidents, which either harmed or could have harmed a patient or staff, including the action taken to prevent future occurrences.

6.  Utilization
    a) There should be a process to advise referring physicians of the indications, contraindications and preparation required for Diagnostic Imaging examinations.

7.  Client Satisfaction
    a) Facilities should solicit feedback from patients and physicians using the facility on a regular basis, regarding their satisfaction with the service.

8.1.3 Larger facilities should have dedicated quality assurance technologists who perform quality control and preventative maintenance procedures and are responsible for calibration and repair of the equipment.

8.1.4 There shall be a designated person in the imaging department responsible for monitoring and reviewing quality assurance/quality control and assessing relative changes in system performance.
8.1.5 Corrective actions shall be recorded.

8.1.6 There shall be an annual review of quality assurance/quality control by the Medical Director/Consultant Radiologist/Imaging Specialist in facilities where an imaging specialist is not present on a full time basis.

8.2 Quality Control

8.2.1 General

1. Facilities shall have a schedule for quality control procedures.
2. All quality control shall be documented.
3. Corrective action shall be taken if results are not within control limits specified in Appendix B and C.

8.2.2 Quality Control

The following shall be considered minimum requirements for quality control, when applicable:
1. Protective Devices – Lead aprons, gloves
   a) Fluoroscoped or radiographed for cracks/holes Annually
   b) Evidence of damage Daily
2. View Boxes
   a) Cleaning and Inspection Annually
3. Dark Room
   a) Safelight test Annually

8.2.3 Preventative Maintenance

1. Facilities shall have a preventative maintenance schedule for each piece of equipment.
2. Manufacturer’s recommendations regarding frequency and procedures shall be considered.
3. All preventative maintenance records shall be retained for a minimum of two years.
9.0 Manuals

Radiology facilities shall have current and comprehensive manuals in place. Policy statements shall be consistent with the goals of the organization and shall reflect any published standards of the College and other medical organizations. Their extent should reflect the complexity and extent of the procedures performed.

9.1 General Information

9.1.1 All policies/procedures shall be developed in consultation with the radiologist/imaging specialist responsible for the facility.

9.1.2 All policies/procedures shall initially be signed by the radiologist/imaging specialist responsible for the facility.

9.1.3 Subsequently, all policies/procedures shall be reviewed annually and signed by the radiologist/imaging specialist responsible for the facility or the administrative designate.

9.1.4 Any changes in the interim shall be initialed by the radiologist/imaging specialist responsible for the facility or the administrative designate.

9.1.5 The policy and procedure manuals shall be available for all personnel involved.

9.1.6 The imaging specialist shall have knowledge of the written procedures and should be involved in and/or aware of changes to the written procedures.

9.1.7 All personnel shall be orientated, upon hire, to the procedure manual. Orientation of new personnel to each procedure will be dependent upon the expectations of the facility, the expertise, specific role of the staff member, risk of injury/damage, and implications of noncompliance.

9.1.8 Each staff member shall be responsible for learning and adhering to the established procedures.

9.1.9 Each staff member shall be responsible for updating or informing the appropriate person of a need to update procedures that are inaccurate or outdated.

9.1.10 A communication process shall be established to inform the necessary personnel of changes in policies and procedures, updates and new procedures.

9.1.11 If there is more than one policy or procedure manual, each shall be numbered to ensure changes are made in identified manuals. One copy should be identified as the master and maintained in a central location in the facility.

9.1.12 Current procedure manual(s) shall be readily available in the appropriate work area.

9.1.13 Copies of past policies and procedures, as changes are made, should be kept on file for legal purposes for 10 years.
9.2 Policy Manual

9.2.1 Design
1. The policy format should be consistent, standardized and easily identified as a policy.
2. Each manual shall have a table of contents identifying a complete list of policies.
3. Each policy shall be complete within its identified numbered pages.

4. Header information on each policy should include:
   a) Facility name;
   b) Title of policy;
   c) Original date of policy which is carried forward on each review;
   d) Revision dates – should also be carried forward with changes;
   e) The last revision date at the end of each section.

9.2.2 Contents

The contents of a Policy Manual should include, but are not limited to, policies on the following:

1. General information and organizational chart;
2. Contrast media;
   a) GI
   b) Intravenous
   c) Intra-arterial
   d) Other
3. Critical Incident Management;
   a) Patients
   b) Personnel
   c) Equipment/facility
4. Drugs
5. Medical Records;
   a) Radiograph ID card
   b) Requisitions
   c) Radiographs
   d) Repeats
   e) Day book
   f) Radiological interpretation
   g) Filing
   h) Retention/storage of radiographs/reports
6. Patient consent;
7. Personnel policies;
   a) Content and access to personnel files
   b) Occupational Health requirements
   c) Orientation and education
   d) Responsibilities/job descriptions
   e) Dress code
   f) Complaints
   g) Harassment and abuse
   h) Smoking
8. Quality Assurance;
a) Equipment/Processors
   (i) Quality control procedures
   (ii) Preventative maintenance
b) Other
   (i) Cassettes and grids
      • Cleaning and contact
   (ii) Protective equipment
      • Inspection
   (iii) Viewboxes
      • Cleaning and inspection
c) Staff Performance Appraisal
   (i) Competency – technical and professional staff
d) Facility
   (i) Darkroom condition
   (ii) Darkroom safelights
   (iii) Visual white light inspection
9. Radiation Protection;
   a) Patients
      (i) General policies regarding exposure to all patients
      (ii) Use of gonadal shielding
      (iii) Collimation
      (iv) Policy for radiography of women of reproductive age
      (v) Policy for examination of pregnant patients
   b) Staff
      (i) Holding patients
      (ii) Pregnant staff members
      (iii) Proper use of protective devices such as lead aprons, lead gloves, thyroid collars and lead eyeglasses, mobile shields, etc.
      (iv) Monitoring readings from thermoluminescent devices

9.3 Procedure/Positioning Manual

9.3.1 Design

1. Each manual shall contain a table of contents identifying a complete list of procedures.
2. Each procedure shall be complete within its identified numbered pages.
3. Header information on each procedure should include:
   a) Facility name;
   b) Title of procedure;
   c) Date the procedure was established;
   d) Revision dates.

9.3.2 Format

A standard format shall be developed and used for all procedures. It should include when appropriate, but not limited to:
1. Name of procedure;
2. Principle/purpose of the procedure;
3. Booking procedure;
4. Patient preparation;
5. Post-procedure care;
6. Equipment/supplies needed;
7. Special equipment cleaning/sterilizing;
8. Description of patient and equipment positioning and steps of procedure in sequential order;
9. Rationale for steps in procedure, included where helpful;
10. Special precautions.

9.4 Equipment Manual

9.4.1 The equipment manual should include, as a minimum, the following:

1. Equipment/Processors
2. List of contact personnel and phone numbers;
3. Manufacturer operating and troubleshooting instructions;
4. Record of repairs;
5. Preventative maintenance schedule and log (daily, weekly, monthly, and annually);
6. Record of maintenance done;
7. Schedule for quality control/acceptance testing (daily, weekly, monthly, and annually);
8. Record of quality control/acceptance testing results;
9. Record of corrective action;
10. Copy of Radiation Certificate (when appropriate).

9.5 Safety Manual

9.5.1 The safety manual should include, as a minimum, the following sections:

1. General Safety
   a) Imaging Safety Officer/Safety Committee
2. Radiation safety
3. Magnetic Safety (if applicable)
4. Radioactive Safety (if applicable)
5. Patient Safety
   a) Medical emergencies
6. Fire safety and Evacuation Procedures
7. Electrical safety
8. Compressed gases
9. Chemicals, solutions, and radioactive material
10. Universal Precautions (Standard Practices)
11. WHMIS
12. Waste management/disposal
    a) Biohazardous waste
    b) Sharps
    c) Radioactive material
13. Infection control
    a) Sterilization
    b) Staff immunization
14. Incident reports
9.6 Computer Manual

9.6.1 The computer manual should include as a minimum:
1. List of contact persons and phone numbers;
2. Availability of software and back-up discs and tapes;
3. Schedule for developing back-up discs or tapes;
4. Procedure to be used in case of computer failure;
5. List of personnel that have access to information and software security codes;
6. Guidelines for protection of confidentiality of patient data;
10.0 Safety

10.1 General Safety

10.1.1 Refer to Section 9.5 – Safety Manual.

10.1.2 There shall be a facility Safety Committee. (where appropriate)

10.2 Radiation Safety

10.2.1 There shall be a system in place that ensures ongoing compliance with:
   1. Radiation Protection Act and Regulations;

10.2.2 The policy/procedure manual shall contain a section relating to radiation protection.

10.2.3 The facility shall have posters clearly visible in the patient area alerting women who may be pregnant to notify the technologist prior to the examination.

10.2.4 Radiation warning labels shall be posted at the entrance of the procedure room.

10.2.5 Doors/entrances into procedure rooms shall be closed during equipment operation.

10.2.6 Gonadal shields shall be used when appropriate.

10.2.7 All technologists and radiologists/imaging specialists shall routinely wear an individual thermoluminescent radiation device.

10.2.8 The results of the thermoluminescent devices shall be monitored and reviewed by the Medical Director or their designate.

10.2.9 There shall be guidelines for persons holding or assisting during imaging examinations.

10.2.10 The facility should have infant immobilizers available, where indicated.

10.2.11 All immobilizing devices shall be regularly inspected for safety and cleanliness.

10.2.12 There shall be a procedure in place to determine whether or not a patient may be pregnant for all procedures involving any radiation to the abdomen or pelvis on women of childbearing age, and that this be documented.
   1. There should be a procedure in place to document the LMP for all obstetrical and gynecology ultrasounds on women of childbearing age.

10.2.13 There shall be a protocol for managing patients who have a delayed LMP.

10.2.14 Collimation shall be evident except where prevented by circumstance.
10.3 Magnetic Safety

10.3.1 Warning signs shall be posted and clearly visible at the entry to the magnet room.

10.3.2 Entry to the magnet room shall be secured and controlled at all times.

10.3.3 There shall be a system in place that ensures compliance with:
   2. Organization's Health and Safety Policies

10.3.4 All MRI personnel shall be screened for potential hazards as part of their employment interview process to ensure their safety in the MRI environment.

10.3.5 All patients shall be screened by the MRI radiologist, technologist or nurse for potential hazards prior to entering the magnet room.

10.3.6 All persons accompanying patients into the magnet room shall be screened for potential hazards prior to entering the magnet room.

10.3.7 The equipment shall comply with national standards for RF power deposition.

10.3.8 The equipment shall produce a warning and abort scan when RF power deposition limits are exceeded.

10.3.9 The facility shall have posters clearly visible in the patient area alerting women who may be pregnant to notify the technologist prior to the examination.

10.3.10 All facilities should have ready access to a strong handheld magnet to test for the presence of grossly detectable ferromagnetic attractive forces.

10.3.11 Non-ferromagnetic stretchers, wheelchairs and IV poles should be available within the MRI facility, where appropriate.

10.4 Radioactive Safety

10.4.1 The storage, handling and disposal of radioactive material shall be in compliance with the Canadian Nuclear Safety Commission (CNSC).

10.4.2 The appropriate licenses and registrations for the use of radioisotopes shall be in order.

10.4.3 The Radioactive Safety Manual shall include a section on decontamination.

10.4.4 There shall be written procedures for handling radioactive waste.

10.4.5 Radiation survey instruments shall be calibrated regularly and this shall be documented.

10.4.6 All areas or rooms where radioactive materials are being used or stored shall be “labeled” to indicate the presence of radioactive materials.
10.4.7 There shall be regular radiation surveys and wipe tests and this shall be documented.

10.4.8 Policies shall include procedures for inspection, monitoring of shipment and appropriate notification in the event of a damaged or leaking radionuclide shipment.

10.4.9 Radionuclide shipments shall be delivered directly to the Nuclear Medicine department and not left unattended.

10.4.10 All shipments of radionuclide’s shall be logged.

10.4.11 Radionuclide handling, storage and decay areas shall be properly shielded.

10.4.12 Radionuclide storage and decay areas shall be locked when not under the supervision of Nuclear Medicine personnel.

10.4.13 Radiation monitoring devices shall be readily available in the appropriate areas of the Nuclear Medicine facility.

10.4.14 The facility shall have a radiation safety officer who is responsible for and actively monitors radiation safety.

10.4.15 If any radioactive material is transferred to any other hospital or clinic, that institution shall have an appropriate Canadian Nuclear Safety Commission license for use of that material.

10.4.16 Radioactive material which is transferred to any other hospital or institution shall be properly packaged according to the CNSC “Packaging and Transport of Nuclear Substances Regulation”. A copy of this documentation shall be kept on file.

10.4.17 Radioactive material which is transferred to any other institution shall be transported according to the Transport Canada’s “Transportation of Dangerous Goods Regulations.”

10.4.18 The disposal of radioactive material shall be in compliance with the Canadian Nuclear Safety Commission (CNSC).

10.5 Patient Safety

10.5.1 There shall be policies and procedures in place to deal with medical emergencies.

10.5.2 Employees shall be familiar with procedures to handle medical emergencies.

10.5.3 If intravascular contrast is used, there shall be a crash cart/drug tray located within the facility and there shall be an emergency drug tray available in the room.

10.6 Fire Safety and Evacuation Procedures

10.6.1 Fire safety shall be in compliance with the institution and local fire department.

10.6.2 Staff shall be familiar with procedures to take, in the event of a fire.
10.6.3 Staff shall be familiar with the evacuation procedure for the facility.

10.7 Electrical Safety

10.7.1 Electrical Safety shall be in compliance with Federal and Provincial standards.

10.8 Compressed Gases

The following list shall be posted for information:

10.8.1 Never permit oil or grease to come in contact with cylinders, valves, regulators, gauges or fittings.

10.8.2 Store cylinders in designated places away from the operating field where they will not be knocked over or damaged by passing or falling objects.

10.8.3 Cylinders shall be protected from direct sunlight.

10.8.4 Cylinders in use shall be securely chained to a solid object, or in a secure base, to prevent their tipping.

10.8.5 Full cylinders shall be used in rotation in the order that they are received from the supplier.

10.8.6 Never use cylinders for rollers, supports or for any purpose other than to carry gas.

10.8.7 Where caps are provided for valve protection such caps shall be kept on cylinders except when cylinders are in use.

10.8.8 Never tamper with the safety devices in valves or cylinders.

10.8.9 Never attempt to repair or alter cylinders or refill cylinders.

10.8.10 Never attempt to use gases in cylinders not bearing a contents label or cylinder having a label all of which is not completely legible.

10.8.11 Never use compressed gas from a cylinder without reducing the pressure through a suitable regulator intended for that purpose only.

10.8.12 Never permit compressed gas to enter the regulator suddenly. Open the cylinder valve slowly.

10.8.13 Fully open the valve when the cylinder is in use.

10.8.14 Never interchange compressed gas regulators, hose or other appliances with similar equipment intended for use with other gases.

10.8.15 Never hold a gloved hand over the outlet to test the pressure. A serious burn may result.

10.8.16 Never heat cylinders above room temperature or allow a flame to play on them.
10.8.17 Never use oxygen in place of compressed air as a pressure medium to blow out obstructed pipelines, to operate pneumatic tools or to build up pressure in tank containing oils or other flammable materials. Nitrogen is the preferred gas for blowing out pipelines. Clean compressed air free of water or oil may also be used.

10.8.18 Oxygen shall never be used to blow dust out of clothing or to freshen air in a closed place. Serious burns may result from such practices.

10.8.19 Close all compressed gas cylinder valves when the cylinders are empty.

10.8.20 WHMIS regulations shall apply (where appropriate).

11.

10.9 Chemicals, Solutions

10.9.1 All chemicals and solutions shall be appropriately labeled and stored.

10.9.2 WHMIS regulations shall apply (where appropriate).

10.10 Waste Management/Disposal

10.10.1 The facility shall be responsible for the safe storage and disposal of contaminated waste.

10.10.2 There shall be written procedures for clean-up and disposal of contaminated materials from spills, blood and body fluids.

10.10.3 Universal Precautions (Standard Practices) shall be observed (where appropriate).

10.10.4 Glassware, sharps and needles shall be discarded in puncture-resistant containers prior to disposal.

10.11 Infection Prevention and Control

These standards have been adapted from Health Canada – Infection Control Guidelines – Hand Washing, Cleaning, Disinfection and Sterilization in Health Care and Health Canada – Infection Control Guidelines – Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care.

Routine infection control practices should be incorporated into everyday patient/resident/client care. Institutional policy should provide for education of every care provider in the principles of routine precautions, provision of adequate equipment to implement them, and a means by which compliance with practice can be monitored and audited.

To minimize the risk of transmission of infection, patients/residents/clients (referred to henceforth as “patients”) should be assessed for infection or potential infections upon admission. Each facility should endeavor to have some assessment procedure in place; the results should be communicated to other personnel providing care and should be documented in the patient record.
In situations requiring additional precautions, these precautions must be instituted as soon as indicated by triggering mechanisms such as diagnosis, symptoms of infection, laboratory information, or assessment of risk factors.

The institution/facility is responsible for ensuring that appropriate precautions are taken for specific patients.

All personnel (physicians, nurses, technologists, students, volunteers and others) are responsible for complying with routine and additional precautions and for tactfully calling observed infractions to the attention of all offenders. There are no hierarchical exceptions to precautions, and everyone has a responsibility to monitor his or her own practice as well as the practice of other care providers. There are no exceptions, and all should teach by example.

10.11.1 Occupational Health/Immunization

1. All personnel, including physicians should have their immunization status reviewed and documented at the time they commence employment at the facility and periodically thereafter.
2. Personnel that are unable to provide acceptable evidence of adequate immunity against hepatitis B, influenza, measles, mumps, rubella, and varicella; should be advised to speak to their physician about immunization.
3. Employers should consider measles, mumps, rubella, hepatitis B and varicella immunity as a condition of employment.
4. Tuberculin skin testing is recommended for all personnel at the beginning of their employment.
5. All personnel shall understand and adhere to “Routine Practices” which incorporate universal blood and body fluid precautions such as described in the “Health Canada Infection Control Guideline: Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care”. (This guideline is available on-line at http://www.phac-aspc.gc.ca/dpg_e.html#infection)
6. There shall be a policy and procedure for the management of significant exposures (e.g. needle-stick injuries).
7. Consultation with a specialist in infectious disease shall be obtained prior to workers with blood-borne pathogens starting work in the facility. “Health care workers who perform exposure-prone procedures have an ethical obligation to know their serologic status for hepatitis B virus (HBV), human immunodeficiency virus (HIV) or hepatitis C virus (HCV) and to follow the recommendations in ‘Proceedings of the Consensus Conference on Infected Health Care Workers: Risk for Transmission of Blood-borne Pathogens’.” (This document is available on-line at http://www.phac-aspc.gc.ca/dpg_e.html#infection)

10.11.2 General Infection Prevention Measures

1. Adequate hand washing sinks shall be appropriately located throughout the facility. Waterless, alcohol based antiseptic hand agents are an acceptable alternative to soap and water, if there is no visible soiling.
2. Hands shall be washed between patients, after removal of gloves, when visibly soiled and after contact with any contaminated objects.
3. Hand washing with an antiseptic agent shall be used:
   a) before performing invasive procedures;
   b) before contact with immuno-compromised patients;
   c) before contact with patients with extensive skin damage.
4. Masks, eye protection and face shields shall be worn for protection of mucous membranes of the eyes, nose and mouth during procedures likely to generate splashes or sprays of blood, body fluids, secretions or excretions.

5. Clean non-sterile gloves shall be worn:
   a) for contact with blood, body fluids, secretions and excretions, mucous membranes, draining wounds or non-intact skin (open skin lesions or exudative rash);
   b) when handling items visibly soiled with blood, body fluids, secretions or excretions;
   c) when the healthcare worker has open lesions on the hands.

6. Gloves are to be changed between care activities and procedures with the same patient after contact with materials that may contain high concentrations of microorganisms.

7. Gloves are to be removed immediately after completion of care or procedure, at point of use and before touching clean environment surfaces.

8. There should be a designated person responsible for the maintenance and enforcement of infection control and occupational health standards in the facility.

10.11.3 Additional Precautions

1. Airborne Transmission Precautions
   a) Patients with known or suspected infectious tuberculosis, measles, varicella or disseminated zoster should be placed directly in a single examination room and the door shall remain closed.
   b) Those patients shall wear a surgical/procedure mask during transport and movement through the facility.
   c) High efficiency dust/mist masks shall be worn by all healthcare workers who enter the examination room of a patient with infectious tuberculosis.
   d) High efficiency dust/mist masks shall be worn by non-immune healthcare workers who absolutely must enter the examination room of a patient with varicella, disseminated zoster or measles.

2. Droplet Transmission Precautions
   a) Patients with known or suspected meningococcal infection, rubella, mumps, pertussis, diphtheria or hemorrhagic fevers should be placed in a single examination room. If this is not possible the patient shall maintain a one meter spatial separation between other patients.
   b) Surgical/procedure masks should be worn by all healthcare workers that must come within one meter of the patient.
   c) The patient shall wear a surgical/procedure mask during transport and movement through the facility.

3. Contract Transmission Precautions
   a) Patients with known or suspected diarrhea, extensive skin or wound infection not contained by dressings, hemorrhagic fevers, meningitis, hepatitis, herpes simplex-disseminated, scabies (extensive or Norwegian/crusted), varicella, disseminated of extensive uncovered zoster and Antibiotic Resistant Organisms (ARO) should be placed in a single examination room. If this is not possible, a spatial separation of on meter shall be maintained between patients.
   b) Gloves should be worn when entering the patient’s room or designated examination space.
   c) Gloves shall be removed before leaving the patient’s room or designated examination space.
   d) Hands shall be washed immediately, first with soap and water if visibly soiled, then an antiseptic agent.
   e) Equipment and surfaces in direct contact with the patient or infective materials shall be cleaned before the room is used by another patient.
10.11.4 General Environmental and Equipment Cleaning

1. A barrier (sheet or paper) should be placed on the examination table. The barrier shall be changed between patients.
2. If no barrier is used, the examination table shall be cleaned between patients.
3. The examination table shall be cleaned between patients is visibly soiled.
4. Items touching mucous membranes or non-intact skin shall be appropriately disinfected between patients.
5. Chairs, cabinets and charts are not usually an infection risk, but should be cleaned on a regular basis.
6. Walls, blinds and curtains should be cleaned regularly and when soiled.
7. Floors should be cleaned regularly, with damp mopping preferred.
8. Carpets/upholstery should be vacuumed regularly and shampooed as necessary.
9. Toys shall be regularly cleaned, disinfected with a low level disinfectant, thoroughly rinsed and dried.

10.11.5 Equipment Cleaning, Disinfecting and Sterilization

1. Endocavitary ultrasound transducers shall be cleaned and disinfected between patients,
2. The “Guidelines for Cleaning and Preparing Endocavitary Ultrasound Transducers Between Patients” of the College of Physicians & Surgeons of Alberta shall apply. (Appendix D)
3. There shall be written policies and procedures for cleaning and sterilizing specialized equipment as described in Health Canada – Infection Control Guidelines – Hand Washing, Cleaning, Disinfection, and Sterilization in Health Care.
4. Personnel involved in the cleaning, disinfecting and sterilization of equipment shall be properly trained.
5. There shall be a designated area for soiled supplies. This area shall be physically separated from patient care areas and from areas housing clean and sterile supplies.
6. Personnel working in the soiled area shall have proper protective apparel for their personal protection.
7. Clean and sterile supplies shall be stored in an area protected from dust and moisture, with access limited to authorized personnel.
8. Sterile supplies shall be clearly marked.

10.12 Incident Reports

Note: An incident is an occurrence which either harmed or could have harmed a patient or a staff member.

10.12.1 There shall be a policy/procedure for reporting incidents.

10.12.2 All incidents shall be reviewed and signed off by senior site management and recommendations documented.

10.12.3 There shall be recommended actions to prevent a recurrence of an incident.

10.12.4 All incident records shall be retained for 10 years.
10.13 Emergency Drug Tray Equipment

10.13.1 There shall be an emergency drug tray immediately available if IV contrast is used or invasive procedures are performed.

10.13.2 The drug tray shall contain:
   1. Epinephrine 1:1,000 and 1:10,000;
   2. Atropine 0.6 mg/ml.

10.13.3 The drug tray should contain the following:
   1. Intravenous supplies;
   2. Parenteral antihistamine;
   3. Parenteral antiemetic;
   4. Short-acting bronchodilator (e.g. salbutamol) either;
      (i) in a metered-dose inhaler with a spacer device;
      (ii) as a solution with a nebulizer administration unit, or;
      (iii) as a diskus device.
11.0 Bone Densitometry

11.1 General

11.1.1 The reports shall at a minimum include:
1. Bone mineral density in raw units;
2. Significance of change from previous measurements;
3. Least significant change value in raw units;
4. T-score (standard deviations from the mean of young adult peak bone mass);
5. Z-score (standard deviations from the mean from age and gender matched population – for pediatric patients only);
6. Indication of individual’s 10 year absolute fracture risk;
7. Categorization of the findings according to criteria of the Osteoporosis Society of Canada
8. Identification of the site measured.

11.1.2 Quantitative comparisons shall be limited to cross calibration equipment.

11.1.3 Major factors which may affect the interpretation of bone density measurement shall be recorded on the in-house worksheet and the DXA report.

11.1.4 Patient height and weight shall be recorded.

11.1.5 A stadiometer shall be used to measure height.

11.2 Personnel – Technical

11.2.1 General
Radiological examinations shall be performed by an imaging specialist or a technologist who has current registration with their professional association.

11.2.2 Registration
1. Technologists shall be registered with the Alberta College of Medical Diagnostic & Therapeutic Technologists (ACMDTT).
2. Combined laboratory and x-ray technologists shall be registered with the Alberta College of Combined Laboratory & X-Ray Technologists (ACCLXT) (specific to x-ray).

Note: Effective April 1998, in the absence of a formal technical training program for bone densitometry, the College accreditation requirements include that:
(i) personnel performing these studies shall have certification in diagnostic radiology or nuclear medicine;
(ii) a manufacturer's training course or equivalent be completed;
(iii) a minimum of 50 studies be performed under supervision at an accredited bone density facility.

11.2.3 Maintenance of Certification
Provision shall be made for technologists to regularly attend relevant continuing education programs.
11.3 Quality Assurance

11.3.1 General

1. Installation of Equipment

2. Registration of Equipment
   a) The Radiation Protection Act and Regulations shall apply.
   b) All designated radiation equipment as defined in the Radiation Protection Act and Regulations, shall be registered.

3. Calibration of Equipment
   a) Facilities containing radiographic equipment shall comply with minimum radiographic standards. Standards and control limits may vary for different types of equipment, and manufacturer's recommendations shall be considered. The frequency of calibration is dependent on radiographic workload.

11.3.2 Quality Control

1. The following shall be considered minimum requirements for quality control:
   a) Precision checks using a phantom
   b) Comparisons on long-term data to detect changes in equipment

2. Between facility calibrating using the same phantom is recommended.

11.3.3 Equipment Maintenance

1. At a minimum, routine preventative maintenance shall be performed annually.
2. Preventative maintenance shall be done to manufacturer's specifications.
3. All maintenance shall be documented and records shall be readily available to staff.
12.0 Computerized Tomography (CT)

12.1 General

12.1.1 All CT imaging protocols shall be approved by a radiologist.

12.1.2 All CT requests should be reviewed by the radiologist for appropriateness prior to booking the examination.

12.1.3 CT fluoroscopy shall be performed under the direction and supervision of a radiologist.

12.1.4 Technologists performing venipuncture for the purpose of administering contrast media shall have a “Condition of Enhanced Practice” placed on their practice permit by the ACMDTT.

12.1.5 CT dose length product shall be documented in RIS and/or on patient records.

12.1.6 CT dose length product shall be documented in a separate log available for review by quality control personnel that contains the following:
   1. patient name;
   2. second patient identifier;
   3. procedure;
   4. exposure rate;
   5. physician/radiologist;
   6. technical personnel operating CT equipment.

12.2 Personnel – Technical

12.2.1 General
Radiological examinations shall be performed by an imaging specialist or a technologist who has current registration with their professional association.

12.2.2 Registration
   1. Technologists performing computerized tomography shall be registered with the Alberta College of Medical Diagnostic & Therapeutic Technologists (ACMDTT).
   2. Technologists performing computerized tomography should have the Computed Tomography Imaging Certificate (CTIC) from the Canadian Association of Medical Radiation Technologists (CAMRT).

12.2.3 Maintenance of Certification
Provision shall be made for technologists to regularly attend relevant continuing education programs.

12.3 Quality Assurance

12.3.1 General
   1. Installation of Equipment
2. Registration of Equipment
   a) The Radiation Protection Act and Regulations shall apply.
   b) All designated radiation equipment as defined in the Radiation Protection Act and Regulations, shall be registered.

12.3.2 Quality Control

1. The following shall be considered minimum requirements for quality control:
   a) Calibration of CT number                     Monthly
   b) Noise and uniformity                       Quarterly
   c) Scan width                                 Quarterly
   d) Accuracy of distance measurements          Annually

12.3.3 Equipment Maintenance

1. At a minimum, routine preventative maintenance shall be performed as per the manufacturer’s recommendation.

2. Preventative maintenance shall be done to manufacturer’s specifications.

3. All maintenance shall be documented and records shall be readily available to staff.

12.4 Cardiac CT

12.4.1 All cardiac CT imaging protocols shall be approved by an approved radiologist or cardiologist.

12.4.2 All cardiac CT requests shall be reviewed by the approved radiologist or cardiologist or a physician designate approved by the radiologists or cardiologist for appropriateness prior to booking the examination.

12.4.3 Where Cardiac CT images are not jointly interpreted by an approved cardiologist and an approved radiologist, the interpretation of non-cardiac anatomy shall be reported by a qualified radiologist.
13.0 Magnetic Resonance Imaging (MRI)

13.1 General

For the following, “MRI radiologist” means a radiologist approved by the College either to interpret studies or to direct an MRI facility.

13.1.1 A physician with full MRI approval shall review a minimum of 20% of the studies performed each month in the facility.

13.1.2 All MRI imaging protocols shall be approved by an MRI radiologist.

13.1.3 All MRI studies shall be interpreted by an MRI radiologist and reported in a timely fashion.

13.1.4 An MRI radiologist shall be on-site for a majority of the studies performed each day in the facility.

13.1.5 An MRI radiologist shall be immediately available (i.e. in person or by phone) during all studies.

13.1.6 All MRI requests should be screened by the MRI radiologist for appropriateness prior to booking the examination.

13.1.7 The patient shall be observed by control room staff at all times while in the magnet.

13.1.8 Verbal communication between the control room staff and the patient in the magnet shall be possible.

13.1.9 There shall be a mechanism for the patient to alert control room staff when in the magnet.

13.1.10 There shall be a section on the requisition to indicate potential hazards to MRI (e.g. aneurysm clips, metallic foreign body, etc.)

13.1.11 There shall be a screening form for patient screening prior to the examination.

13.1.12 The MRI technologist or nurse shall review the completed screening form with the patient before entering the magnet room.

13.1.13 Technologists performing venipuncture for the purpose of administering contrast media shall have a “Condition of Enhanced Practice” placed on their practice permit by the ACMDDT.

13.1.14 The facility shall have access to the services of a physicist.

13.2 Personnel – Technical

13.2.1 General
Magnetic Resonance Imaging (MRI) examinations shall be performed by an imaging specialist or a technologist who has current registration with their professional association.

13.2.2 Registration
Technologists performing MRI shall be registered with the Alberta College of Medical Diagnostic & Therapeutic Technologists (ACMDTT).
13.3 Quality Assurance

13.3.1 General

13.3.2 Quality Control

1. The following shall be considered minimum requirements for quality control:

<table>
<thead>
<tr>
<th>Device</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Image quality</td>
<td>Monthly</td>
</tr>
<tr>
<td>b) Quality of transmit coil (Q of the coil)</td>
<td>Monthly</td>
</tr>
<tr>
<td>d) Spatial linearity</td>
<td>Monthly</td>
</tr>
<tr>
<td>d) Signal to Noise (standard head &amp; body coil)</td>
<td>Monthly</td>
</tr>
<tr>
<td>e) Food field uniformity</td>
<td>Monthly</td>
</tr>
<tr>
<td>f) Spatial resolution, and line spread functions</td>
<td>Monthly</td>
</tr>
<tr>
<td>g) Slice thickness/profile</td>
<td>Monthly</td>
</tr>
<tr>
<td>h) Checks for phase shift</td>
<td>Monthly</td>
</tr>
<tr>
<td>i) Accuracy of couch localization</td>
<td>Semi-Annually</td>
</tr>
</tbody>
</table>

2. The above measurements should be done at acceptance, at monthly preventative maintenance and following any major service.

3. A test phantom supplied by the manufacturer or test object sanctioned by the AAPM or CCPM should be utilized.

4. Values should be plotted at acceptance and monthly and be reviewed annually.

13.3.3 Equipment Maintenance

1. At a minimum, routine preventative maintenance shall be performed as per the manufacturer’s recommendation.

2. Preventative maintenance shall be done to manufacturer’s specifications.

3. All maintenance shall be documented and records shall be readily available to staff.

13.4 Remotely Supervised MRI

13.4.1 Remotely supervised MRI services are subject to accreditation by the College as a separate imaging facility.

13.4.2 The Medical Director of a remote service shall be Medical Director of at least one accredited fully-supervised full-time MRI facility in Alberta.

[Supervision requirements for fully-supervised facilities include that an MRI-qualified radiologist shall be on-site for at least 50% of studies and the Medical Director shall be on-site for at least 20% of studies.]

13.4.3 The Medical Director of a remote service shall inspect the mobile service or the remote site no less than once each year and document the findings and corrective actions from that inspection.
13.4.4 An Alberta MRI-approved radiologist shall review all requisitions, prescribe all imaging protocols and interpret all studies.

13.4.5 An Alberta MRI-approved radiologist shall be available to the imaging technologist by phone during imaging sessions.

13.4.6 The technologist performing studies shall be a qualified MRI technologist.

13.4.7 MRI equipment, shielding and vehicle shall meet all applicable standards.

13.4.8 MRI studies requiring preliminary review before discharging patients in accordance with generally accepted standards of practice in Alberta shall have and use remotely supervised-imaging technology for review by the radiologist of such cases performed at the remote facility.

13.4.9 MRI studies with the use of gadolinium: refer to section 4.3.3 Intravascular Contrast Agents

13.4.10 MRI studies under intravenous sedation or on patients requiring monitoring of vital signs during the imaging procedure are not permitted.

13.4.11 Studies for which the generally accepted standard of practice in Alberta is the direct supervision by a radiologist shall not be performed by remote MRI.
14.0 Mammography

14.1 General

14.1.1 Facilities providing mammography services shall maintain current accreditation with the Canadian Association of Radiologists – Mammography Accreditation Program (CAR-MAP).

14.2 Personnel – Technical

14.2.1 General
Radiological examinations shall be performed by an imaging specialist or a technologist who has current registration with their professional association.

14.2.2 Registration
1. Technologists performing Mammography shall be registered with the Alberta College of Medical Diagnostic & Therapeutic Technologists (ACMDTT).
2. Technologists should have special training in mammography.

14.2.3 Maintenance of Certification
1. Provision shall be made for technologists to regularly attend relevant continuing education programs.
2. Technologists performing Mammography shall meet the CAR-MAP continuing education requirements.

14.3 Mammography Accreditation

14.3.1 Non-CAR Accreditation
1. Mammography units utilized for biopsy procedures only shall maintain Mammography-Non CAR accreditation with the College.
2. The radiologists reporting mammography shall meet the CAR-MAP minimum criteria and continuing education requirements.
3. The technologists shall meet the CAR-MAP training and continuing education requirements.

14.4 Quality Assurance

14.4.1 General

1. Installation of Equipment
2. Registration of Equipment
   a) The Radiation Protection Act and Regulations shall apply.
   b) All designated radiation equipment as defined in the Radiation Protection Act and Regulations, shall be registered.
3. Calibration of Equipment
   a) Facilities containing mammographic equipment shall comply with minimum radiographic standards. Standards and control limits may vary for different types of equipment, and manufacturers' recommendations shall be considered. The frequency of calibration is dependent on radiographic workload.
14.4.2 Quality Control

1. The standards as adopted for CAR accreditation apply.

14.4.3 Repeat/Reject Analysis

1. There shall be a repeat/reject analysis to monitor photographs and equipment quality control procedures, determine the cause of non-diagnostic films and indicate areas where improvements are required.
2. A repeat/reject analysis report should be done monthly.
3. A review of the analysis shall be done with staff.
4. There shall be documentation of corrective action taken.
5. Record or repeat/reject analysis shall be kept for two years.

14.5 Digital Mammography (DR & CR)

14.5.1 Digitization/acquisition system:
These systems require 5.0 lp/mm acquisition resolution (100 micron wide detector elements) x 10 bits array or better. This is true for both small field (18 x 24 cm) and full field (24 x 30 cm) digital mammography systems.

14.5.2 Display/reporting system:
These systems require a 2560 x 2048 (5.0 mega pixel) gray scale monochromatic monitor or better with a luminescence rating of at least 500 candelas/m² and a contrast ratio of at least 600:1 for an LCD display. The monitor must be capable of displaying a minimum of 1024 levels of gray. The workstation must be able to display segments of the image at full resolution. Less stringent standards may be acceptable when display systems are used for preliminary consultation.

14.6 Remotely Supervised Mammography

14.6.1 Remotely supervised mammography services shall only be approved for screening mammography only and arrangements for referral of patients requiring further work up to facilities with an on-site radiologist shall be in place.
15.0 Nuclear Medicine

15.1 General

15.2 Personnel – Technical

15.2.1 General
Nuclear Medicine examinations shall be performed by an imaging specialist or a technologist who has current registration with their professional association.

15.2.2 Registration
Technologists performing Nuclear Medicine shall be registered with the Alberta College of Medical Diagnostic & Therapeutic Technologists (ACMDTT).

15.2.3 Maintenance of Certification
Provision shall be made for technologists to regularly attend relevant continuing education programs.

15.3 Quality Assurance

15.3.1 General

15.3.2 Quality Control

1. The following shall be considered minimum requirements for quality control when applicable:

<table>
<thead>
<tr>
<th>Device</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Physics, Instrumentation, Gamma Cameras</td>
<td>Daily</td>
</tr>
<tr>
<td>Room Background</td>
<td>Daily</td>
</tr>
<tr>
<td>Calibration for energy window settings (i.e. Tc$^{99m}$)</td>
<td>Daily</td>
</tr>
<tr>
<td>Intrinsic flood/uniformity</td>
<td>Monthly</td>
</tr>
<tr>
<td>Bar phantoms for resolution (Analog systems only)</td>
<td>Semi-Annually</td>
</tr>
<tr>
<td>Multi-window registration</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Pulse height resolution (where possible)</td>
<td>Semi-Annually</td>
</tr>
<tr>
<td>Extrinsic uniformity for collimator/flood source</td>
<td>Semi-Annually</td>
</tr>
<tr>
<td>System deadtime</td>
<td>Semi-Annually</td>
</tr>
<tr>
<td>Pixel calibration</td>
<td>Semi-Annually</td>
</tr>
<tr>
<td>b) SPECT Cameras</td>
<td>As per Manufacturer’s</td>
</tr>
<tr>
<td>Room Background</td>
<td>Daily</td>
</tr>
<tr>
<td>Calibration for energy window settings (i.e. Tc99m)</td>
<td>Daily</td>
</tr>
<tr>
<td>Intrinsic flood/uniformity</td>
<td>As per Manufacturer’s</td>
</tr>
<tr>
<td>Centre of rotation</td>
<td>Monthly</td>
</tr>
<tr>
<td>Recommendation</td>
<td>Semi-Annually</td>
</tr>
<tr>
<td>Bar phantoms for resolution</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Multi-window registration</td>
<td>As per Manufacturer’s</td>
</tr>
<tr>
<td>SPECT phantom reconstruction</td>
<td></td>
</tr>
<tr>
<td>Count correction flood (30 million count flood)</td>
<td></td>
</tr>
</tbody>
</table>
Diagnostic Imaging

c) Well Counters
• Background accumulation
• Reference standard calibration (Co57, Cs137)
• Confirmation of proper window settings on radionuclides
• Crystal energy resolution
• Chi square reproducibility test
  Recommendation
  Daily
  Daily
  Daily
  Semi-Annually
  Semi-Annually
d) Uptake Probes
• Background accumulation
• Reference standard calibration (Co57, Cs137)
• Confirmation of proper window settings on radionuclides
• Crystal energy resolution
• Chi square reproducibility test
• Counting efficiency
  Recommendation
  Daily
  Daily
  Daily
  Semi-Annually
  Semi-Annually
  Semi-Annually
e) Dose Calibrator
• Zero and background
• Instrument functioning test (battery test)
• Sample holder contamination test
• Well Liner contamination test
• Reference source check (instrument constancy)
• Instrument linearity and constancy
• Pre-set calibration test
• Calibration of radiation survey meters
  Recommendation
  Daily
  Daily
  Daily
  Daily
  Daily
  Quarterly
  Semi-Annually
  Annually
f) Radiopharmacy
• Tc99 generator eluate:
• Aluminum contamination
• Moly99 breakthrough
• Clarity and volume
• Eluate assay
  Recommendation
  Initial
  Daily
  Daily
  Daily
  Daily
16.0 Positron Emission Tomography (PET)

16.1 General

16.2 Personnel – Technical

16.2.1 General
Positron Emission Tomography examinations shall be performed by an imaging specialist or a technologist who has current registration with their professional association.

16.2.2 Registration
Technologists performing PET shall be registered with the Alberta College of Medical Diagnostic & Therapeutic Technologists (ACMDTT).

16.2.3 Maintenance of Certification
Provision shall be made for technologists to regularly attend relevant continuing education programs.

16.3 Quality Assurance

16.3.1 General

16.3.2 Quality Control
17.0 Radiography

17.1 General

17.2 Personnel – Technical

17.2.1 General
Radiological examinations shall be performed by an imaging specialist or a technologist who has current registration with their professional association.

17.2.2 Registration
1. Technologists shall be registered with the Alberta College of Medical Diagnostic & Therapeutic Technologists (ACMDTT).
2. Technologists shall be registered with the Alberta College of Combined Laboratory & X-Ray Technologists (ACCLXT) (specific to x-ray).

17.2.3 Maintenance of Certification
Provision shall be made for technologists to regularly attend relevant continuing education programs.

17.3 Quality Assurance

17.3.1 General

1. Installation of Equipment
2. Registration of Equipment
   a) The Radiation Protection Act and Regulations shall apply.
   b) All designated radiation equipment as defined in the Radiation Protection Act and Regulations, shall be registered.
3. Calibration of Equipment
   a) Facilities containing radiographic or fluoroscopic equipment shall comply with minimum radiographic standards. Standards and control limits may vary for different types of equipment, and manufacturers’ recommendations shall be considered. The frequency of calibration is dependent on radiographic workload.

17.3.2 Quality Control

1. The following shall be considered minimum requirements for quality control when applicable:

<table>
<thead>
<tr>
<th>Device</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Film Processors</td>
<td></td>
</tr>
<tr>
<td>• Sensitometry – speed, control, fog</td>
<td>Daily (recommended)</td>
</tr>
<tr>
<td>• Chemistry – volumes, rates, times, temperature</td>
<td>Monthly</td>
</tr>
<tr>
<td>• Cleaning:</td>
<td></td>
</tr>
<tr>
<td>• Crossover rollers</td>
<td>Daily</td>
</tr>
<tr>
<td>• Processor racks</td>
<td>Monthly</td>
</tr>
<tr>
<td>b) Generators</td>
<td>58</td>
</tr>
</tbody>
</table>

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• kVp accuracy
• Linearity and reproducibility of exposure
• Timer accuracy

  c) X-ray Tubes
  • Beam quality (HVL)
  • Collimators
  • Distance (SID) indicators
  • Radiation/light field edge congruence
  • Perpendicularity
  • Radiation/film holder centering
  • Positive beam limitation

  d) Image Intensifiers
  • Radiation/intensifier film size beam limitation
  • Fluoro dose rate
  • Image intensifier lag
  • Low contrast resolution
  • High contrast resolution
  • Flat film density

  e) Automatic Exposure Control (AEC) Devices
  • Reproducibility
  • Comparability
  • kVp/thickness compensation
  • Back-up timer
  • Flat film density

  f) Cassettes
  • Film/screen contact
  • Screen condition and light leaks
  • Artifact identification
  • Film/screen cleaning

  g) Grids
  • Damage/artifact identification
  • Alignment and focal distance

  h) Tomography
  • Tomographic level
  • Depth of cut/slice thickness
  • Stability of movement

17.3.3 Repeat/Reject Analysis

1. There shall be a repeat/reject analysis to monitor images and equipment quality control procedures, determine the cause of non-diagnostic films and indicate areas where improvements are required.
2. A repeat/reject analysis report should be done monthly.
3. A review of the analysis shall be done with staff.
4. There shall be documentation of corrective action taken.
5. Record or repeat/reject analysis shall be kept for two years.
17.4 Fluoroscopy

17.4.1 Fluoroscopy shall be performed under the direction and supervision of a radiologist or physician approved by the College.

17.4.2 Physicians who are not radiologists may be approved to operate fluoroscopy equipment in non-hospital facilities upon confirmation of the following:
1. That the physician’s use of fluoroscopy is adjunctive for a clinical procedure performed within the scope of their specialty training;
2. That the physician provides evidence of proficiency with performance of the procedure under fluoroscopy; and
3. That a documented course of instruction is satisfactorily completed, which includes:
   a) Didactic training:
      (i) radiation physics;
      (ii) radiation safety;
      (iii) principles of ALARA;
      (iv) techniques to optimize image quality;
      (v) techniques to capture, retrieve and print images;
      (vi) documenting and analyzing fluoro-times; and
   b) Hands-on training with the specific equipment in use in the facility.

17.4.3 A technologist operating fluoroscopy equipment under the supervision of a radiologist must be a registered MRT or CLXT.

17.4.4 A technologist operating fluoroscopy equipment under the supervision of an approved non-radiologist physician must be a registered MRT or CLXT.

17.4.5 The use of fluoroscopy as an adjunct to performance of a clinical procedure shall include the capture and storage of a minimum of one image per case for quality assurance purposes.

17.4.6 Fluoroscopy time shall be documented on patient records.

17.4.7 Fluoroscopy time shall be documented in a separate log available for review by quality control personnel that contains the following:
1. patient name;
2. second patient identifier;
3. procedure;
4. fluorotime;
5. physician/radiologist;
6. technical personnel operating fluoroscopy equipment.

17.4.8 Facilities without a radiologist medical director where fluoroscopy is performed by an approved physician who is not a radiologist, shall have a consultant who is a radiologist licensed to practice in Alberta.

17.4.9 The radiologist consultant shall review and report on the following at least every three months;
1. the quality control records for the fluoroscopy and all ancillary equipment;
2. the quality of images stored;
3. the log of fluoro-times.

17.4.10 The radiologist consultant shall visit the facility and report on the above, annually.
17.5 Mobile X-ray Equipment

17.5.1 Mobile x-ray equipment shall comply with the Radiation Protection Act and Regulations.

17.5.2 Mobile radiographic equipment shall not be used as stationary radiographic equipment.

17.5.3 Only those technologists who can demonstrate specific training in mobile radiography shall be considered competent to operate mobile radiographic equipment.

17.6 Remotely Supervised Fluoroscopy

17.6.1 Remotely supervised digital fluorography will be considered on an individual basis until standards for these studies are developed.
18.0 Ultrasound

18.1 General

18.1.1 Fetal Doppler ultrasound should only be performed on equipment where the acoustic power output data can be displayed in Real Time. The recommended displayed data are the soft tissue thermal index (TIS) or the bone thermal index (TIB) whichever is appropriate. On older equipment the $I_{SPTA,3}$ (spatial peak temporal average intensity) may be substituted. Regardless of the units of measurement, the acoustical power output should be documented on hard copy images obtained.

The sonologist and sonographer must be familiar with the concepts of Thermal Indices and ALARA (As Low As Reasonably Achievable) and the equipment should have operator adjustable acoustic power output. The College recommends the acoustic power output be adjusted so that the Thermal Index is less than 1.0 whenever possible.

18.1.2 Ultrasound examinations of the first and early second trimesters of all multiple gestations shall define and report amnionicity and chorionicity whenever possible.

18.2 Personnel – Technical

18.2.1 General

Ultrasound examinations shall be performed by an imaging specialist or a technologist/sonographer who has current registration with their professional association.

18.2.2 Registration

1. Sonographers shall be registered with Sonography Canada (CARDUP), the American Registry of Diagnostic Medical Sonographers (ARDMS) or Alberta College of Medical Diagnostic and Therapeutic Technologists (ACMDTT).

2. Sonographers should be registered with Sonography Canada (CARDUP), ARDMS or ACMDTT in the areas of their specialty.

18.2.3 Maintenance of Certification

Provision shall be made for technologists/sonographers to regularly attend relevant continuing education programs.

18.3 Quality Assurance

18.3.1 General

18.3.2 Quality Control

1. The following shall be considered minimum requirements for quality control:
   a) Equipment test using ultrasound phantom Annually

2. The following is for information:
   a) An AIUM or equivalent test objects must be available to check calibration and equipment function.
   b) Absolute maximum values and typical values (mean measured values at highest output settings) are to be reported for the following quantities:
      • Ultrasonic power
18.4 Echocardiography

Echocardiography and Remotely Supervised Echocardiography will fall under the Ultrasound Standard until a specific standard is developed.

18.5 Supervision of Studies

18.5.1 An ultrasonologist shall be on-site at the facility for consultation, supervision and interpretation of all ultrasound examinations unless otherwise approved by the College.

18.5.2 Remotely Supplied Ultrasound is an approved exception to the above, subject to specific accreditation standards for Remotely Supplied Ultrasound services.

18.5.3 In unusual circumstances, approval for ultrasound examinations without an ultrasonologist available either on-site or by remotely supervised ultrasound will be considered only upon application and only for specified studies and locations where the absence of ultrasound services could harm patients. Approvals are subject to adequate arrangements for the prompt interpretation of studies by an ultrasonologist and a process for immediate referral of complex cases. Interpretation of studies by ultrasonographers or others who are not ultrasonologist is not acceptable.

18.6 Remotely Supervised Ultrasound

18.6.1 For the purpose of these standards, remotely supervised ultrasound refers to those situations where sonologists are geographically distant from the site of ultrasound testing and are not able to attend the patient within 15 minutes of travelling time if required during that visit, or arrange for the patient to wait under the care of the physician requesting the study until an on-site sonologist can attend to them at that same location.

18.6.2 The presence of an on-site sonologist remains the ideal, but it is recognized that geographic realities in Alberta do not permit the presence of an on-site sonologist in all locations. Given the adequate supply of sonologists and close geographic proximity to diagnostic imaging facilities, remote supervision of ultrasound is not permitted within a 100 kilometre radius from the city centre of metropolitan areas of greater than 50,000 residents unless the ratio of residents to sonologists exceeds 20,000:1.
18.6.3 Publicly or privately operated facilities without an on-site sonologist shall, at a minimum, require:
- The capacity to transmit images via cine clip;
- The sonologist to review the images before the patient leaves the facility;
- Documentation of the release of the patient by the interpreting sonologist and;
- A documented process for referral to a facility with an on-site sonologist.

18.6.4 Sonographers performing remotely supervised ultrasound shall be registered with Sonography Canada (CARDUP), have a minimum of one year of full-time post-certification experience and shall receive yearly training to a minimum total of 5 days per calendar year of which at least 3 must be face to face with the interpreting sonologist. This may be accomplished by travel by the interpreting sonologist to the remote site or by the sonographer to the location of the interpreting sonologist.

18.6.5 Final interpretive reports may be issued by the sonologist from the transmitted images only when they are of diagnostic quality and in accordance with accepted standards for the anatomical study required. Ultrasound studies that are inconclusive shall be identified so that appropriate follow-up can be arranged.

18.6.6 MSK, Breast, and Hernia ultrasound studies are not suitable for remote interpretation; these studies must only be performed in facilities with an on-site sonologist.

18.6.7 There shall be a means of communication by audio and text transmission between sonographer and sonologist.

18.6.8 Instructions from the sonologist shall be recorded on the requisition or worksheet.

18.6.9 Studies for which the sonologist or the sonographer identify the need for direct participation by a sonologist shall be referred to a facility with an on-site sonologist.

18.6.10 In addition to policy and procedure manuals for an on-site ultrasound service, manuals shall address the specific elements of a remotely supervised ultrasound service.

18.6.11 The quality assurance program shall include capture and transmission of a test image at least monthly to test the overall operation of the system.

18.6.12 All equipment shall be properly maintained and up-to-date.
Appendix A - Accreditation Process for Diagnostic Imaging Facilities
(Distance Review)

College informs facility of upcoming review, sends questionnaires and requests facility to select films for review and to forward questionnaires to College and films to reviewer.

Facility sends pre-directed letter to College to confirm receipt of documentation and forwards questionnaires to College.

College enters demographic information from the questionnaires into the report and forwards to the reviewer for completion.

Facility sends pre-directed letter to College to confirm documentation is sent to reviewer.

Reviewer completes review & forwards report to College by e-mail.

College Advisory Committee reviews inspection report

- **Approved**: Accreditation Certificate issued
- **Outstanding Requirements**: Medical Facility Assessment Committee (MFAC) notified of Accreditation

College Advisory Committee forwards report to facility with a request to respond to requirements/recommendations within 90 days “Interim Accreditation”

Facility/Medical Director forwards response to requirements/recommendations to College

- **Outstanding Requirements**: College advises Medical Director of Committee response “Interim Accreditation” extended

College Advisory Committee reviews response for compliance

- **Approved**
  - Accreditation Certificate issued
  - MFAC notified of Accreditation
- **Not Approved**
  - Accreditation denied
  - Dialogue
  - MFAC reviews and makes decision regarding Accreditation
    - **Approved**: Council reviews and makes decision regarding Accreditation
      - **Approved**
        - Accreditation Certificate issued
        - MFAC notified of Accreditation
      - **Not Approved**: Accreditation denied
        - Council reviews and makes decision regarding Accreditation
          - **Not Approved**: Accreditation denied
          - **Approved**: Accreditation Certificate issued
          - MFAC notified of Accreditation

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Appendix B - Control Limits For Preventative Maintenance and Calibration*

<table>
<thead>
<tr>
<th>Factor</th>
<th>Control Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilovoltage accuracy</td>
<td>±10%</td>
</tr>
</tbody>
</table>
| Radiation output reproducibility | a) Coefficient of variation is ±5%  
b) Individual measurement is ±15% of average measurement |
| Radiation output linearity      | ±10%                                                                                             |
| Timer accuracy                  | ±10% + 1 ms                                                                                      |
| mAs Loading                     | ±10% + 2 mAs                                                                                      |
| Minimum irradiation time        | The greater of 1/60s or the time required to deliver 5 mAs at the SID                            |
| Beam limiting device            | Minimum x-ray field size shall not exceed 5 cm by 5 cm at SID = 100cm                           |
| Light/radiation field alignment | ±2% of SID                                                                                        |
| Automatic exposure control      | Film-based allowable variable in optical density:  
a) ±15% for variable kilovoltage and constant object thickness  
b) ±20% for variable object thickness and constant kilovoltage  
c) ±20% for variable object thickness and variable kilovoltage  
d) ±10% for constant object thickness and constant kilovoltage |
| HVL (filtration, beam quality)  | See Appendix C                                                                                     |

*taken from Health Canada Safety Code 35, Radiation Protection in Radiology – Large Facilities, Section 2.5
## Appendix C

### A. Radiographic and Radioscopic Equipment

Minimum Half-Value Layers of Aluminum for X-Ray Tube Voltages*

<table>
<thead>
<tr>
<th>X-Ray Tube Voltage (kV)</th>
<th>Half-Value Layer of Aluminum (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>2.5</td>
</tr>
<tr>
<td>80</td>
<td>2.9</td>
</tr>
<tr>
<td>90</td>
<td>3.2</td>
</tr>
<tr>
<td>100</td>
<td>3.6</td>
</tr>
<tr>
<td>110</td>
<td>3.9</td>
</tr>
<tr>
<td>120</td>
<td>4.3</td>
</tr>
<tr>
<td>130</td>
<td>4.7</td>
</tr>
<tr>
<td>140</td>
<td>5.0</td>
</tr>
<tr>
<td>150</td>
<td>5.4</td>
</tr>
</tbody>
</table>

*taken from Health Canada Safety Code 35, Radiation Protection in Radiology – Large Facilities, Table 8

### A. Computed Tomography (CT) Equipment

Minimum Half-Value Layers of Aluminum for X-Ray Tube Voltages*

<table>
<thead>
<tr>
<th>X-Ray Tube Voltage (kV)</th>
<th>Half-Value Layer of Aluminum (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>1.9</td>
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<tr>
<td>70</td>
<td>2.1</td>
</tr>
<tr>
<td>80</td>
<td>2.4</td>
</tr>
<tr>
<td>90</td>
<td>2.7</td>
</tr>
<tr>
<td>100</td>
<td>3.0</td>
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</tr>
<tr>
<td>130</td>
<td>4.2</td>
</tr>
<tr>
<td>140</td>
<td>4.6</td>
</tr>
</tbody>
</table>

*taken from Health Canada Safety Code 35, Radiation Protection in Radiology – Large Facilities, Table 9
Appendix D - Guidelines for Cleaning and Preparing Endocavitary Ultrasound Transducer Between Patients

The purpose of this document is to provide guidance regarding the cleaning and disinfection of trans-vaginal and trans-rectal ultrasound transducers.

All sterilization/disinfection represents a statistical reduction in the number of microbes present on a surface. Cleaning is an extremely important part of equipment and instrument reprocessing and is necessary to permit maximum efficacy of subsequent disinfection and sterilization treatments. Cleaning of transducer probes must be followed by a disinfecting procedure to ensure high degree of protection to patients from infectious disease transmission, even if a disposable barrier covers the instrument during use.

Medical instruments fall into different categories with respect to potential for infection transmission. The most critical level of instruments are those that are intended to penetrate skin or mucous membranes. These require sterilization. Less critical instruments (often called “semi-critical” instruments) such as endocavitary diagnostic probes that simply come into contact with mucous membranes require a minimum of high-level disinfection.

Although endocavitary ultrasound transducers might be considered even less critical instruments because they are routinely protected by single use disposable probe covers, leakage rates of 0.9% - 2% for condoms and 8% - 81% for commercial probe covers have been observed in recent studies. For maximum safety one should therefore perform cleaning and high-level disinfection on the transducer between each use and a probe cover or condom should be used as an aid to keeping the transducer clean.

There are four generally recognized categories of disinfection and sterilization.

Sterilization is the complete elimination of all forms of microbial life including spores and viruses. Disinfection is the selective removal of microbial life and is divided into three classes:

- **High-Level Disinfection** – Destruction/removal of all micro-organisms except bacterial spores;
- **Intermediate-Level Disinfection** – Inactivation of Mycobacterium Tuberculosis, bacteria, most viruses and most fungi and some bacterial spores;
- **Low-Level Disinfection** – Destruction of most bacteria, some viruses and some fungi. Low-level disinfection will not necessarily inactivate Mycobacterium Tuberculosis or bacterial spores.

The following specific recommendations are made for the use of endocavitary ultrasound transducers. Users should review the Health Canada Infection Control Guidelines – Hand Washing, Cleaning, Disinfection and Sterilization in Health Care to be certain that their procedures conform to the principles for disinfection of patient care equipment. Always refer to the manufacturer instructions.

1. **CLEANING** – After removal of the probe cover, wipe off any residual gel or debris from the probe with a damp cloth. Immerse the probe in water (only the part of the probe that is safe to immerse) according to manufacturer’s instructions and clean with medical grade detergent or enzymatic cleaner. Consider the use of a small brush especially for crevices and areas of angulation depending on the design of your particular transducer. Rinse the transducer thoroughly with clean tap water under the surface of the water, and then dry the transducer with a soft lint free cloth.

2. **DISINFECTION** – Cleaning as described above is important as the first step in proper disinfection since chemical disinfectants act more rapidly on clean surfaces. However, the additional use of a high-level liquid disinfectant will ensure further statistical reduction in microbial load. Because of the potential disruption of the barrier sheath, additional high-level disinfection with chemical agents is necessary. Examples of such high level disinfectants include but are not
3. limited to:
   ⇒ 2.4-3.2% glutaraldehyde products (a variety of available proprietary products including “Cidex”, “Metricide”, or “Procide”);
   ⇒ Non-glutaraldehyde agents (proprietary products include “Cidex OPA [o-phthalaldehyde]”, “Cidex PA [hydrogen peroxide & peroxycetic acid]”).
   ⇒ 2% Accelerated Hydrogen Peroxide (AHP) (e.g. Resert)
   ⇒ Hydrogen peroxide vapour system (e.g Trophon EPR Sonex vapour High level disinfectant, GE Canada). This product must be used in a dedicated system according to manufacturer’s instructions.

All disinfectants shall have a Drug Identification Number (DIN) or Natural Product Number (NPN) from Health Canada and be approved for use in Canada.

Other agents such as quaternary ammonium compounds are not considered high level disinfectants and should not be used. Isopropanol is not a high level disinfectant when used as a wipe and transducer manufacturers do not generally recommend soaking transducers in the liquid.

The high level disinfection contact conditions, such as duration of soak, temperature of disinfectant solution, concentration testing and changing of solutions, cleaning of trays, etc. must be in accordance with manufacturer directions. Practitioners should consult the labels of proprietary products for specific instructions. They should also consult instrument manufacturers regarding compatibility of these agents with transducers. Many of the chemical disinfectants are potentially toxic and many require adequate precautions such as proper ventilation, wearing personal protective equipment (PPE) (chemically resistant gloves, face/eye protection, etc.) and thorough rinsing to remove chemical residue before reuse of the transducer.

4. PROBE COVERS – When in use, the transducer should be covered with a single-use barrier. If the barrier used are condoms, these should be non-lubricated and non-medicated. Practitioners should be aware that condoms have been shown to be less prone to leakage than commercial probe covers, and have a six-fold enhanced AQL (acceptable quality level) when compared to standard examination gloves. They have an AQL equal to that of surgical gloves. Users should be aware of latex-sensitivity issues and have available nonlatex-containing barriers.

5. ASEPTIC TECHNIQUE – Reprocessed transducers must be stored in a clean, dry protected are when not in use. For the protection of the health care worker, all endocavity examinations should be performed with the operator wearing clean procedure gloves throughout the procedure. Gloves should also be worn when handling used probes, when removing the condom or other barrier from the transducer and to clean the transducer as outlined above. When removing the barrier or condom, care should be taken not to contaminate the probe with secretions from the patient. At the completion of the procedure, gloves should be removed and hands should be thoroughly washed with soap and water.

**Note:** Obvious disruption in condom pr barrier integrity does NOT require modification of this protocol. Following these guidelines take into account possible transducer contamination due to a disruption in the barrier sheath.

In summary, routine high-level disinfection of the endocavity transducer between patients, plus the use of a probe cover or condom during each examination is required to properly protect patients from infection during endocavity examinations. Whenever chemical disinfectants are used, precautions must be taken to protect workers and patients from the toxicity of the disinfectant.

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